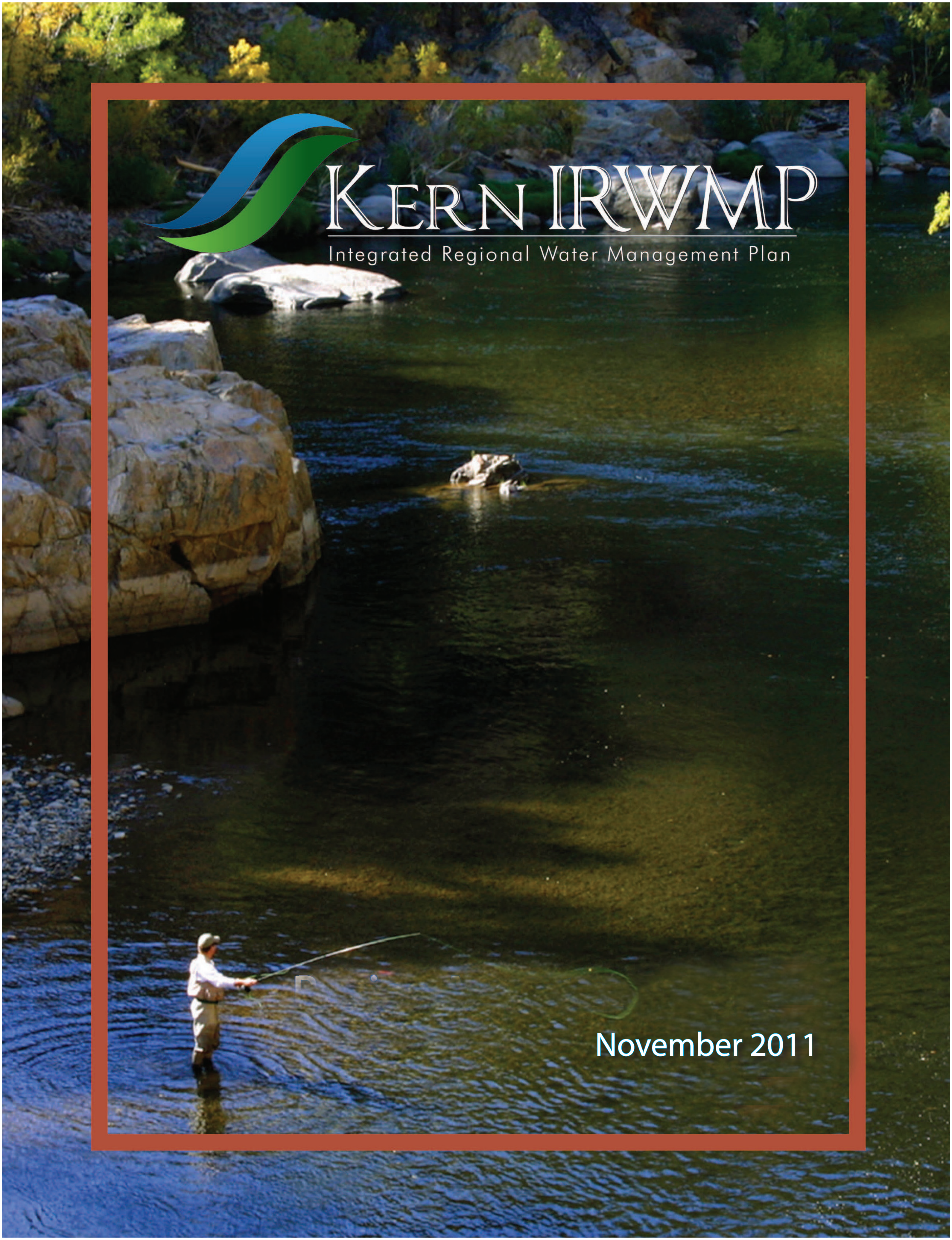


Kern IRWMP

Integrated Regional Water Management Plan

November 2011

Kennedy/Jenks Consultants

2775 North Ventura Road, Suite 100
Oxnard, California 93036
805-973-5700
FAX: 805-973-1440

Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan Final Update

November 2011

Prepared for

Kern County Water Agency
P.O. Box 58
Bakersfield, CA 93302

K/J Project No. 0889044

Table of Contents

List of Tables

List of Figures

List of Appendices

Section 1: Introduction

1.1 Introduction to the Region

The Tulare Lake Basin hydrologic region consists of approximately 17,000 square miles, and includes all of Tulare and Kings Counties, and most of Fresno and Kern Counties (see Figure 1-1). Significant geographic features include the southern half of the San Joaquin Valley, the Temblor Range to the west; the Tehachapi Mountains, Transverse Ranges, and San Emigdio Range to the south; and the southern Sierra Nevada to the east.

The Tulare Lake Basin Portion of Kern County Region (Kern Region), as defined for the purposes of this Integrated Regional Water Management Plan (IRWMP), consists of that portion of the Tulare Lake Basin hydrologic region that is within Kern County, with small additional areas that are included for hydrologic reasons (see Figure 1-2). The Kern Region boundary is consistent with the Tulare Lake Hydrologic Basin Planning Area boundary delineated by the Central Valley Regional Water Quality Control Board (CVRWQCB), and the California Water Plan (Bulletin 160) Hydrologic Region, and Integrated Regional Water Management Program "Funding Area" boundary. The Kern Region covers approximately 5,690 square miles of Kern County and a small portion of southern Kings County. The Kern Region is separated into nine (9) subregions, which acknowledge the variation in geography, agency boundaries, and water management strategies within the greater region (see Figure 1-4). These subregions are: (1) Greater Bakersfield, (2) Kern Fan, (3) Mountains/Foothills, (4) Kern River Valley, (5) North County, (6) South County, (7) West Side, (8) KCWA[1] and (9) the County of Kern.[1]

Water demands within the Kern Region are serviced by a variety of water purveyors, including the large wholesale agency, the Kern County Water Agency (KCWA) and its member districts (both agricultural, and municipal and industrial [M&I]), irrigation districts, investor-owned water companies, mutual water companies, municipalities and private well owners. Water supplies utilized in the region are the State Water Project (SWP) via the California Aqueduct, the Central Valley Project (CVP) via the Friant-Kern Canal, and local surface supplies from the Kern River and other local streams, as well as the largest common groundwater basin, the San Joaquin Valley groundwater basin, covering the majority of the managed resources in the Kern Region. Other groundwater basins in the Kern Region include the Kern River Valley groundwater basin to the east; Walker Basin Creek Valley groundwater basin to the southeast; Cummings Valley and Tehachapi Valley West on the eastern side of the Region, Brite Valley to the southwest; and Cuddy Canyon Valley, Cuddy Ranch Area, Cuddy Valley; and Mil Potrero Area basins to the south. All of these groundwater basin boundaries are within the watershed boundary of the Kern Region (see Figure 2-7 for basin locations).

Increasing development and environmental demands on water availability and quality for agricultural and M&I purposes, coupled with curtailments of imported SWP and CVP deliveries due to prolonged drought and regulatory restrictions, have intensified the competition for available water supplies in the Kern Region. Consensus was needed to develop a water

[1] KCWA and the County of Kern were chosen to be separate subregions because they each overlap the entire Kern Region, as well as represent the interests of their subregion, whether for water supply management or land use planning purposes.

resources management plan and strategy that addresses the needs of both M&I purveyors to reliably provide the quantity and quality of water necessary to serve the continually expanding urban needs and the needs of agricultural water users that require adequate and reliable supplies of reasonably-priced irrigation and groundwater recharge water. In addition, the Tulare Lake hydrologic region is a "closed basin." Water that enters the basin is not 'lost to' or 'returned to' a salt sink after use – with the exception of a few areas in the Westside Subregion. Thus opportunities for recycling and conjunctive use programs are magnified. For these reasons, the Kern Region is an appropriate area for integrated regional water management.

1.1.1 Relationship with Neighboring IRWMPs

The Kern Region is adjacent to nine other existing or developing IRWM planning regions: Poso Creek, Southern Sierra, Inyo-Mono, Antelope Valley, Fremont Basin, Upper Santa Clara River, the Watersheds Coalition of Ventura County (Ventura), Santa Barbara, and San Luis Obispo. Overlapping areas exist with three of these Regions: (1) San Luis Obispo, (2) Antelope Valley, and (3) Poso Creek.

Coordination with each of these planning regions, as well as a discussion of these identified overlaps and an explanation of their basis is documented below. See Figure 1-3 for a schematic of these planning regions.

1.1.1.1 Poso Creek IRWMP

Prior to the formation of the Kern IRWMP region, the only IRWMP region that existed within the Tulare Lake Basin portion of Kern County was the Poso Creek IRWMP, which is located in the northerly portion of the Kern County and southerly portion of Tulare County (see Figure 1-3). The Poso Creek region, which currently continues to exist as an IRWMP Region, includes Semitropic Water Storage District (SWSD), Cawelo Water District, Delano-Earlimart Irrigation District (DEID), Kern-Tulare Water District (KTWD), North Kern Water Storage District (NKWSD), Shafter-Wasco Irrigation District (SWID), and North West Kern Resource Conservation District as their Regional Management Group (RMG).

The Kern Region overlaps the Poso Creek region as a result of the respective boundaries of each IRWMP's participants. Some members of the Kern and Poso Creek IRWMPs have a long history of open communication and coordination of surface water and groundwater management on regional and local scale, which predates the IRWM program. Regional coordination and communication is evident in the numerous joint groundwater banking programs, routine exchanges and transfers of water supplies between urban and agricultural purveyors, participation in local and state programs and participation in a multitude of local water management committees and meetings. In addition to the regular communication between the Kern and Poso Creek regions, the two regions have executed a "Letter Agreement on Region Boundaries and Coordination of Water Management Strategies for the Poso Creek Integrated Regional Water Management Plan and the Kern Integrated Regional Water Management Plan" (Agreement). The Agreement defines the Poso Creek IRWMP's boundaries within the Kern IRWMP, and identifies the area of overlap. Additionally, the Agreement identifies the need for continued collaboration and five main water management issues of mutual interest, including restoration of water supplies, protection of water quality, preservation of local management, protection and/or restoration of habitat and improving the relationship between land use planning and water resources. During the 2011 Region Acceptance Process (RAP) the Kern and Poso Creek Regions were both fully approved by the California Department of Water Resources (DWR).

1.1.1.2 Southern Sierra IRWMP

The Southern Sierra IRWMP is a primarily watershed based region, covering a large portion of the southern Sierra Nevada Mountains. Originally, the Southern Sierra IRWMP and the Kern IRWMP boundaries overlapped in the lower portion of the Kern River watershed, located in northeastern Kern County. Beginning in late 2008, representatives of the two regions worked together to determine if such a large area of overlap was necessary and/or beneficial to the region and arrived at a mutual set of boundaries. At that time it was determined that the Kern IRWMP had already conducted extensive outreach in the area to communities (including Disadvantaged Communities [DACs] and tribal groups), water purveyors, environmental and conservation organizations, recreational groups, land use planning entities, and many more potential stakeholders, and that those stakeholders were actively participating in the Kern IRWMP process. After discussing the overlapping boundary with stakeholders in the region and their option to participate in either IRWMP, it was determined that the stakeholder preference in the area was to remain a part of the Kern IRWMP. Therefore, representatives of the Southern Sierra and Kern Regional Water Management Groups (RWMGs) decided it was in the best interest of stakeholders and both IRWMPs to adjust the boundaries to eliminate the overlapping region. After multiple discussions during 2008-2009, both groups agreed that the Kern-Tulare County line would serve as the northern and southern boundaries of the Kern and Southern Sierra IRWMPs, respectively, in order to eliminate the unnecessary overlap. Additionally, as both regions had already identified several watershed-wide issues and objectives (e.g., protection of the headwaters of the Kern River, removal of invasive aquatic species, etc.), it was mutually agreed that the two regions would work collaboratively on these objectives and any potential watershed projects that may arise from either IRWMP effort.

Representatives of both IRWMPs have executed a letter agreement detailing the boundary decision, cross-boundary resource management issues and objectives, and strategies for collaboration between the two groups. The letter is provided in Appendix A.

1.1.1.3 Inyo-Mono IRWMP

The Kern RWMG has been in communication with the Inyo-Mono IRWMP planning region since late 2008. The Inyo-Mono IRWMP extends from the southern portion of the North Lahontan hydrologic region into the northern portion of the South Lahontan hydrologic region. Currently the Kern Region shares a watershed boundary in the northeast portion of Kern County, along the crest of the Sierra Nevada. Open lines of communication exist between the Kern and Inyo-Mono IRWMP regions, and facilitation of any cross-boundary issues, objectives, and/or projects will be collaborative. A letter agreement regarding the mutual boundary between the two regions has been executed and is provided in Appendix A.

1.1.1.4 Antelope Valley IRWMP

A small portion of the Kern Region's southeast boundary departs from the Tulare Lake Basin watershed boundary to overlap with the northern portion of the Antelope Valley watershed-based boundary in order to be inclusive of the entire Tehachapi-Cummings County Water District (TCCWD) service area. TCCWD is a member unit of the KCWA, and provides imported water supplies and groundwater management services to its service area. Due to these infrastructure and contractual relationships, TCCWD chose not to participate in the Antelope Valley IRWMP planning effort, and is currently involved in the Kern IRWMP planning effort.

Both the Kern RWMG and Antelope Valley RWMG acknowledge the existence of an overlap of boundaries and have agreed to work collaboratively to address issues of common interests in this area as both regions advance their respective efforts. A letter of agreement in support of this mutual boundary was executed and is provided in Appendix A.

1.1.1.5 Fremont Basin IRWMP

The Fremont Basin IRWMP is a developing region in eastern Kern County. The Fremont Basin IRWMP covers the Fremont groundwater basin and abuts the Kern Region's eastern boundary. Although the Fremont Basin region is in the early planning phases, representatives of the Kern Region have been in communication with the group, and have provided assistance with boundary development and information regarding starting an IRWM program. The Fremont Basin IRWMP was approved during the 2011 RAP. The Kern RWMG will continue to foster an open line of communication and provide assistance as the Fremont Basin IRWMP develops.

1.1.1.6 Ventura IRWMP, Santa Barbara IRWMP, San Luis Obispo IRWMP

At the southernmost portion of the Kern Region boundary a small overlap occurs with the Upper Santa Clara River IRWMP; with much of the northern boundary of the Ventura IRWMP; and if extended to the County line, there is a very small shared boundary with the Santa Barbara IRWMP (see Figure 1-3). Coordination among these four planning regions occurred in early 2009 during the RAP to discuss mutual boundary lines and possible letters of agreement. It was determined by the parties that there was little likelihood for water resources to be managed across the shared boundaries; however, there would continue to be open lines of communication should any jurisdictional issues and/or projects arise. Everyone was supportive of the boundaries as they had been delineated.

As shown on Figure 1-3, a small portion of the Kern Region boundary, comprising the southwestern corner of the West Kern Water District (WKWD), extends into San Luis Obispo County in order to include the entire WKWD service area in the Kern Region. WKWD is a member unit of the KCWA, provides imported water supplies to its service area, and is currently participating in the Kern IRWMP planning effort. This area of overlap was discussed between the two IRWMP Regions, and it was determined that because no water resources within those areas of overlap need to be managed, the overlapped areas in question were not areas of significance that would cause any confusion or controversy, and it is acceptable to both planning regions.

1.1.1.7 Upper Santa Clara River IRWMP

At its southernmost portion the Kern Region shares a very small piece of boundary with the Upper Santa Clara River IRWMP. The consultant team for the Kern Region, which also prepared the Upper Santa Clara River IRWMP, has consulted with the RWMG for the Upper

Santa Clara River IRWMP regarding this small shared area, and has determined that it is not a significant issue needing further coordination between the two planning regions.

1.2 Purpose of the Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan

The purpose of the Kern IRWMP is to develop a cooperative regional framework, implementation plan, and context for managing water resources in the Kern Region. As stated above, this IRWMP aims to address as much of the Kern County portion of the Tulare Lake Basin a possible, and includes a wide Stakeholder base. A collaborative approach for the Kern IRWMP will help strengthen regional influence, reduce conflict, increase benefits across the region and may reduce costs for individual agencies, many of which are economically disproportionate compared to other more urbanized funding regions in the State.

A goal of this IRWMP is also linkage or nexus to IRWMPs prepared by other regions, if appropriate. For example, it may be that issues of importance to the entire Tulare Lake hydrologic region, or to the San Joaquin Valley as a whole, could be addressed by linking multiple IRWMPs to solve common problems. Linkage of these IRWMPs will provide mutual benefits and potential joint funding partnership opportunities for entities within the Tulare Lake hydrologic region.

Currently, stakeholders from the Tulare Lake Hydrologic Region, including the Kern, Upper Kings Basin Water Forum, Tule, Kaweah River Basin, Poso Creek and Southern Sierra, have been meeting monthly to discuss IRWM program and planning issues of mutual concern. This forum has been used to develop mutual boundaries, discuss grant applications, collaborate on regional planning topics (such as addressing climate change), and create a watershed coordinator position for the Tulare Lake Basin. As the participating IRWMPs are in various stages of development, it is anticipated that the relationship of the IRWMPs and role of the group, will continue to evolve over time. Additionally, it is anticipated that the various IRWMPs, including the Kern IRWMP and the regional planning group, will serve as a blueprint for future IRWMPs within the Tulare Lake Hydrologic Region and will continue to facilitate regional collaboration.

This IRWMP effort is funded entirely by local participating agencies. A number of individuals have contributed to the development of this IRWMP, including representatives of local agencies, city and county staff, and consultants. This IRWMP is a comprehensive plan that primarily addresses Region-wide water management and related issues. This IRWMP complies with the State Guidelines (Proposition SBXX1) for an IRWMP and provides for integration of project and program implementation strategies that best address the needs and objectives of the Region.

1.3 Stakeholder Involvement

This IRWMP benefits from active participation by a wide range of Stakeholders. Members of the RWMG Executive Committee and other Stakeholders have participated in monthly Stakeholder meetings, reviewed draft document materials, and provided extensive collaborative input to shape the formation of this IRWMP. By participating in Stakeholder meetings to develop this Plan, participants have created opportunities for establishing and developing mutually beneficial partnerships. Participating Stakeholders are listed in Section 1.3.3.

1.3.1 Regional Water Management Group

The Kern Region RWMG was established by a Participation Agreement, a document similar in nature to a Memorandum of Understanding (MOU) that prescribes the preliminary roles and responsibilities for the RWMG, including complying with the IRWMP sections of the Water Code. The members of the RWMG that signed the Participation Agreement in October 2008, referred to as “Participants”, are listed in Table 1-1. The Participation Agreement is discussed in Section 12.5 provided in Appendix B.

Table 1-1 also identifies how each agency is responsible for statutory authority over water supply or water management within the Kern Region by noting whether the agency has authority over any of the following: water supply, water quality management, wastewater treatment, flood management/control, or stormwater management.

TABLE 1-1
ROLES AND RESPONSIBILITIES OF THE REGIONAL WATER MANAGEMENT GROUP PARTICIPANTS

Agency	Subregion	Roles And Responsibility	Statutory Authority Over Water Supply Or Water Management
City of Arvin	South County	Municipal government that provides open space and land use planning as well as stormwater capture and treatment, and creek restoration within City borders. Wastewater treatment is also provided to residents.	Water supply, water quality management, flood management/control, stormwater management
Arvin Community Services District	South County	Provides groundwater for drinking water in the Arvin area.	Water supply
Arvin-Edison Water Storage District	South County	Delivers CVP and other water to the services are and for the operation of conjunctive use banking program; recharge, store, and recover water to improve water supply and stabilize groundwater levels for local agricultural lands; provide water management to others, typically for drought protection.	Water supply
City of Bakersfield Water Resources	Greater Bakersfield	Municipal government that provides groundwater, surface water from Kern River, and purchased water from KCWA Improvement District 4 (ID4) to a portion of the Bakersfield area. Also operates recharge ponds and canals.	Water supply, water quality management, flood management/control, stormwater management
Bear Valley Community Services District	Mountains/ Foothills	Provides police protection, groundwater, road maintenance, wastewater treatment, and solid waste disposal services to the Bear Valley Springs community.	Water supply, wastewater treatment, water quality management

Agency	Subregion	Roles And Responsibility	Statutory Authority Over Water Supply Or Water Management
Belridge Water Storage District	West Side	Provides surface water from the State Water Project and imported groundwater from local exchange programs to agricultural lands and petroleum production facilities within its service area.	Water supply
Berrenda Mesa Water District	West Side	Provides groundwater, surface water from Kern River, and purchased water from KCWA to agricultural lands within its service area.	Water supply
Buena Vista Water Storage District	Kern Fan	Provides groundwater, surface water from Kern River, and purchased water from KCWA to agricultural lands within its service area.	Water supply
Buttonwillow County Water District	Kern Fan	Provides groundwater to the community of Buttonwillow.	Water supply
California Water Service, Bakersfield	Greater Bakersfield	Provides groundwater, surface water from Kern River, and purchased water from KCWA ID4 to a portion of the Bakersfield area.	Water supply
California Water Service, Kern River Valley District	Kern River Valley	Provides groundwater and surface water from Kern River to its service area.	Water supply
Casa Loma Water Company	Greater Bakersfield	Provides drinking water supply to its service area.	Water supply
City of Delano	North County	Municipal government that provides open space and land use planning as well as stormwater capture and treatment, and creek restoration within City borders. Also provides drinking water and wastewater treatment services to its residents.	Water supply, wastewater treatment, water quality management, flood management/control, stormwater management
Desert Mountain Resource Conservation and Development Council	Kern River Valley	Develop partnerships to enhance economic growth while protecting the natural resources in the Kern Region.	Water quality management, flood management/control
Dudley Ridge Water District	West Side	Provides surface water from State Water Project and imported groundwater from local banking and exchange programs to agricultural lands within its service area.	Water supply
East Niles Community Services District	Greater Bakersfield	Provides groundwater and purchased water from KCWA ID4 to the East Bakersfield area.	Water supply

Agency	Subregion	Roles And Responsibility	Statutory Authority Over Water Supply Or Water Management
Frazier Park Public Utility District	Mountains/ Foothills	Provides local spring water and groundwater to the Frazier Park community.	Water supply
Golden Hills Community Services District	Mountains/ Foothills	Provides groundwater via adjudicated water rights and recharge projects to the Golden Hills community for drinking water.	Water supply
Greenfield County Water District	Greater Bakersfield	Provides groundwater to its service area for drinking water.	Water supply
Henry Miller Water District	Kern Fan	Provides groundwater, surface water from Kern River, and purchased water from KCWA to agricultural lands within its service area.	Water supply
Kern County Water Agency (KCWA)	Kern County Water Agency	Wholesale water supplier.	Water supply
Kern County Resource Management Agency	County of Kern	Municipal government that provides environmental and land use planning as well as permitting and planning for future supply and new transportation projects.	Flood management, stormwater management
KCWA Improvement District No. 4 (ID4)	Greater Bakersfield	Provides a supplemental water supply to the urban Bakersfield area through (1) direct recharge and (2) treatment and delivery of water to its member agencies.	Water supply, water quality management
Kern Delta Water District	South County	Provides groundwater, surface water from Kern River, and purchased water from KCWA to its service area.	Water supply
Kern Water Bank Authority	Kern Fan	Operation of the Kern Water Bank; recharge, store, and recover water to improve water supply for its participants during periods of water shortage.	Water supply
Lamont Public Utility District	South County	Special purpose district that provides water, sewer, and street lighting services to the town of Lamont.	Water supply, wastewater treatment, water quality management
Lamont Stormwater Utility District	South County	Provides and plans for stormwater control and diversion projects within the Caliente Canyon watershed.	Stormwater management
Lebec County Water District	Mountains/ Foothills	Provides groundwater to the community of Lebec.	Water supply
Long Canyon Water Company	Mountains/ Foothills	Provides groundwater to its service area.	Water supply
Lost Hills Utility District	West Side	Provides groundwater for municipal and commercial services and wastewater collection and treatment services to the community of Lost Hills and the I-5/Hwy 46 interchange.	Water supply, wastewater treatment, water quality management

Agency	Subregion	Roles And Responsibility	Statutory Authority Over Water Supply Or Water Management
Lost Hills Water District	West Side	Provides groundwater and purchased water from KCWA to agricultural lands within its service area.	Water supply
City of Maricopa	Kern Fan	Municipal government that provides open space and land use planning as well as stormwater capture and treatment, and creek restoration within City borders.	Water supply, water quality management, flood management/control, stormwater management
City of McFarland	North County	Municipal government that provides open space and land use planning as well as stormwater capture and treatment, and creek restoration within City borders. Also provides drinking water and wastewater services to its residents.	Water supply, water quality management, flood management/control, stormwater management
Mettler County Water District	South County	Provides groundwater to the rural community of Mettler.	Water supply
Mountain Mesa Water Company	Kern River Valley	Provides groundwater to its service area.	Water supply
North of the River Municipal Water District	Greater Bakersfield	Provides groundwater, surface water from Kern River and purchased water from KCWA ID4 to its service area. Wholesales water to Oildale Mutual Water Company.	Water supply
North West Kern Resource Conservation District	North County	Manages resource conservation projects on public and private lands.	Water quality, flood management/control
Oildale Mutual Water Company	Greater Bakersfield	Provides groundwater and purchased water from North of the River Municipal Water District to its service area.	Water supply
Olcese Water District	Kern Fan	Provides groundwater and surface water from Kern River to agricultural lands within its service area.	Water supply
Rainbird Valley Mutual Utility Company	Kern River Valley	Provides groundwater to its service area for drinking water.	Water supply
Rosedale-Rio Bravo Water Storage District	Kern Fan	Operation of conjunctive use banking program; recharge, store, and recover water to improve the water supply for its participants during periods of water shortage. Provides surface water from KCWA and Kern River, and water from City of Bakersfield.	Water supply
City of Shafter	North County	Municipal government that provides open space and land use planning as well as stormwater capture and treatment, and creek restoration within City borders. Also provides drinking water and sewer treatment for its residents.	Water supply, water quality management, flood management/control, stormwater management

Agency	Subregion	Roles And Responsibility	Statutory Authority Over Water Supply Or Water Management
Stallion Springs Community Services District	Mountains/ Foothills	Provides potable groundwater, and wastewater services to its service area.	Water supply, wastewater treatment, water quality management
City of Taft	Kern Fan	Municipal government that provides open space and land use planning as well as stormwater capture and treatment, and creek restoration within City borders.	Water supply, water quality management, flood management/control, stormwater management
City of Tehachapi	Mountains/ Foothills	Municipal government that provides open space and land use planning as well as stormwater capture and treatment, and creek restoration within City borders.	Water supply, water quality management, flood management/control, stormwater management
Tehachapi-Cummings County Water District	Mountains/ Foothills	Provides purchased water from KCWA and flood protection services to its service area.	Water supply, flood management/control
Tehachapi Resource Conservation District	Mountains/ Foothills	Manages resource conservation projects on public and private lands.	Water quality, flood management/control
Tejon-Castac Water District	Mountains/ Foothills	Provides groundwater, surface water from local streams, and purchased water from KCWA to its service area.	Water supply
Valley Estates Property Owners Association	Kern River Valley	Provides road system and groundwater to Valley Estates.	Water supply
Vaughn Water Company	Kern Fan	Provides groundwater to the Rosedale area of Bakersfield.	Water supply
City of Wasco	North County	Municipal government that provides groundwater, open space and land use planning, stormwater capture and treatment, and creek restoration within City borders.	Water supply, water quality management, flood management/control, stormwater management
West Kern Water District	Kern Fan	Provides groundwater, surface water from Kern River, and purchased water from KCWA to its service area.	Water supply
Wheeler Ridge-Maricopa Water Storage District	South County	Provides purchased surface water from KCWA to agricultural lands within its service area.	Water supply

As part of the Participation Agreement, RWMG members have agreed to:

- Provide facilities to hold stakeholder meetings
- Appoint one representative and one alternate to participate in the Executive Committee
- Share data necessary for development of the IRWMP
- Attend stakeholder and subregion meetings
- Review and comment upon draft and final versions of the IRWMP

As is evident from the extensive list of RWMG participants in Table 1-1, the RWMG represents the majority of water authorities and stakeholders in the region.

1.3.2 Executive Committee

To develop an IRWMP that identifies and addresses those issues specific to the Kern Region, while recognizing and honoring local conditions and preferences over a large geographic area, the Kern IRWMP was organized to solicit input from nine (9) “subregions”. This “subregion” stakeholder structure acknowledges the variation in geographic and water management strategies in a region of over 8,000 square miles. The Executive Committee is a subgroup of the RWMG Participants consisting of one representative and one alternate from each of the nine subregions that comprise the Kern Region. Aligning the Executive Committee with the subregions ensures that their roles and responsibilities will support this regional planning effort.

Responsibilities of the Executive Committee as outlined in the Participation Agreement include:

- Collaborate with the RWMG, Stakeholder Group, and other entities
- Call and conduct Participant and Executive meetings as necessary
- Recommend to the Stakeholder Group, hire, and manage consultants as needed
- Approve or disapprove expenditures of contingency funds
- Approve or disapprove agendas and materials for meetings related to plan development
- Coordinate with KCWA management (or assignees) on matters related to development of the IRWMP
- Determine the appropriate timeframe for the completion and submission of data, executed agreements, and other relevant information and actions
- The Executive Committee will pick two (2) of its members as co-chairs, one (1) from the agricultural sector and one (1) from the urban sector
- The co-chairs will conduct and direct meetings of the RWMG
- The co-chairs, acting as signatories for the RWMG, may execute third-party agreements for integration with other RWMGs with the approval of at least 51 percent of the Participants
- Coordinate with a legal entity willing to act on behalf of the Stakeholder Group to execute and manage contracts and oversee financial transactions

As part of this approach, the Executive Committee was the governing body and invited Stakeholder involvement (i.e., beyond the Participation Agreement signatories), through frequently scheduled Executive Committee meetings.

1.3.3 Stakeholders

The Kern IRWMP was prepared through a collaborative process of many agencies and organizations with an interest in improving water supply, operational efficiency, water quality, flood management, and promoting land use planning and resource stewardship in the Kern

Region. A broad stakeholder outreach process was crucial to ensure that this IRWMP identified local issues, reflected local needs, promoted the formation of partnerships, and encouraged coordination with State and Federal agencies.

Table 1-2 provides a list of all of the Stakeholders that were involved in the development of the Kern IRWMP, and the subregion they represent. The broad array of stakeholders includes the agencies that comprise the RWMG, as well as an extensive mix of town councils, regulatory, environmental, agricultural, tribal and land use planning entities that represent all areas of the Kern Region. They are grouped into several categories per California Water Code (CWC) §10541(g) and their roles in the planning process are briefly described below. A brief discussion of coordination efforts with local planning, State, and Federal agencies is also provided where appropriate.

TABLE 1-2
STAKEHOLDER LIST

Organization	Subregion
Wholesale and Retail Water Purveyors/Wastewater Agencies/Flood Management Agencies/Special Districts	
Arvin Community Services District	South County
Arvin-Edison Water Storage District	South County
Bear Valley Community Services District	Mountains/Foothills
Belridge Water Storage District	West Side
Berrenda Mesa Water District	West Side
Buena Vista Water Storage District	Kern Fan
Buttonwillow County Water District	Kern Fan
California Water Service	Greater Bakersfield
California Water Service, Kern River Valley District	Kern River Valley
Casa Loma Water Company	Greater Bakersfield
Desert Mountain Resource Conservation and Development Council	Kern River Valley
Dudley Ridge Water District	West Side
East Niles Community Services District	Greater Bakersfield
Frazier Park Public Utility District	Mountains/Foothills
Golden Hills Community Services District	Mountains/Foothills
Greenfield County Water District	Greater Bakersfield
Henry Miller Water District	Kern Fan
KCWA Improvement District No. 4	Greater Bakersfield
Kern County Water Agency	Kern County
Kern Delta Water District	South County
Kern Water Bank Authority	Kern Fan
Lamont Public Utility District	South County
Lamont Stormwater Utility District	South County
Lebec County Water District	Mountains/Foothills
Long Canyon Water Company	Kern River Valley
Lost Hills Utility District	West Side

Organization	Subregion
Lost Hills Water District	West Side
Mettler County Water District	South County
Mountain Mesa Water Company	Kern River Valley
North Kern Water Storage District	North County
North of the River Municipal Water District	Greater Bakersfield
North West Kern Resource Conservation District	North County
Oildale Mutual Water Company	Greater Bakersfield
Olcese Water District	Kern Fan
Rainbird Valley Mutual Utility Company	Kern River Valley
Rosedale-Rio Bravo Water Storage District	Kern Fan
Semitropic Water Storage District	North County
Shafter-Wasco Irrigation District	North County
Stallion Springs Community Services District	Mountains/Foothills
Tehachapi-Cummings County Water District	Mountains/Foothills
Tejon-Castac Water District	Mountains/Foothills
Valley Estates Property Owners Association	Kern River Valley
Vaughn Water Company	Kern Fan
West Kern Water District	Kern Fan
West Side Mutual Water Company	West Side
Wheeler Ridge-Maricopa Water Storage District	South County
Municipal and County Governments and Special Districts	
County of Kern	Kern County
County of Kern Development Services Agency	Kern County
Kern County Water Agency	Kern County Water Agency
Kern Council Of Governments	Region-wide
Kern River Valley Chamber of Commerce	Kern River Valley
City of Arvin	South County
City of Arvin Planning Department	South County
City of Bakersfield Planning Department	Greater Bakersfield
City of Bakersfield Water Resources	Greater Bakersfield
City of Delano	North County
City of Delano Planning Department	North County
City of Maricopa	Kern Fan
City of McFarland	North County
City of Shafter	North County
City of Taft	Kern Fan
City of Tehachapi	Mountains/Foothills
City of Tehachapi Planning Commission	Mountains/Foothills
City of Wasco	North County
State and Federal Prisons	Region-Wide
Regulatory and Resource Agencies – State and Federal	
California Department of Public Health/Drinking Water	Region-wide
California Department of Water Resources	Region-wide

Organization	Subregion
California Department of Fish and Game	Region-wide
Central Valley Regional Water Quality Control Board	Region-wide
United States Bureau of Reclamation	Region-wide
United States Forest Service	Region-wide
United States Bureau of Land Management	Region-wide
United States Fish and Wildlife Service	Region-wide
United States Army Corps of Engineers	Region-wide
United States Department of Agriculture	Region-wide
Recreational and Environmental Entities	
Tulare Basin Wildlife Partners	Region-wide
Kern County Parks and Recreation	Region-wide
Tulare Lake Basin Working Group	Region-wide
Kern River Valley Revitalization	Mountains/Foothills
Kern National Wildlife Refuge (USFW)	North County
Sequoia Riverlands Trust	Mountains/Foothills
Kern River Preserve	Mountains/Foothills
Kern Audubon Society	Region-wide
Sierra Club – Kern-Kaweah Chapter	Region-wide
Wind Wolves Preserve	West Side
Tulare Basin Wetlands Association	Region-wide
Great Valley Center	Region-wide
Kern Valley Resource Conservation District	Mountains/Foothills
Tehachapi Resource Conservation District	Mountains/Foothills
Community Representatives/Social Justice Organizations/Public and Private Interests	
Tubatulabals of Kern Valley (Tribe)	Kern River Valley
Self-Help Enterprises	Region-wide
Community Water Center	Region-wide
Tulare Basin Watershed Coordinator	Region-wide
AERA Energy	N/A
Chevron	N/A
Oxy (Occidental Petroleum)	N/A
California State University, Bakersfield	Region-wide
California State University, Fresno	Region-wide
Agricultural Interests	
Kern County Farm Bureau	Region-wide
California Farm Water Coalition	Region-wide

1.3.3.1 Wholesale and Retail Water Purveyors/Wastewater Agencies/Flood Management Agencies/Special Districts

The wholesale and retail water purveyors, wastewater agencies, flood management agencies, and special districts of the Kern Region are involved in the development and implementation of the objectives and projects for this IRWMP. Their participation was focused particularly on the water supply and flood management issues pertaining to the region. These agencies include, but are not limited to SWP districts (KCWA and its 13 member units), Kern River districts (i.e., NKWSD, Kern Delta Water District [KDWD], etc), CVP districts (i.e., Arvin-Edison Water Storage District (AEWSD), SWID, etc.), groundwater supplier districts (smaller water suppliers like the Vaughn Water Company (VWC) and Casa Loma Water Company [CLWC], and community services districts such as Bear Valley Community Services District [BVCSD] and Golden Hills Community Services District [GHCSD]).

1.3.3.2 Municipal and County Governments and Special Districts

Municipal and county governments and special districts include local jurisdictions and land use planning agencies that were involved in the identification of issues, formation of objectives, and development of projects of this IRWMP. Their participation provided a link between local planning agencies and this IRWMP by offering discussion in meetings, providing accurate, consistent land use planning information, and incorporating local planning documents and goals into the project objectives. The cities of Bakersfield, Delano and Wasco, the County of Kern, Kern County Resource Management Agency (KCRMA), and Kern Council of Governments are examples of land use agencies and entities participating in the meetings.

1.3.3.3 Regulatory and Resource Agencies - State and Federal

Several State and Federal regulatory and resource agencies were involved in the identification of issues, formation of objectives, and development of projects for this IRWMP. Coordination with these regulatory agencies is essential to the development and implementation of all recommended objectives and projects due to the need for regulatory and environmental approval prior to implementation. The fact that resource and environmental stewardship is a cornerstone of this IRWMP also makes close collaboration with these resource agencies imperative to effectively promoting and addressing local environmental needs. These agencies have had the opportunity to address items of concern relating to these topics at the stakeholder meetings. Their roles and responsibilities were to ensure that this IRWMP considers resource management, resource enhancement, and regulatory compliance standards. The agencies include: California Department of Public Health/Drinking Water, DWR, California Department of Fish and Game (CDFG), the United States (US) Bureau of Reclamation, US Fish and Wildlife Service (USFWS), and the US Forest Service (USFS).

1.3.3.4 Recreational and Environmental Entities

The role and responsibility of recreational and open space entities was to ensure that issues and goals related to conservation, protection, and restoration of the natural resources and habitat within the Kern Region were incorporated in this IRWMP and into projects when appropriate. They also sought opportunities for integrating restoration and enhancement into projects addressing water supply, water quality and flood management needs. Some of those involved are the Tulare Basin Wildlife Partners, the Kern National Wildlife Refuge (KNWR) of the USFWS, Sequoia Riverlands Trust, Sierra Club, USFS, and the Kern County Department of Parks and Recreation.

1.3.3.5 Community Representatives/Public and Private Interests

Other stakeholders involved in the development of this IRWMP include other community representatives such as the Kern River Valley Chamber of Commerce as well as public and private interests including non-profit organizations. The Tubatulabal Tribe of Kern Valley, Self-Help Enterprises, and California State University Fresno are participating stakeholders and have provided input into the development of this IRWMP.

1.3.3.6 Public Outreach

The Kern RWMG contracted with a professional facilitation consultant to identify, contact, and coordinate with potential stakeholders and the general public. By working through the professional facilitator, the region was able to get the input from a broad range of stakeholders, including representatives of, or entities that work on behalf of, DACs (such as Self-Help Enterprises).

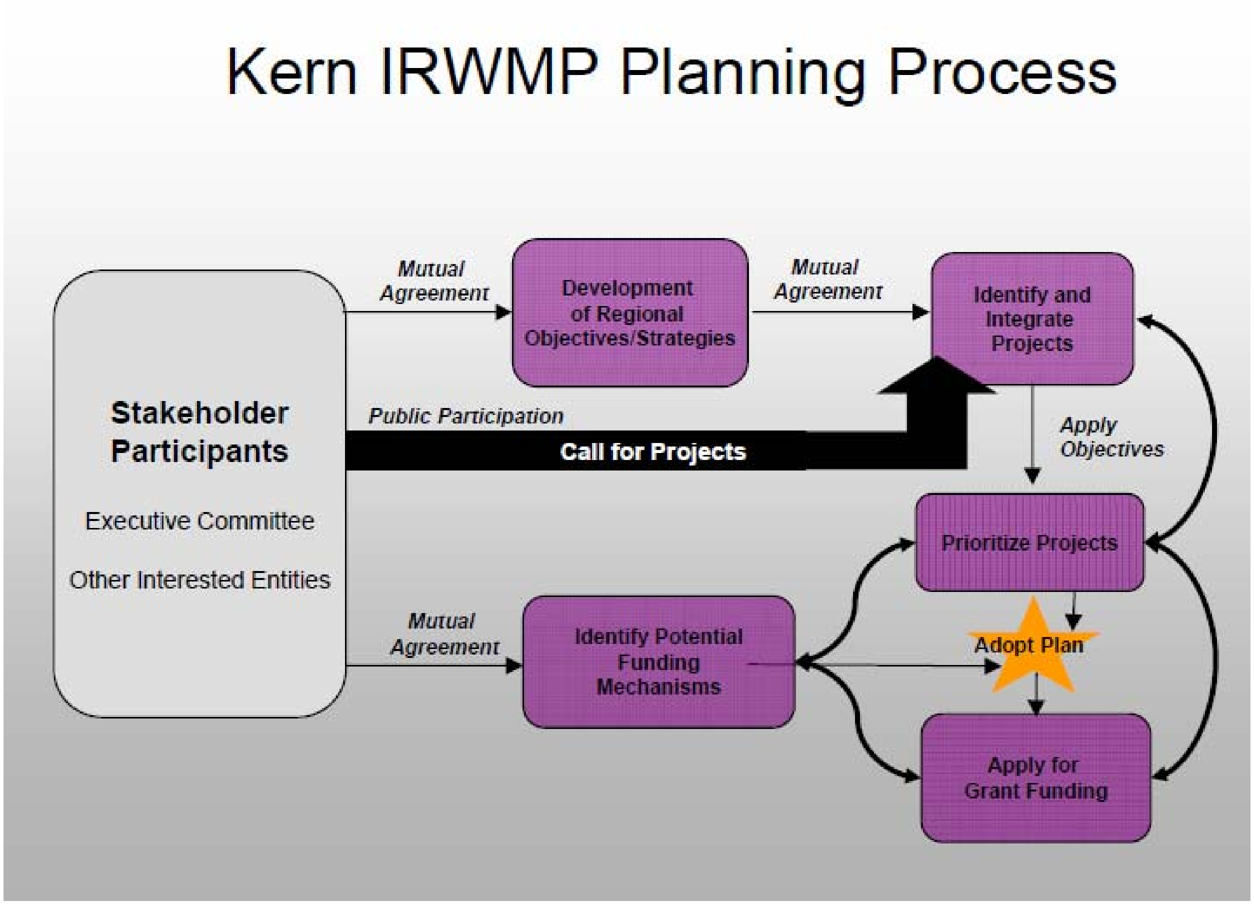
1.4 Participation and Outreach

This IRWMP was developed to identify and address those issues specific to the Kern Region, while recognizing and honoring local conditions and preferences over a large geographic area. In order to accomplish this, an effective process to involve stakeholders and incorporate their input was necessary. The development of the IRWMP aimed to create as many opportunities for the public to be both part of and aware of regional water management and the IRWMP efforts. A schematic of the Kern IRWMP planning process is shown in Figure 1-5. The Kern IRWMP planning process included the following key steps:

1. Identify Issues and Needs in the Kern Region: Illustrate the issues and needs of the region related to water resources in a manner that reflects the majority of Stakeholder concerns. These issues and needs are what drive the stakeholders into taking action.
2. Develop Regional Objectives and Strategies: Collectively establish the quantifiable objectives that the regional entities will work together to accomplish and identify the water management strategies available to meet those objectives.
3. Identify and Integrate Projects: Identify and integrate projects within the water management strategy areas that satisfy the IRWMP objectives of water supply, operational efficiency, water quality, flood management, and promoting land use planning and resource stewardship. This step also includes a “Call for Projects” in which stakeholders submit projects and project concepts for inclusion in the IRWMP.
4. Evaluation and Prioritization: This step in the planning process includes developing a prioritization process for evaluating and ranking Stakeholder-identified projects in order to identify which projects the group will take “action” on first. This prioritization process was developed concomitant with the identification of projects.
5. Identify Potential Funding Mechanisms: There are many opportunities for grant funding available to the stakeholders in the Kern Region that are well suited to stakeholder projects. These opportunities are being identified concurrently with development of the IRWMP.

6. Apply for Grant Funding: As funding becomes available the prioritization process will be used to select projects appropriate for each opportunity.

FIGURE 1-5



The planning process for the Kern IRWMP is designed to provide a forum for assured and effective dialogue among the various stakeholders. Each stakeholder meeting contains a public comment period whereby the public is afforded the time to comment on record to the RWMG about the IRWMP process. Public hearing announcements and monthly meeting notices were noticed via the project website (www.kernirwmp.com) and through electronic and written communications. These avenues for public access to the RWMG and Kern IRWMP are discussed in greater detail below.

- **Stakeholder Meetings:** The Kern IRWMP process centered on monthly stakeholder meetings open to the public where attendees were invited to participate in several ways. Attendees were asked to participate in facilitated discussions of major items of interest, to develop objectives and identify strategies, and to provide input on the agenda for upcoming stakeholder meetings. These meetings were announced to a broad distribution list via e-mail and all materials developed for use in stakeholder meetings were made available on the project website (see Appendix C for meeting materials). In addition, special evening meetings were publicly advertised and held to encourage additional participation by members of the general community. Meeting minutes were developed for each meeting and were provided on the project website prior to the next meeting for public review. In this manner all public comments are kept on record, as part of the IRWMP administrative record.

- **Subregion Meetings:** Subregions were encouraged to meet independently, to discuss content provided at the Stakeholder meetings, and to brainstorm project concepts and ideas. The subregions ensure that the IRWMP reflects the geographic and water management differences that exist within the larger Kern Region.

- **Review of Plan Sections:** The Kern IRWMP is a comprehensive, living body of work related to water resources within the Kern Region. The IRWMP was developed incrementally by Section and was provided to all interested stakeholders periodically for review. During development, there were multiple opportunities for stakeholders to provide input. Sections were finalized only after the stakeholders reached a majority consensus on the material. Early on in the process, stakeholders submitted many plans, reports, and studies to the region's IRWMP resource library to ensure that the IRWMP accurately reflects each stakeholder's individual perspectives, while fostering recognition of opportunities for partnering to resolve common issues.

- **Project Website:** A project website was developed (www.kernirwmp.com) to facilitate the distribution of project information to stakeholders and interested members of the public. The website contains background information about IRWMP development, a schedule of meetings and meeting information, and contact information. The website also includes a database tool through which stakeholders can submit or review projects or project concepts. Since the project website was created in January 2009 it has received approximately 3,000 visits.

- **Electronic and Written and Communications:** Electronic mail was the main tool used to maintain a high level of stakeholder communication and engagement. All meetings and public hearing announcements were sent as far in advance as possible to stakeholders. Various stakeholder groups also forward these messages to their constituencies, thereby reaching additional stakeholders. In addition, written communications in the form of letters to cities and press releases to the media were utilized to expand awareness of, and participation in, this IRWMP development.

Newspaper coverage was a public access point identified for further outreach and development, whether it be through increased attendance at stakeholder meetings by the local press or regularly scheduled postings or announcements.

1.4.1 Disadvantaged Community Outreach

Initially, the process used for including DACs was not disaggregated from the outreach to the rest of the region's stakeholders, which was invitation of representatives from the region's local water agencies, special districts and municipalities to participate in the IRWMP development process. These were the "inaugural" pre-IRWMP stakeholder meetings, prior to the formation of a RWMG, whereby proactive stakeholders (including agencies with an interest in water and other resource management) in the Kern Region began meeting in March 2008 to improve communication and explore opportunities to leverage their collective staff and financial resources. After these initial meetings, an extensive list of as many potentially interested parties as possible was developed and subjected to multiple revisions and additions. This list was then utilized to invite potential stakeholders to the first "official" stakeholder meeting.

The first "official" stakeholder meeting was held in October 2008. The goal of this first meeting was to provide an orientation to the IRWMP process, to introduce goals and objectives for the IRWMP, and to identify opportunities for public involvement. Stakeholders were encouraged to attend stakeholder meetings, to participate in Plan development efforts, and to disseminate information to their constituents and communities. Identification and participation by DACs was discussed, as outreach is a critical element to the IRWMP process. As a result, the following additional stakeholders, including DACs, were suggested for invitation to the Kern IRWMP process:

- Small water and system operators
- Kern Council of Governments
- Kern Water Bank Authority
- Oil companies
- Land use planners
- Green energy firms/environmental organizations
- City and County parks departments
- Tulare Basin Wildlife Partners
- DAC communities of Frazier Park, Mettler, Lost Hills, and those within the proposed Poso Creek IRWMP boundary but that are not participants in that planning effort.

Through this invitation and outreach effort, the Kern RWMG was officially established by Participation Agreement, with a diversified stakeholder group including a range of close to 100 participants that includes the agencies that comprise the RWMG, as well as state and federal agencies, recreational and environmental entities, community representatives and social justice organizations, DACs including those mentioned above, private interests and educational institutions, and agricultural interests.

Community outreach was targeted not just for DACs, but also underserved communities, traditionally isolated communities or rural communities, severely disadvantaged communities, and Native American tribes. Most of the outreach to these communities to date has all been through meeting invitations via mail, electronic mail and telephone. The most effective process or structure to promote access to and collaboration with people or agencies with diverse views within the Kern Region has so far been effective communication by direct mailings, emails and the IRWMP website, plus simple word of mouth. Telephone and word of mouth communication was especially critical in isolated and rural communities, as well as severely disadvantaged communities, which often lack the staff and/or financial resources, and even a formal organizational structure. Planned outreach activities in the future also include distribution of materials in Spanish. Many of the DACs that have been contacted have had continuous representation at the stakeholder meetings. The on-going outreach strategy will be to encourage the involvement of communities that had previously chosen, for whatever reason, not to participate or did not have the resources to participate in an effort like the IRWMP planning process. It will be part of the outreach strategy to effectually relate the benefits of the IRWMP to DACs, which include a reliable water supply, meeting water quality standards and protect existing supplies from contamination, managing flood waters and providing adequate flood control, and protecting and preserving open space, habitat, recreational uses, and agricultural lands within the entire region.

Because many severely disadvantaged communities do not have the staff to be able to regularly participate directly in meetings, the IRWMP relies on in-kind support from local technical assistance and other non-profit organizations, like Self Help Enterprises and Community Water Center to help support integration of these communities into the process. Additionally, representatives from the Kern region are participating actively in the Tulare Lake Basin Disadvantaged Community Water Study to help develop regional solutions to disadvantaged community water and wastewater challenges and will be incorporating the inventories on community needs and projects, as well as other recommendations, into the Kern IRWMP.

1.4.2 Environmental Justice Outreach

The United States Environmental Protection Agency (EPA) defines “environmental justice” as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Simply stated, this means that that no group of people should bear a disproportionate share of negative environmental consequences resulting from industrial, governmental, and commercial operations or policies.

To begin identifying potential environmental justice issues facing the Kern Region, EPA’s EnviroMapper database and maps were researched to locate any hazardous waste sites within the Kern Region. EPA’s EnviroMapper showed multiple hazardous waste sites, water discharge sites, and air emission release sites within the Region, the majority of which appeared to be concentrated in and around the cities of Bakersfield, Oildale, Rosedale, Shafter, McFarland, Arvin and Delano. Oil fields and refineries are a part of the historic industrial development within Kern County, and many large facilities are located near or in these cities. Additionally, chemical production and/or processing facilities have historically operated at various locations in the Kern Region. Impacts from these and other facilities have created environmental justice concerns, which center on water quality. In particularly, localized elevated concentrations of arsenic and nitrates have been detected during routine regulatory water quality monitoring performed by water suppliers within the Kern Region. While there is no complete listing of affected communities, communities throughout the Kern Region have been faced with drinking and agricultural water well closures due to contamination. Drinking water well closures have resulted in increase costs to consumers, localized restrictions on growth, and water supply system limitations. Therefore, addressing soil and groundwater contaminants that are either currently impacting or have the potential to impact DACs in the future need to be addressed.

In addition to remediating current water quality concerns, great emphasis has been placed on preventing future impacts. As the Kern Region continues to grow, care will need to be taken to prevent creating environmental justice issues that unfairly affect certain communities. The Kern IRWMP objectives of ensuring water supply, water quality, flood protection, wise land use management, and environmental protection must be consistently applied to future projects and development to benefit all residents equally. Land use planning must designate enough open space to meet the recreational needs of all communities and include habitat preservation and restoration throughout the Region.

1.4.3 Media Coverage of Plan Preparation

During development of the Kern IRWMP, public notices were submitted to a number of regional newspapers and online news television stations announcing public meetings and/or regular stakeholder meetings for the IRWMP. Newspapers and online media included: the Bakersfield Californian, Arvin Tiller & Lamont Reporter, www.kget.com, www.kernlife.com, www.bakersfield.com, and the Kern County Community and Government Services Calendar.

1.5 IRWMP Development

The Kern IRWMP was created using the advice, feedback, and assistance of multiple Stakeholders. In order to guarantee a fruitful process, Stakeholder meetings were facilitated by a facilitation consultant team. The Stakeholder process was also governed by a set of “ground rules” and “operating procedures” developed by the facilitation consultant team as listed below.

1.5.1 Ground Rules for Participation

1. Cooperate with the process, including the scope and intent of our planning effort together and specific agenda topics.
2. Work toward shared goals, proposing strategies that relate to the goals and that may be acceptable to all stakeholders.
3. Base your opinions, ideas and comments on facts and experience rather than on perception.
4. Wait to be recognized by the facilitator before you speak.
5. Participate fully in the group discussion.
6. Keep your comments brief and constructive.
7. Focus on issues instead of people or personalities.
8. Reference the past if needed, but look to the future.
9. Be respectful of differing perspectives and opinions.
10. Stay with the topic at hand or hold your comment and yield to someone who has a comment on the topic at hand.
11. Be open to new ideas and be expansive in your thinking.

1.5.2 Operating Procedures

1. Stakeholders will abide by the agreed upon participation ground rules and operating procedures during this process.

2. We will strive for mutual agreement but note when we have a minority opinion.

3. Stakeholders are encouraged to participate consistently and attend all meetings. If unable to attend, a Stakeholder may send an alternate to ensure the organization's consistent participation.

4. Stakeholders who are participating based on their organizational affiliation represent the organization; their opinions should be consistent with and as authorized by the organization.

5. Meeting summaries will be prepared by the facilitators, and will include major points of discussion, agreements, and areas of disagreement.

6. Stakeholders will receive meeting materials ten days before the meeting to allow for advance review.

7. Stakeholders will provide review and comment during the timeframes requested.

As described in the following sections, through the facilitated Stakeholder process, participants in the Kern IRWMP have been able to address, discuss, and recommend regional objectives and strategies, and propose projects to meet those objectives.

1.6 Program Preferences and Statewide Priorities

1.6.1 Program Preferences

1.6.1.1 Include Regional Projects or Programs

Development of the Kern IRWMP provided an ongoing forum in which the Participants could collaborate and develop regional partnerships and programs. The IRWMP also provides a forum to facilitate regional partnerships and regional solutions for regional issues.

1.6.1.2 Integrate Water Management Programs and Projects

As part of the Kern IRWMP, Participants are asked to identify and consider a broad range of water management strategies so as to insure a wide range of strategies are brought to the table.

1.6.1.3 Resolve Significant Water-Related Conflicts

One of the primary benefits of an IRWM plan is that it creates the institutional framework through which water related conflicts can be discussed and even resolved.

1.6.1.4 Contribute to Attainment of CALFED Bay-Delta Program Goals

The four CALFED Bay-Delta Program objectives can be summarized as follows:

1. Water Quality
2. Water Supply
3. Ecosystem Restoration
4. Levee Integrity

The Kern IRWMP region receives SWP and CVP water delivered through the Delta. Friant Division CVP contractors are provided water from Millerton Lake by way of a series of exchanges with the "four exchange contractors" situated in western Fresno and Merced County, who then receive water from the Delta. Actions within the Region could contribute to the success of CALFED Bay-Delta Program objectives or those of similar programs, such as the in-progress Bay Delta Conservation Plan. Any reduction in water demand would reduce demand on imported water and contribute to the attainment of CALFED objectives. Senate Bill 7 of Extended Session 7 (SBX7-7) has been enacted mandating that urban water suppliers reduce statewide water use (in gallons per capita per day) by 20 percent by 2020. The IRWMP provides the opportunity for the Kern Region as a whole to tackle enhanced water use efficiency.

1.6.1.5 Address Water Supply and Water Quality Needs of Disadvantaged Communities

The Kern IRWMP provides an opportunity to focus on the water quality and water supply needs of DACs in order to provide "a safe, clean, affordable, and sufficient water supply to meet the needs of California residents, farms, and businesses".

1.6.1.6 Effectively Integrate Water Management with Land Use Planning

The Kern IRWMP has the benefit of participation from the City of Bakersfield planning entity and Kern County within the Region. Information in the IRWMP, including the demographic data and the resultant water demand relies on planning documents that include General Plans and recently updated Urban Water Management Plans (UWMPs). In addition, CDFG Conceptual Area Protection Plans from 2007 to 2009 provide important guidance on land use within the Kern IRWMP region area. Information from the Tulare Basin Conservation Plan Water Supply Strategies Report (2010) can also serve to effectively integrate water management with land use planning.

1.6.2 Statewide Priorities

1.6.2.1 Drought Preparedness

This Plan is focused on drought preparedness and takes a major step forward by incorporation of region specific climate change data. The Plan not only evaluates the Region's vulnerability to climate change, but develops adaptive strategies.

1.6.2.2 Use and Reuse Water More Efficiently

Methods of complying with SBX7-7, the legislation mandating a 20 percent reduction in urban per capita water use by 2020, include enhanced water conservation, water use efficiency, and recycled water. The Kern IRWMP provides a forum for the Region as a whole to address water use efficiency.

1.6.2.3 Climate Change Response Actions

The Kern IRWMP (Plan) identifies strategies to address adapting and mitigating the general effects of climate change. These “no regrets” strategies recognize the current water management context of the region and are a part of the region’s overall objectives.

1.6.2.4 Expand Environmental Stewardship

As part of the IRWMP process, participants are asked to identify new strategies to achieve all the Plan objectives, including resource stewardship. Information in the IRWMP related to resource stewardship relies on planning documents that include General Plans, Specific Plans, Tulare Basin Wildlife Partners Conservation Plans, local habitat conservations plans, and numerous state and federal documents. Resource stewardship throughout the Kern Region is also intrinsically linked to land use planning.

As a resource for this effort, the CA Department of Conservation has funded the Tulare Basin Watershed Coordinator (May 2011 – May 2013) through a grant to the Tulare Basin Wildlife Partners. The Watershed Coordinator works with the Tulare Basin IRWM groups, with the Tulare Basin Wildlife Partners, and with the 70+ participating agencies and NGOs in the Tulare Basin Working Group to prepare and integrate new watershed-based integrated resource management strategies (a state-wide watershed program priority), and to help, fund, and implement projects that will expand environmental stewardship Tulare Basin-wide.

1.6.2.5 Practice Integrated Flood Management

The IRWMP is intended to identify both existing and future issues related to water resources and greatly informs the description of future flood management conditions and needs. Climate Change will provide a means to consider uncertainty and risk not only for water management but specifically for flood management. Existing research on climate change suggests that one of the primary outcomes will be a shift in snowfall to rainfall and an increase in peak flood flows. Climate Change will identify flood vulnerabilities as well as adaptation strategies, including the potential for integrated flood management.

1.6.2.6 Protect Surface Water and Groundwater Quality

The Kern Region will need to balance the sometimes competing objectives of developing new, local water supplies, with protection of surface water and groundwater quality. Nowhere is this truer than when an area is contemplating the production and use of recycled water.

1.6.2.7 Improve Tribal Water and Natural Resources

The Kern Region is within the historic range of the Tubatulabals of Kern Valley. The Tubatulabals are Participants in the Kern IRWMP and they provided helpful, direct feedback during development of the Plan.

1.6.2.8 Ensure Equitable Distribution of Benefits

The Kern IRWMP includes processes to maximize access and participation by a broad range of Participants. Input and participation is sought through email, a publicly accessible website, water agency mailers, and notices in local newspapers. Meetings and workshops were, and will continue to be, held at a time to allow maximum Stakeholder and public involvement. Participation of the Stakeholders ensures that all the various water users (DACs, tribes, municipal, agricultural, environmental) are represented. All participants are able to submit projects for consideration and integration. This will also ensure that benefits are shared and potential impacts do not unduly fall on one particular group.

1.7 IRWMP Organization

This IRWMP complies with Proposition 84 for integrated water management planning. The IRWMP provides the following chapters:

- Section 1 – Introduction: Provides the purpose of this IRWMP, identifies the RWMG, Executive Committee, and Stakeholders, and overall organization of the document.

- Section 2 – Tulare Lake Basin Portion of Kern County Region: This Section provides a description of the larger geographic boundary of the Region and includes an explanation of why it is an appropriate area for this IRWMP. A description of the social and cultural makeup, cultural and social values, and economic conditions and trends of the Region is provided. The potential impact of these issues on water supply planning, flood management planning and other technical components is discussed.

- Sections 3 to 9 – Subregion Descriptions: Sections 3 to 9 provides characterizations of the regions for each of the individual Region Groupings: Greater Bakersfield, Kern Fan, Mountains/Foothills, Kern River Valley, North County, South County, and West Side. Within each Section, the water and environmental issues and needs are identified specific to that localized region.

- Section 10 – Plan Objectives: Documents the development of the objectives and planning targets for the IRWMP. Objectives refer to the general intent for planning within the Kern Region.

- Section 11 – Water Management Strategies Used to Meet Plan Objectives: Introduces the diverse menu of water management strategies that are available to meet the objectives for the Kern Region.

- Section 12 – Project Priorities and Implementation: Presents the criteria that were identified and agreed upon by the Participants and Stakeholders for setting priorities and how they were applied to prioritize projects.

- Section 13 – Finance Plan: Identifies potential funding sources to implement the IRWMP, discusses of ongoing support and financing for operation and maintenance of implemented projects, and presents the grant funding package.

- Section 14 – Data Management, Technical Analyses, and Plan Performance: Provides a discussion of the data, technical methods, and analyses used in plan development. Data gaps are identified; measures and monitoring systems used to evaluate project/plan performance and opportunities to adapt project operations based on monitoring of performance are discussed; and the economic and technical feasibility of projects are demonstrated. This chapter also includes a discussion of how data is managed and disseminated to stakeholders and the public, as well as how data collection will support statewide data needs.

- Section 15 – Coordination and Outreach: Documents the extensive public outreach activities that occurred prior to and during IRWMP development and discusses the mechanisms and processes that facilitated stakeholder and public involvement and communication.

- Section 16 – References: Documents used in the development of this IRWMP.

Section 2: Tulare Lake Basin Portion of Kern County Region

2.1 Introduction and Overview

This section presents a regional description for the Kern Region, including the physical and environmental characteristics of the Region, the social and demographic characteristics of the Region, hydrologic features, discussion of water reliability, and regional growth projections.

As described in Section 1, the Kern Region, as defined for this IRWMP, covers approximately 5,690 square miles (3,641,600 acres) of southwest Kern County, or approximately 70 percent of Kern County and a small portion (37,600 acres) of Kings County. The Kern Region includes the southern half of the San Joaquin Valley, part of the Temblor Range to the west, the Tehachapi Mountains to the south, and part of the southern Sierra Nevada to the east. Elevations range from about 400 feet on the valley floor in the Bakersfield area to about 8,800 feet in the Frazier Park area. The headwaters of the Kern River are at an elevation of about 13,000 feet at the divide in the southern Sierra Nevada separating the Region. As discussed in Section 1.1.1, this IRWMP Region encompasses the Poso Creek IRWMP planning region, and overlaps a part of the Southern Sierra IRWMP planning region.

The major water body in the Region is the Kern River and its tributaries. Major State, Federal and local water conveyance meet in the Region: the California Aqueduct, Friant-Kern Canal, Kern River and Cross Valley Canal (CVC), respectively. Minor streams include, but are not limited to, Poso Creek, Caliente Creek, and El Paso Creek. Figure 2-1 provides a map of the Region and these features.

2.2 Climate

Climate in the Kern Region is characterized as an "inland Mediterranean climate" with hot and dry summers and cool winters. The climate around the Valley floor is prone to large diurnal fluxes due to its inland location, and is dominated by dry, hot weather throughout the summer months.

In the winter, the Kern Region experiences a phenomenon known in the southern San Joaquin Valley as "Tule Fog." Tule Fog forms as a result of radiation inversions when air closer to the ground is cooled faster than the air above. The result is an inversion layer where warmer air sits at the top of the air column, trapping the cooler and denser air below. Low wind speeds, combined with low inversion layers in the winter, create a climate conducive to high concentrations of fog. Visibility in Tule Fog can be less than an eighth of a mile (about 600 feet) down to at times less than 10 feet, often causing dangerous driving conditions on regional Interstate 5 and other arterial highways. While Tule Fog can contain significant moisture, it does not qualify as "precipitation," as it does not typically soak into soils.

The Valley floor receives average precipitation of less than 6 inches per year, most of which falls between November and April, whereas the various mountain ranges can receive up to 20 inches per year (Western Regional Climate Center, Precipitation data for Bakersfield, CA and Glennville, CA). Table 2-1, Climate on the San Joaquin Valley Floor in the Kern Region, summarizes the historical range in temperatures and precipitation on the Valley floor, Table 2-2 summarizes the historical range in temperatures and precipitation in the foothill areas. Figure 2-2 shows how these variables, along with evapotranspiration (ET) can differ between the Valley floor and higher mountain/foothill areas.

TABLE 2-1
CLIMATE ON THE SAN JOAQUIN VALLEY FLOOR IN THE KERN REGION

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Monthly Avg. ET (inches)[(a)]	2.01	2.44	4.67	6.45	7.65	9.29	9.15	8.81	6.25	4.42	1.9	1.43	5.37
Avg. Rainfall (inches)[(b)]	1.40	1.17	0.79	0.76	0.17	0.00	0.01	0.01	0.08	0.35	0.40	0.66	5.79
Avg. Max Temp. (°F)[(b)]	56.6	63.2	68.8	73.7	84.2	91.8	97.8	95.8	90.7	79.2	65.6	58.8	77.2
Avg. Min Temp. (°F)[(b)]	36.4	38.8	43.0	47.2	54.8	61.2	67.9	65.9	60.7	52.0	42.6	36.8	50.6

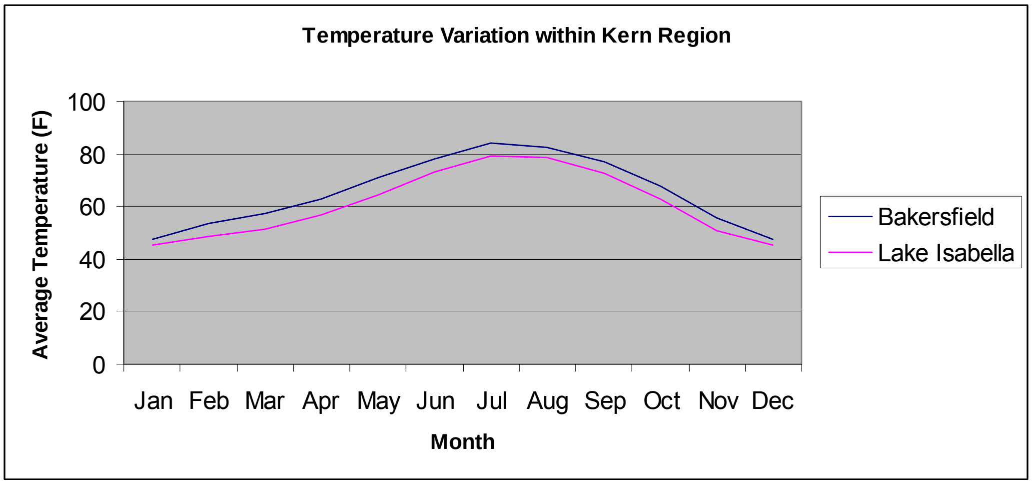
Notes:
(a) CIMIS Data for Arvin-Edison Station 125
(b) Western Regional Climate Center, Bakersfield 5 NW 354 Station for the Years 1999 to 2007.

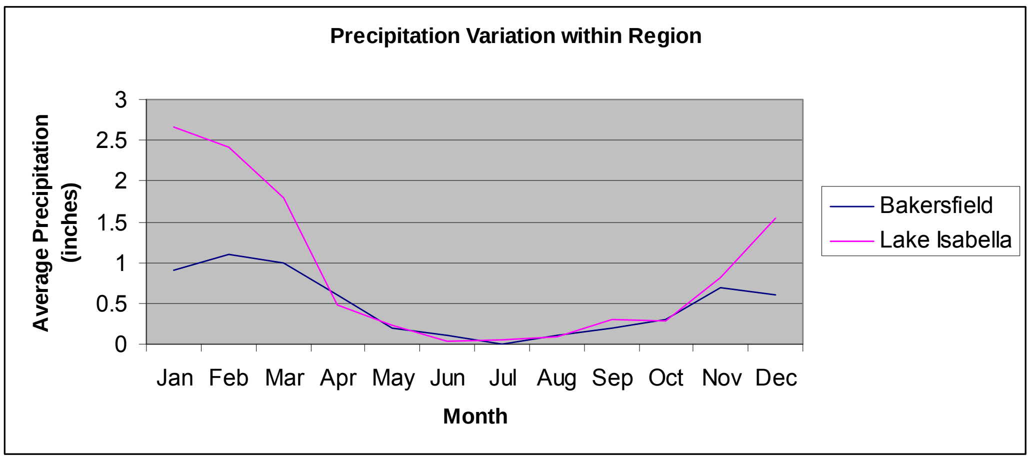
TABLE 2-2
CLIMATE IN THE KERN FOOTHILL AREAS

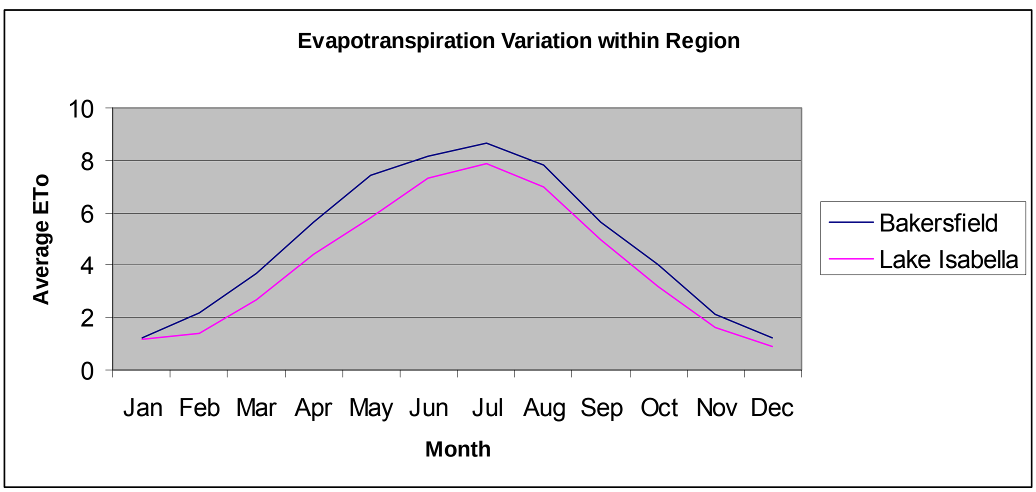
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Monthly Avg. ET (inches)[(a)]	1.2	1.4	2.7	4.4	5.8	7.3	7.9	7	5.0	3.2	1.6	0.9	4.03
Avg. Rainfall (inches)[(b)]	2.79	2.39	1.93	0.87	0.28	0.10	0.12	0.18	0.29	0.38	1.35	1.84	12.53
Avg. Max Temp. (°F)[(b)]	59.1	62.7	66.4	72.8	81.0	90.3	97.6	96.7	91.1	80.1	67.3	60.00	77.1
Avg. Min Temp. (°F)[(b)]	32.2	35.0	38.0	43.1	50.5	58.0	64.3	62.7	57.3	47.4	37.5	32.3	46.5

Notes:
(a) University of California Cooperative Extension. 1989. Irrigation Scheduling: A Guide for Efficient On-Farm Water Management) National Weather Service.
(b) National Weather Service. Average Temperature by Month 1946 to 2008, Kern River PH3 Weather Station

FIGURE 2-2
CLIMATIC VARIATION WITHIN KERN REGION







2.3 Land Use

Land use in the Kern Region is divided among urban and rural areas, predominately agricultural areas. Figure 2-3 provides a map of the cities and communities within the Region. Most of the Region's population lives within or near the incorporated areas. The largest city in the Region is Bakersfield (with a population of over 300,000), followed by the City of Delano (with a population of over 50,000); Shafter, and Wasco; all other cities and communities in the Region have populations of less than 10,000 persons.

Land uses within the unincorporated areas are governed by the County of Kern, and the Kern County General Plan lays out the policies and regulations governing the physical development of the lands under County jurisdiction, as does the Kings County General Plan for the affected portion of Kings County. Agriculture is an important land use in Kern and Kings Counties and is vital to the local economy. Kern County is the third largest agricultural county in the state in economic value, and produces over 250 different crops, including over 30 types of fruits and nuts, over 40 types of vegetables, over 20 field crops, lumber, nursery stock, livestock, poultry and dairy products. The total value of these agricultural products annually exceeds $3.5 billion. The average size of farms in Kern County is 1,272 acres and over 98 percent of agricultural lands are irrigated (City-data.com, 2009).

In addition to agriculture, mineral and petroleum resources are fundamental parts of Kern County's economy. Because of the importance of agriculture, mineral resources and petroleum production to the Kern Region, the Kern County General Plan emphasizes policies for protecting agricultural lands and directing urbanization to areas without important mineral and petroleum resources.

Within the incorporated, generally urban areas, land use is guided by the following land use plans (see Table 2-3). Additionally, as mentioned in Section 1.6.1.6, CDFG Conceptual Area Protection Plans provide important guidance on land use within the Kern IRWMP area. Region-specific plans include the Goose Lake Conservation Plan, Buena Vista Lake- Kern Lake Conservation Plan, Tulare Basin Riparian and Wildlife Corridors Conservation Plan.

TABLE 2-3
LOCAL LAND USE POLICY DOCUMENTS

Jurisdiction Planning Document	Land Use Element Last Adoption Date
Kern County Joint Metropolitan Bakersfield General Plan with City of Bakersfield	2004, currently under revision
Kings County General Plan	2010
City of Arvin General Plan	Updated 1989
City of Bakersfield Joint Metropolitan Bakersfield General Plan with Kern County	2002, currently under revision
City of Delano General Plan 2-3	2005
City of Maricopa General Plan	2009
City of McFarland General Plan	1992
City of Shafter General Plan	2005
City of Taft* General Plan	2010
City of Tehachapi General Plan	1999
City of Wasco General Plan	2002

Source: The California Planners' Book of Lists, 2011 Edition. State of California, Governor's Office of Planning and Research. January.

The Kern Region, like the rest of the Central Valley, is facing increasing population pressures. The County has been ranked among California's leading counties in total urbanization and loss of farmland. From 1990 to 2006, the amount of "important" farmland in Kern County decreased by 88,338 acres. Approximately one-third (approximately 29,000 acres) of this decrease was due to urban-related changes (County of Kern 2009). Increasing population raises many land use issues, including urban-rural conflicts and increased competition for resources such as water. In 2010 the City of Wasco was awarded an Urban Greening Planning Grant from the Strategic Growth Council to help with its updating of its Open Space and Water Conservation elements of its General Plan. Delano, Taft and the County of Kern all applied for grants for land use planning in the last year. Long-term water supply planning is important to ensuring that rural and urban economic growth can be accommodated.

2.4 Ecological Processes and Environmental Resources

Geologically, the Kern Region is located in four of the twelve traditionally recognized geomorphic provinces in California, including the Coast Ranges, the Great Valley, the Transverse Range, and the Sierra Nevada Range province. These geologic attributes influence the climate, wildlife, vegetation, hydrology, and other environmental factors in the Region.

The Coast Range borders the Region to the west. The San Andreas Fault is the most notable structural feature of this province and has a very well-defined fault zone in part of the Region as it trends approximately northwest-southeast in the Carrizo Plain. Only a small portion of the Transverse Range Province is in Kern County. It includes lands along the southern County line near Frazier Park and a small portion of western Tejon Ranch. In the Sierra Nevada Range, which includes the Tehachapi Mountains, are located the White Wolf fault, the Sierra Nevada fault, and the Kern Canyon-Breckenridge fault at the southeastern edge of the Region.

The Tulare Lake Basin, the southern portion of the San Joaquin Valley, which covers the Kern Region, has no natural outlet for surface waters. Streams from the Sierra Nevada, Coast Ranges and Tehachapi Mountains have eroded and deposited materials in the Tulare Lake Basin, forming alluvial fans at the surface. Most notable in the Region is the Kern River fan, sourced from the Sierra, and the largest of these formations, covering about 300 square miles of the Valley.

Environmental resources of the Region include the Kern River, Sequoia National Forest, several wildlife refuges, and the unique flora and fauna of the Tejon Pass area and Transverse Ranges. The riparian forest along the South Fork Kern River in the vicinity of Onyx and Weldon is one of the highest quality and most extensive stands of that vegetation type in California. This section of the river has the largest populations of Southwestern willow flycatchers and yellow-billed cuckoos in California. Much of this forest is conserved in the USFS South Fork Wildlife Area, Audubon California's Kern River Preserve, and CDFG's Canebrake Ecological Reserve.

The Kern River is a magnificent resource in the generally arid Valley, and originates on the western slopes of Mount Whitney; thus the upper reaches of the Kern River are within national forest lands and are not located within the Region. Once the two forks of the River pass the Sierra Nevada drainage divide and enter the Region near Weldon and Kernville, the Kern River pools as Isabella Reservoir behind Isabella Dam, which is a U.S. Army Corps of Engineers flood control facility protecting the City of Bakersfield and other downstream areas. After leaving

Isabella Reservoir the River travels generally southwest through the Sierra foothills and the City of Bakersfield. North, south, and west of Bakersfield much of the River is diverted for agricultural use and the River becomes dry or nearly dry for most of the year below Calloway Weir. The Kern River supports many vegetation types and both common and sensitive species are found along the River corridor. Vegetation types include riparian woodland, riparian scrub, riparian savannah, freshwater marsh, quail bush scrub, alluvial scrub, and grassland/scrub. Bakersfield cactus, Hoover's eriastrum, San Joaquin blue curls, and cottony (Kern) buckwheat are some of the sensitive plants found in the River corridor. The San Joaquin kit fox, blunt-nosed leopard lizard, Buena Vista Lake shrew Tipton kangaroo rat, giant kangaroo rat, San Joaquin antelope squirrel, Swainson's hawk, bald eagle, willow flycatcher, least Bell's vireo, and California condor are considered sensitive wildlife species within the Kern River (County of Kern 2003). The Kern River is the home of three California native trout: the California golden trout, the Kern River rainbow trout, and the Little Kern golden trout. Additionally, the Kern River is a resource for birds migrating along the Pacific Flyway (US Forest Service 2009a).

The Sequoia National Forest sits along the northeastern edge of the Region and extends into Tulare County. The forest draws visitors from around the world, primarily attracted by the giant sequoia trees, but also to visit the forest's other features, including the Kern River, glacier-carved U-shaped valleys, rock monoliths, limestone caverns, and wildlife habitats. Giant sequoia trees grow only on the western slopes of the Sierra Nevada and are considered to be the largest tree species in the world in terms of volume. In addition to the giant sequoia, the forest is home to 339 species of vertebrates, 60 of which are game species. Several rare and endangered species including the California condor, California spotted owl, Pacific fisher, American marten, and goshawk are known to occur in the Sequoia National Forest (US Forest Service 2009b).

The KNWR is located 18 miles west of the city of Delano in the northern part of the Region. The 11,249-acre Kern refuge contains remnant habitats of the original Tulare Lake region and consists of freshwater marshes, valley grasslands, and a relict cottonwood-willow riparian corridor. The refuge provides habitat for wintering and migrating waterfowl, shorebirds, and marsh birds and also provides habitat for upland and riparian bird species. The endangered Buena Vista Lake shrew, San Joaquin kit fox and blunt-nosed leopard lizard occur within the refuge (US Fish and Wildlife Service 2009a).

The Bitter Creek National Wildlife Refuge is located in the southwest corner of the Region. This refuge is intended to protect dwindling California condor foraging and roosting habitat; the 14,097-acre refuge is the site where the last wild female condor was trapped in 1986. The refuge is bisected by the San Andreas Fault and Bitter Creek Canyon. In addition to the California condor, the refuge provides habitat for San Joaquin kit fox, blunt-nosed leopard lizard, giant kangaroo rat, western spadefoot, coast horned lizard, and tricolored blackbird. Coyote, bobcat, mountain lion, mule deer, pronghorn, tule elk, and western rattlesnake are also found in the refuge (US Fish and Wildlife Service 2009b).

The southeastern portion of the Region, surrounding the Tejon Pass area, is located at the intersection of five geomorphic provinces: Sierra Nevada, Great Central Valley, Coast Ranges, Transverse Ranges, and Mojave Desert. These geomorphic areas each have a distinct ecology, and the intermixing of these geomorphic provinces creates a unique and diverse landscape in a relatively small area. Here the oak-dominated habitat of the Sierra Nevada intermixes with the conifer forests of the Tehachapi Mountains and the desert species of the adjacent Antelope Valley. Because of its unique biogeography and location between major urban centers in Los Angeles and Kern counties, the Tejon Pass area also supports many threatened and endangered species and other species considered rare or sensitive because of their restricted distributions and substantial loss of habitat. At least 20 species listed as Threatened or Endangered under the Federal and California Endangered Species Acts and an additional 61 species otherwise designated as sensitive are known to occur or have the potential to occur in the vicinity of Tejon Pass. Species that are known or have the potential to occur in this area include:

- American peregrine falcon
- Bakersfield cactus
- Bald eagle
- Blunt-nosed leopard lizard
- Burrowing owl
- California condor
- California jewelflower
- California red-legged frog
- California spotted owl
- Fort Tejon woolly sunflower
- Golden eagle
- Least Bell's vireo
- Little willow flycatcher
- Ringtail
- San Joaquin antelope squirrel
- San Joaquin kit fox
- Southwestern willow flycatcher
- Striped adobe lily
- Tehachapi pocket mouse
- Tehachapi slender salamander
- Tejon poppy
- Western yellow-billed cuckoo

(US Fish and Wildlife Service 2009c)

In 2008 five environmental organizations and the Tejon Ranch Company entered into an agreement to permanently protect 178,000 acres of Tejon Ranch in the southern area of the Region, near the community of Lebec. The Tejon Ranch Conservancy, an independent nonprofit conservation organization will monitor and enforce a conservation easement on the

178,000 acres of conserved lands while implementing a long-term stewardship plan to protect and restore habitat. The Tejon Ranch Conservancy is working to acquire an additional 62,000 acres. The majority of the preserve is in Kern County with a portion in Los Angeles County (Tejon Ranch Conservancy 2009).

Since 1998, The Wildlands Conservancy has owned and managed Wind Wolves Preserve, an ecologically unique region where the Transverse Ranges, Coast Ranges, and San Joaquin Valley converge. Due to elevation ranging from 640 to 6,005 feet, the preserve has an impressive array of landforms and habitats that serve as a critical landscape linkage and wildlife corridor between the Coast Ranges and Sierra Nevada. At 95,000 acres, Wind Wolves, the west coast's largest non-profit preserve, extends from rolling grasslands on the valley floor and extends uphill through blue oak and valley oak savanna and extensive riparian woodlands to juniper and pinyon forests that ascend into stands of ponderosa pine and big cone spruce. Tule elk were reintroduced to the Wind Wolves Preserve, the southernmost extension of their historic range. The elk herd has grown to more than 200 elk and the CDFG estimates the preserve can support up to 2,500 elk. The USFWS places stillborn elk calves on the preserve as a food source for California condor, which can be seen regularly. On the San Joaquin Valley floor, the preserve contains 30 square miles of annual grasslands with remnant stands of saltbush. These grasslands are home to the endangered San Joaquin kit fox and blunt-nosed leopard lizard, and one of the largest stands of the endangered Bakersfield cactus. (The Wildlands Conservancy 2010)

Other environmental resources in the Region include the Center for Natural Land Management’s Lokern Preserve and Semitropic Preserve, and the CDFG Semitropic Ecological Reserve.

2.5 Social and Cultural Characteristics

2.5.1 Demographics and Population

Table 2-4 provides a summary of the demographics for the Kern Region as determined by 2000 U.S. Census Bureau and 2005 American Community Survey data. Where possible, data was estimated from census tracts within the Region boundaries. For some subjects (such as educational attainment), it was necessary to assume the Region had characteristics similar to Kern County as a whole.

As shown in Table 2-4, the median household income (MHI) for the Region (in 1999 dollars) was less than $51,000. Based on census data for Kern County, it is estimated that more than 70 percent of adults in the Kern Region have graduated from high school, with approximately 7 percent of the population attaining an associates degree, 10 percent of the population having a bachelor’s degree, and 5 percent of adults in the Region receiving a graduate or professional degree.

TABLE 2-4
DEMOGRAPHICS SUMMARY FOR THE KERN REGION

Area	Bakersfield	Wasco	Arvin	Delano	Maricopa	Shafter	Taft	Tehachapi	Unincorp. Kern County[(c),(d)]
Age Structure (by %)									
under 5	9.4	7.5	11.3	7.4	6.4	10.2	6.8	4.4	5.8
5-9	8.3	7.4	11.7	7.1	7.6	10.8	6.8	5.3	7.5
10-14	8.3	8.2	10.7	8.6	10.6	9.6	7.6	5.5	8.7
15-19	8.0	7.3	10.1	6.6	7.9	9.5	8.3	5.9	7.2
20-24	7.9	13.9	9.1	10.0	4.3	8.2	8.3	10.3	2.6
25-34	16.0	20.0	15.5	20.1	11.2	14.4	13.3	22.5	6.6
35-44	14.3	13.4	13.4	13.8	14.7	14.2	14.6	20.3	18.0
45-54	12.1	11.0	7.8	12.0	14.5	9.4	13.2	10.6	15.8
55-59	4.2	3.6	2.7	4.1	6.5	3.0	4.8	3.4	6.2
60-64	2.9	2.8	2.0	2.3	5.1	2.6	3.6	2.6	5.6
65-74	4.1	3.3	3.5	3.3	7.0	4.0	6.7	5.2	11.4
75-85	3.2	1.6	1.7	3.5	3.7	2.9	4.8	3.3	4.4
85 and over	1.1	0.1	0.6	1.2	0.5	1.2	1.3	0.9	0.4
Median Household Income	50,918	32,440	23,674	37,248	27,917	29,515	33,861	29,208	35,955
Income Levels (by %)									
< $10,000	5.4	11.2	18.6	5.7	13.6	15.1	11.0	17.3	10.6
$10k to $14.9k	6.1	6.5	9.2	10.0	11.9	7.8	9.9	10.3	6.9
$15k to $24.9k	11.0	20.0	24.8	16.7	18.6	18.6	14.1	14.8	15.9
$25k to $34.9k	10.8	14.1	17.4	13.8	15.4	18.7	15.9	14.0	13.2
$35k to $49.9k	15.9	21.7	14.1	21.0	18.6	17.4	14.0	12.2	16.1
$50k to $74.9k	18.6	11.5	10.6	20.1	14.1	13.4	17.9	21.3	27.5
$75k to $99.9k	13.4	8.8	3.4	6.7	2.7	6.0	9.4	4.7	8.3
$100k to $149k	12.1	3.9	0.9	3.9	2.0	1.5	6.2	3.7	6.4
$150k to $199k	3.7	1.0	0.3	1.5	0.7	1.0	1.1	0.4	1.71
$200k or more	3.0	1.3	0.8	0.8	2.2	0.5	0.6	1.2	
Population Density(persons per sq. mile)[(b)]	2,793.0	3182.0	3112.0	5187.0	758.0	863.0	504.0	1261.0	14.5
Languages spoken[(a)]									
English	80.5	N/A	19.3	26.8	88.3	41.0	82.2	71.5	91%
Spanish	12.1	N/A	77.1	61.1	10.4	57.1	12.1	23.1	6%
Indo-European	3.7	N/A	0.0	0.9	1.1	1.2	0.9	0.5	<1%
Asian	2.9	N/A	1.2	10.6	0.0	0.5	4.8	4.7	<1%
Other (all <1%)	0.8	N/A	2.4	0.7	0.2	0.2	0.0	0.2	1%

Notes: (a) For age 5 and up, 2000 Census Tract Data.
(b) Data taken from City-Data.com, 2007.
(c) Age structure, population density, and languages spoken for Unincorporated Kern County is taken from census data for all of Unincorporated Kern County
(d) Data on median household income and income levels for unincorporated Kern County is limited to just that portion within the Region and includes census tracts 32.08, 33.02, 33.03, 33.04, 37, 45, 46.02, 51.03, 52.01, 60.04, 60.05, and 62.02.

Based on census data for Kern County, it is estimated that within the Region the population is largely White and Latino. Approximately 60 percent of the population identifies as being white and approximately 40 percent of the population reports being Hispanic (US Census Bureau 2005). Persons identifying as African American, Asian, American Indian, and Native Hawaiian make up less than 2 percent of the population. English is the primary language, but a significant portion of the population speaks Spanish.

2.5.1.1 Population Projections

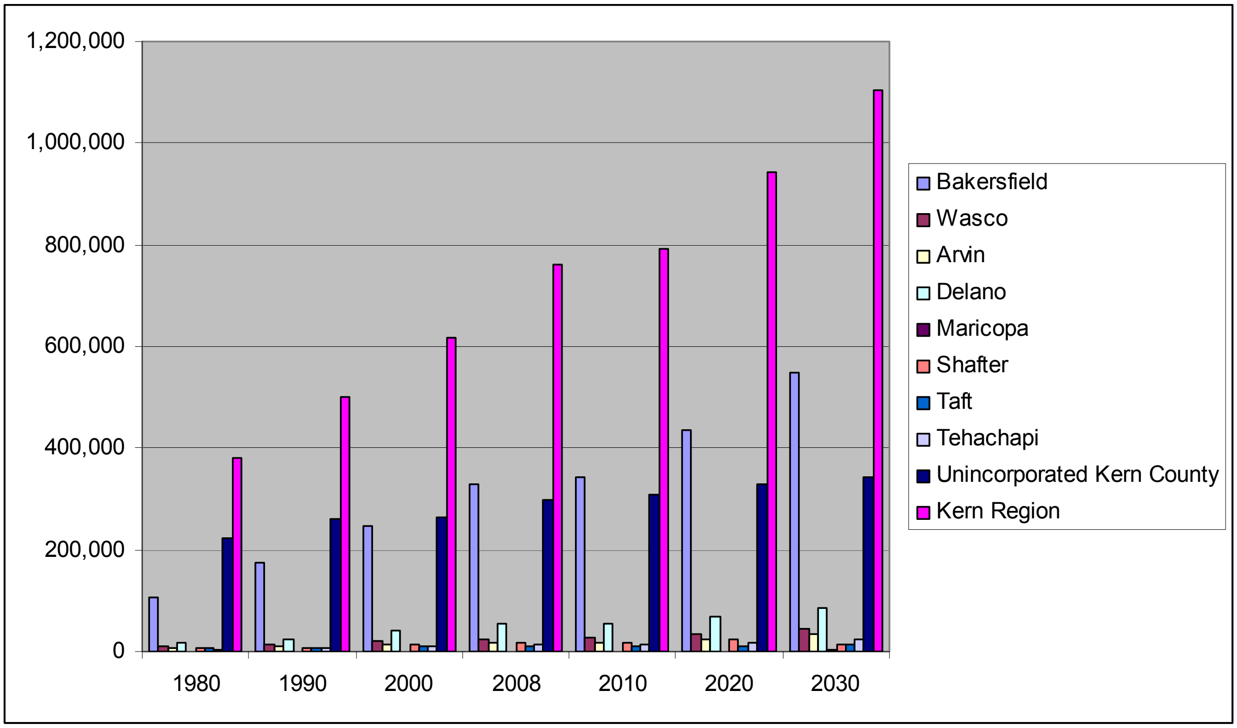
The Region is nearing 800,000 persons and is in one of the fastest growing counties in California. During the first half of this decade, Kern County grew by 90,000 persons and is presently the 13th most populated county in the state. With the exception of Rosamond, all the areas experiencing the greatest amount of growth are within the IRWMP Region: Metropolitan Bakersfield, Greater Tehachapi, and Frazier Park. Recent prison construction and corresponding job openings have increased growth rates in the communities of Delano, McFarland, Taft, and Wasco. The historic and projected populations for the Kern Region are shown in Table 2-5. Historical population data is based on 1980 to 2000 Census Bureau records and California Department of Finance 2006 estimates, while projected population data is derived from the Kern Council of Governments 2007 Regional Transportation Plan. Projections indicate that over one million people will reside in the Region by the year 2030. If Highway 178 into Kern Valley gets expanded completely into four-lane highway (from Bakersfield through Lake Isabella), which per CalTrans, may occur in years 2015 to 2020, population numbers could be larger than estimated (M. Begay, personal communication, Tubatulabals of Kern Valley). See Figure 2-5 for a graph of these population projections.

TABLE 2-5
POPULATION PROJECTIONS

	Population					
	1980	**1990**	**2000**	**2010**	**2020**	**2030**
Bakersfield	105,611	174,820	246,899	342,700	433,800	549,100
Wasco	9,613	12,412	21,263	26,800	34,200	43,600
Arvin	6,863	9,286	12,956	17,200	24,100	33,700
Delano	16,491	22,762	39,499	54,000	67,500	84,300
Maricopa	946	1,193	1,111	1,230	1,490	1,800
Shafter	7,010	8,409	12,731	16,700	23,900	14,000
Taft	5,316	5,902	8,811	9,800	11,700	14,000
Tehachapi	4,126	5,791	11,125	13,900	17,800	22,800
Unincorporated Kern County	131,917	177,285	238,256	284,788	340,408	406,890
Kern Region	**287,893**	**417,860**	**592,651**	**767,118**	**954,898**	**1,170,190**

Source: Kern Council of Governments 2007 Regional Transportation Plan Destination 2030 (Figure 3-1).
Notes:
(a) Projections assume future growth in the unincorporated portions of the Kern Region would have a similar annual growth rate as metropolitan Bakersfield (1.8%). Projections assume past population (1980 and 1990) growth rate of 3%, consistent with metropolitan Bakersfield.

FIGURE 2-5
POPULATION PROJECTIONS



2.5.2 Economic Factors

The Region's economy is based on the diverse assets of agriculture, oil, and warehousing services. Transportation, logistics and warehousing, are emerging and growing industries in the Region. Biomass is a growing form of locally-generated renewable energy while solar remains a relatively untapped potential. Lower business costs, the availability of land, and relatively lower costs of living also add to Kern's attractiveness and competitive advantage.

Despite this seeming economic diversification, the overall performance of the Region has been mixed in recent years when compared to the State and other areas, although noticeable progress has been made overall. The agricultural sector consists mostly of low paying and often seasonal employment which limits the positive multipliers within the economy. The Region has disproportionally suffered in the recent economic downturn, in May 2009 the Kern County unemployment rate was estimated at 14.2 percent, compared to 11.2 percent for the State of California. In May 2008, Kern County's estimated unemployment rate was 9.3 percent (California Employment Development Department 2009).

2.5.3 Disadvantaged Communities

DACs, as defined by both Propositions 50 and 84, are communities whose average MHI is less than 80 percent of the statewide annual MHI. In 2000, 80 percent of the state of California's

MHI was $37,994. A number of communities within the Kern Region have been identified as DACs. These are listed in Table 2-6, and shown on Figure 2-6. It should also be noted that two-thirds of the communities listed below are severely disadvantaged communities, whose average MHI is less than 60 percent of the statewide annual MHI.

TABLE 2-6
DISADVANTAGED COMMUNITIES IN KERN REGION

	Median Household Income	Percentage State Median Income
California	47,493	NA
Arvin City	23,674	49.85%
Bodfish	22,368	47.10%
Buttonwillow	28,370	59.74%
Delano City	28,143	59.26%
Edwards AFB	36,915	77.73%
Ford City	25,192	53.04%
Kernville	28,352	59.70%
Lake Isabella	19,813	41.72%
Lamont	25,578	53.86%
Lost Hills	31,875	67.12%
Maricopa City	27,917	58.78%
McFarland City	24,821	52.26%
Mettler	28,750	60.54%
Mountain Mesa	23,875	50.27%
Oildale	27,041	56.94%
Onyx	16,058	33.81%
Shafter City	29,515	62.15%
South Taft	20,921	44.05%
Taft City	33,861	71.30%
Taft Heights	37,684	79.35%
Tehachapi City	29,208	61.50%
Tupman	27,500	57.90%
Wasco City	28,997	61.06%
Weedpatch	19,838	41.77%
Weldon	22,857	48.13%
Wofford Heights	24,326	51.22%

Source: U.S. Census Bureau, 2000.
Note: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, nonsampling error, definitions, and count corrections see http://factfinder.census.gov/home/en/datanotes/expsf3.htm

2.5.4 Social and Cultural Values

The earliest recorded history of the Region begins with Native Americans. The Region was at one time home to at least three Indian groups, the Yokuts, Shoshonean (sometime also referred to as Piutes), Tubatulabals, and coastal Chumash (Brewer 2001). Yokuts had major village sites throughout the valley and foothill area, including the western edge of Buena Vista Lake, Poso Creek, and Bakersfield (Brewer 2001). At the southern end of the Central Valley were a group called the Tejon Indians, a part of the coastal Chumash. Tubatulabals and later Shoshone (Paiutes) Tribes lived in the Green Horn and Johnsondale Area Mountains, Kern River Canyon, and the Kern River Valley to the Tehachapi Pass (Brewer 2001).

Tubatulabals refer to the current day Bakersfield area as the following: “Palatalap” – Bakersfield “the place where the sun and water sets” (Gomez 2009).

Many of the Native American Tribes in Kern Region continue to speak their native language, hold their traditional and sacred ceremonies, live on lands in trusts (i.e., allotments), and continue to petition for federal recognition status. Existing Native American Tribes in Kern Region are sovereign Tribes with their own governance, Tribal Council, and Tribal members. Protection of sacred lands, waters, and natural resources (i.e., native plants, birds, animals, medicines of the land) continue to be a priority for these Tribes. Water is viewed as sacred and goes beyond just quantification. Water is seen as a cycle of life, from the ocean to the top of the mountain snows, and natural filtration of streams and rivers. Water stewardship is important in managing headwaters, mountain meadows, watersheds, and major rivers. Manmade lakes have only existed in the Kern area since the 1940s. Isabella Dam had flooded the convergence of the North and South Forks of the Kern River. Today, this dam is under review due to its location on the Kern fault line and on-going water seepage. This situation and demand for water in urban areas has forced lake levels to be lowered and has resulted in exposure of old Tribal villages, cultural objects, and human remains. There is also concern for the health of the lake and existing fishing stock.

In May 2009, DWR, Tubatulabals of Kern Valley and North Fork Mono Tribe hosted a 1 day Tribal Water Regional Planning day which was attended by representatives from U.S. Forestry – Sequoia Rangers, Kern River Audubon, California Governor’s Office of Emergency Planning, KCWA, several local Tribes (Tubatulabals, Paiutes, Chumash, Yokuts), and other local interested residents. Protection and continued access to quality drinking water was identified as a high priority for these Tribes. Due to non-federally recognized status for many of the local Tribes, federal and state funding is very limited, if at all available for these Tribes. In addition, the protection of cultural and sacred Tribal sites has also been placed as a high priority. Participation in the planning process has also allowed the Tubatulabal Tribe to emphasize the importance of protecting the headwaters coming from USFS lands in this IRWMP.

Native Americans first arrived in Southern Sierra mountains more than 13,000 years ago (Johnson et al. 2002), in the Paleo-Indian period. Their presence may be an indication that warm and dry climate conditions allowed the piñon-juniper ecosystem to spread down slope between 3,000 and 1,500 B.C. Several sites in the Kennedy Meadows region, near Kernville, have been dated to this phase (Moratto 1984:333). Sawtooth phase (AD 600-1300), as indicated by greater numbers of temporary use sites and “piñon camps,” as well as increasing quantities of obsidian artifacts (Moratto 1984:333). Increasing site and artifact numbers suggest even more intensive occupation of the southern Sierra during the Chimney phase (AD 1300 – historic) (Moratto 1984:333-334). Prior to European contact, Native Americans had lived very close to rivers, streams, and springs. Seasonal living in the flood plains occurred for source of food and natural resources (i.e., basket making and housing materials, collection of tule, and net fishing).

Spanish explorers entered the Kern area as early as 1772 and the area became territory of Mexico in 1822, but widespread European settlement in the area was not common until the 1840's when the Mexican government began awarding large ranchos. In 1843 the American government commissioned John C. Fremont to explore the West. In 1844, while returning from mapping the Oregon territory, Fremont entered the Kern Region. Fremont is responsible for naming Kern County (Brewer 2001).

By 1848 California was an American possession. Following the gold rush, former miners moved throughout California, including Kern County. These miners started several gold mining operations in the Region, including several mining camps near what is now Lake Isabella. Other businesses, particularly agriculture and ranching, grew in support of the gold mining operations. Large irrigation systems were developed to deliver water from local rivers in dry years and to take away water in wet years. By the 1860's large portions of former swamp land in the San Joaquin Valley were being drained for agriculture and ranching. Under the Montgomery Act, any person reclaiming swamp land belonging to the state would be deeded a percentage of the recovered land.

During 1851-1852, there were 18 treaties (one signed by Tribes in Camp Burton – Tule Reservation and one signed by Tribes in Texon/Tejon area), these treaties were never ratified by the U.S. government. The treaties would have assigned additional lands, resources, and on-going access to traditional territories (California State Library, April, 2006 – Resource Center, Senator Burton requested a study of these 18 unratified treaties). In these treaties, many of the Tribal Territories were outlined by existing rivers and streams.

The growing ranching industry attracted large numbers of French and Spanish Basque settlers. Chinese laborers and later African Americans were in demand as field laborers (Brewer 2001). Grapes, cotton, citrus and almonds were all grown by the mid-1800's and these continue to be important crops today. In 2008 the estimated value of Kern agriculture was over four billion dollars (Kern County Agricultural Commissioner 2009). The mining and agricultural industries benefited from stagecoach and wagon routes that connected Los Angeles and San Francisco via Tejon Pass. By the turn of the century, the Kern Region was served by two major railroads, the Southern Pacific and Santa Fe (Brewer 2001).

In the mid-1860's a local entrepreneur began to market unrefined oil found in the region for use as farm machinery lubrication. Until this point, petroleum in Kern County had received little interest. It is known that local Yokut Indians used asphaltum for waterproofing, roofing, baskets, and pots. Despite some false starts, by the turn of the century several large oil fields were in operation in the Region, including the McKittrick Field and Kern River Oil Field. In 1910 drillers working in what is now known as the Midway-Sunset Oil Field tapped the Lakeview Gusher. The initial flow of the Lakeview Gusher is estimated at 125,000 barrels a day. The gusher flowed uncontrolled for over 18 months and is considered the largest recorded oil gusher in US history. Today Kern produces almost half of all the oil from California.

Kern County is characterized by its traditional industries, agriculture, oil and gas production, as well as increasing urbanization and population growth. Kern has a large immigrant population, and is becoming increasingly culturally diverse. A survey by the Public Policy Institute of California (PPIC), in Collaboration with the Great Valley Center, identified the strains growth is placing on the Kern Region. Over 50 percent of respondents to the survey stated that "growth in the wrong places" and "lack of effective regional planning" as major causes of problems in the Southern San Joaquin Valley. In this survey, more than 40 percent of respondents identified affordable housing, and job opportunities as "big problems" in the Central Valley; and more than 60 percent identified air quality as a big problem in the Southern San Joaquin Valley.

The PPIC survey showed a strong concern for the environment. More than 60 percent of respondents in the Southern San Joaquin Valley favored the following statements:

> *"Protecting the wetlands and rivers, and other environmentally-sensitive areas, even if this means there will be less commercial and recreational development"*
>
> *"Restricting the development of housing on land that has a significant risk of flooding, even if this means there will be less housing available"*
>
> *"Restricting urban development on farms and agricultural lands, even if this means there will be less housing available"*

Decisions regarding future land use and the dedication of water resources will need to weigh varying agricultural, municipal, and industrial needs as they continue to develop and as the balance between these interests continues to change.

2.6 Water Supply

The following section describes the sources of water supply for the Region including imported surface water, local surface water, and local groundwater. Water related infrastructure in the Region is shown in Figure 2-1.

Water supplies utilized in the Region are the SWP and CVP via the California Aqueduct, the CVP via the Friant-Kern Canal, and local surface supplies from the Kern River and other local streams, as well as the largest common groundwater basin, the San Joaquin Valley groundwater basin. Other groundwater basins in the Region include the Kern River Valley groundwater basin to the east; Walker Valley Creek Basin to the southeast; Cummings Valley and Tehachapi Valley West on the eastern side of the Region, and Cuddy Canyon Valley, Cuddy Ranch Area, Cuddy Valley, and Mil Poterero Area basins to the south.

2.6.1 Imported Water Supply from the State Water Project

The SWP is the largest state-built, multi-purpose water project in the country. It was authorized by the California State Legislature in 1959, with the construction of most initial facilities completed by 1973. Today, the SWP includes 28 dams and reservoirs, 26 pumping and generating plants, and approximately 660 miles of aqueducts and is managed by DWR. The primary water source for the SWP is the Feather River, a tributary of the Sacramento River. Storage released from Oroville Dam on the Feather River flows down natural river channels to the Sacramento-San Joaquin River Delta (Delta). While some SWP supplies are pumped from the northern Delta into the North Bay Aqueduct, the vast majority of SWP supplies are pumped from the southern Delta into the 444-mile-long California Aqueduct. Many of the agencies participating in the Kern IRWMP receive SWP water from turnouts located on the California Aqueduct, and few also receive SWP water from the Coastal Branch of the California Aqueduct. Several centrally located water districts in the Region lie to the east of the Aqueduct and receive shares of SWP water through the CVC, which is also used for many operational exchanges and groundwater banking. AEWSD has a bidirectional intertie to the California Aqueduct at the end of its canal system to facilitate various water management programs. CVC conveyance capacity is in the process of being expanded from 922 cubic feet per second (cfs) to 1,422 cfs. SWP facilities in the Region are shown in Figure 2-1.

In the early 1960s, DWR began entering into individual SWP Water Supply Contracts with urban and agricultural water supply agencies located throughout northern, central, and southern California for SWP water supplies. KCWA and Dudley Ridge Water District (DRWD) are two of 29 water agencies (commonly referred to as “contractors”) that have an SWP Water Supply Contract with DWR. Each SWP contractor’s SWP Water Supply Contract contains a “Table A,” which lists the maximum amount of water an agency may request each year throughout the life of the contract. Table A is used in determining each contractor’s proportionate share, or “allocation,” of the total SWP water supply DWR determines to be available each year. The total planned annual delivery capability of the SWP and the sum of all contractors’ maximum Table A amounts was originally 4.23 million acre-feet (MAF). The initial SWP facilities were designed to meet contractors’ water demands in the early years of the SWP, with the construction of additional diversions of coastal rivers, a Peripheral Canal and storage facilities planned as demands increased. However, the Wild and Scenic Rivers Act blocked diversions from coastal rivers, the Peripheral Canal was not authorized by voters, and essentially no additional SWP storage facilities have been constructed since the early 1970s. SWP conveyance facilities were generally designed and have been constructed to deliver maximum Table A amounts to all contractors. After the permanent retirement of some Table A amount by two agricultural contractors in 1996, the maximum Table A amounts of all SWP contractors now total about 4.17 MAF. Currently, KCWA’s annual Table A amount is 998,730 acre-feet (AF) and DRWD’s current Table A amount is 50,343 AF. DRWD’s Table A Amount will be reduced to47,343 acre-feet per year (AFY) in 2015 and 43,343 AFY in 2020 (D. Melville, personal communication, DRWD, 2011).

Consistent with other SWP contractors, historically, SWP deliveries to KCWA and DRWD have increased as its requests for SWP water have increased. Table 2-7 presents historical total SWP deliveries to KCWA municipal and agricultural purveyors and to DRWD agricultural purveyors.

TABLE 2-7
HISTORICAL TOTAL SWP DELIVERIES TO KCWA M&I PURVEYORS AND AGRICULTURAL MEMBER UNITS

Year	KCWA Table A (AF)	KCWA Deliveries (AF)	DRWD Table A (AF)	DRWD Deliveries (AF)	Year	KCWA Table A (AF)	KCWA Deliveries (AF)	DRWD Table A (AF)	DRWD Deliveries (AF)
1968	62,100	127,384	14,300	26,360	1988	1,225,900	1,009,520	53,500	47,994
1969	159,600	141,265	14,325	31,375	1989	1,241,000	1,146,062	55,600	57,049
1970	269,600	204,634	15,700	40,407	1990	1,253,400	862,448	28,850	36,296
1971	320,000	375,505	17,900	41,053	1991	1,253,400	34,886	53,411	927
1972	387,500	535,573	20,000	42,443	1992	1,253,400	421,520	57,700	23,770
1973	471,000	515,546	22,000	22,057	1993	1,253,400	1,219,653	57,700	50,618
1974	612,500	656,773	33,390	33,390	1994	1,253,400	711,002	57,700	28,793
1975	662,600	828,437	40,555	40,555	1995	1,253,400	1,219,146	57,700	60,686
1976	716,500	888,112	30,921	41,421	1996	1,253,400	1,335,394	53,370	56,948
1977	766,300	432,837	30,400	11,153	1997	1,209,969	1,303,900	53,370	71,308
1978	820,300	678,400	32,500	51,747	1998	1,183,845	987,299	53,370	55,650
1979	871,700	1,295,388	38,544	38,544	1999	1,183,845	1,386,481	53,370	59,697
1980	919,200	968,092	41,000	41,000	2000	1,183,845	1,438,120	53,370	60,539
1981	969,800	1,386,641	41,000	41,000	2001	1,095,047	573,382	53,370	41,548
1982	1,017,700	900,973	41,000	41,000	2002	1,095,047	818,440	57,343	48,170
1983	1,055,000	601,183	42,900	42,900	2003	1,095,047	1,135,299	57,343	46,082
1984	1,100,000	1,138,040	45,100	45,100	2004	1,092,828	812,610	57,343	49,080
1985	1,135,000	1,078,147	47,200	46,251	2005	1,092,828	1,535,608	57,343	79,005
1986	1,172,100	929,178	49,300	50,249	2006	1,092,828	1,337,456	57,343	58,652
1987	1,202,400	1,028,124	51,400	46,288	2007	1,092,828	693,653	57,343	57,343

Sources: Unpublished data KCWA. Only includes deliveries through KCWA. DRWD data from DWR's Bulletin 132-06 Management of the California State Water Project, December 2007.

While Table A identifies the maximum annual amount of water an SWP contractor may request, the amount of SWP water actually available and allocated to SWP contractors each year is dependent on a number of factors and can vary significantly from year to year. The primary factors affecting SWP supply availability include hydrology, the amount of water in SWP storage at the beginning of the year, regulatory/biological and operational constraints, and the total amount of water requested by SWP contractors. Urban SWP contractors' requests for SWP water, which were low in the early years of the SWP, have been steadily increasing over time, which increases the competition for limited SWP dry-year supplies.

In an effort to assess the impacts of these varying conditions on SWP supply reliability, DWR issued its "State Water Project Delivery Reliability Report" in May 2003. The report assists SWP contractors in assessing the reliability of the SWP component of their overall supplies. DWR updated this report in 2005, 2007, and most recently in December 2009 (DWR 2009). In these updates, DWR provides a recommended set of analyses for SWP contractors to use in water supply planning. The 2005 and 2007 analyses indicated that the SWP, using existing facilities operated under current regulatory and operational constraints, and with all contractors requesting delivery of their full Table A Amounts in most years, could deliver 66 to 69 percent of total Table A Amounts on a long-term average basis. The 2007 analyses also projected that SWP deliveries during multiple-year dry periods could average about 33 to 35 percent of total Table A amounts and could possibly be as low as 7 percent during an unusually dry single year.

However, recent regulatory and judicial decisions related to endangered species in the Delta have further impacted the reliability of the SWP, due to increased restrictions on pumping from the south Delta. These impacts on the SWP were captured in the release of the 2009 Draft Reliability Report in December (DWR 2009).

The SWP supplies projected to be available for delivery to the Region were determined based on the total SWP delivery percentages identified by DWR in its 2009 analyses. Table 2-8 shows SWP supplies projected to be available to the Region in average/normal years (based on the average delivery over the study's historic hydrologic period from 1922-2003). Table 2-8 also summarizes estimated SWP supply availability in a single dry year (based on a repeat of the worst-case historic hydrologic conditions of 1977) and over a multiple dry year period (based on a repeat of the worst-case historic four-year drought of 1931-1934).

TABLE 2-8
KCWA WHOLESALER SUPPLY RELIABILITY (AF)

Wholesaler (Supply Source)	2010	2015	2020	2025	2030
Average Water Year					
DWR (SWP)					
KCWA Table A Supply	599,238	599,238	599,238	599,238	599,238
% of Table A Amount[a]	60%	60%	60%	60%	60%
Single Dry Year					
DWR (SWP)					
KCWA Table A Supply	69,911	69,911	69,911	109,860	109,860
% of Table A Amount[a]	7%	7%	7%	11%	11%
Multiple Dry Year					
DWR (SWP)					
KCWA Table A Supply	339,568	339,568	339,568	349,555	349,543
% of Table A Amount[a]	34%	34%	34%	35%	36%

Note: (a) Percentages of Table A amount from DWR's "2009 SWP Delivery Reliability Report." Assumes Table A contract amount of 998,730 AFY.

While the primary supply of water available from the SWP is allocated Table A supply, SWP supplies in addition to Table A water have, until recently, been periodically available, including "Article 21" water, Turnback Pool water, and DWR dry-year purchases. Article 21 water (which refers to the SWP contract provision defining this supply) is water that may be made available by DWR when excess flows are available in the Delta (i.e., when Delta outflow requirements have been met, SWP storage south of the Delta is full, and conveyance capacity is available beyond that being used for SWP operations and delivery of allocated and scheduled Table A supplies). Article 21 water is made available on an unscheduled and interruptible basis and is typically available only in average to wet years, generally only for a limited time in the late winter. However, the recent regulatory decisions mentioned above will have significant impacts on the future availability of Article 21 water, since excess flows that normally make up the bulk of this supply will now be used to meet new flow requirements for Delta fish species.

The Turnback Pool is a program where contractors with allocated Table A supplies in excess of their service area needs in a given year may turn back that excess supply for purchase by other contractors who need additional supplies that year. The Turnback Pool can make water available in all types of hydrologic years, although generally less excess water is turned back in dry years. As urban contractor demands have increased through time, the amount of water turned back and available for purchase has diminished.

In critical dry years, DWR has formed Dry Year Water Purchase Programs for contractors needing additional supplies. Through these programs, water is purchased by DWR from willing sellers in areas that have available supplies and is then sold by DWR to contractors willing to purchase those supplies. Because the availability of these supplies is somewhat uncertain, they are not included as supplies in this IRWMP. However, KCWA's access to these supplies when they are available may enable it to augment its SWP supplies beyond the values used throughout this report.

2.6.2 Imported Water Supply from the Central Valley Project

The CVP is a set of federal facilities that extend generally from north of Redding to areas near Bakersfield, as well as the South Bay Area. The CVP encompasses two of California's largest river systems, the Sacramento River, which flows southward toward the Delta and the San Joaquin River, which flows north into the Delta. Friant Dam stores San Joaquin River flows in Millerton Lake and diverts this water southward through the Friant-Kern Canal (and north in the Madera Canal, though that facility is not located in the Kern Region). The Friant-Kern Canal is 151.8 miles long and carries water south from Millerton Lake just northeast of Fresno and terminates into the Kern River. Through various agreements, the California Aqueduct can deliver west side CVP contractor supplies from the Delta, which are typically sold to west side districts with California Aqueduct access or exchanged with Friant districts such as AEWSD. For example, AEWSD's Friant water can be delivered to upstream Friant reaches while AEWSD takes delivery of SWP supplies delivered via the California Aqueduct. The Friant-Kern Canal has a maximum capacity of 5,000 cfs, which decreases to 2,000 cfs at its terminus into the Kern River. Deliveries are dependent upon Class 1 (firm) and Class 2 (non-firm, hydrology dependent) contract percent allocations determined by the Bureau of Reclamation, however the Bureau of Reclamation may also provide surplus water (Section 215 contracts to non-long term contractors), of which the Kern Region has utilized in the past. In addition, and similar to the SWP Article 21, the Westside CVP contracts from the Delta also have Section 215 contracts. An average of 318,877 AF of CVP water is delivered through the Friant-Kern Canal annually to the Kern Region for agricultural and municipal and irrigation uses. Table 2-9 provides a summary of the historical deliveries to Kern County. Future deliveries are anticipated to be below the average historic delivery, at approximately 243,887 AFY (see Table 2-10). Due to the San Joaquin River Restoration Program, Friant Division contractors as well as Section 215 contracts to Kern Region are expected to experience a reduction in water deliveries.

TABLE 2-9
CENTRAL VALLEY PROJECT DELIVERIES TO KERN REGION

Year	Kern Region Deliveries[(a)] (AF)	DRWD Deliveries[(b)] (AF)	Year	Kern Region Deliveries[(a)] (AF)	DRWD Deliveries[(b)] (AF)
1950	762		1979	462,526	
1951	27,005		1980	462,772	
1952	49,500		1981	469,966	
1953	83,558		1982	656,608	
1954	112,093		1983	550,874	
1955	126,238		1984	425,371	
1956	279,134		1985	337,514	
1957	141,684		1986	589,262	
1958	223,830		1987	291,981	
1959	166,099		1988	292,828	
1960	156,987		1989	293,865	
1961	126,412		1990	200,141	
1962	231,045		1991	204,396	
1963	234,283		1992	208,021	
1964	189,330		1993	489,783	
1965	245,482		1994	186,303	
1966	232,084		1995	647,077	1,587
1967	319,706		1996	611,262	7,498
1968	206,499		1997	630,026	2,804
1969	372,826		1998	466,490	2,246
1970	351,392		1999	350,526	
1971	348,865		2000	494,023	
1972	238,475		2001	200,865	
1973	412,178		2002	250,598	
1974	480,575		2003	363,108	
1975	442,130		2004	241,290	
1976	226,512		2005	702,465	4,881
1977	121,469		2006	582,490	1,559
1978	357,847		2007	197,894	
			Mean	**318,877**	

Notes: (a) Unpublished data, KCWA.
(b) Deliveries are combination of Section 215 water and CVP flood water (R. Besecker, personal communication, DRWD, February 2010).
Source: Unpublished data, KCWA.

TABLE 2-10
PROJECTED CENTRAL VALLEY PROJECT DELIVERIES TO KERN REGION (INCLUDING DELIVERIES TO DRWD)

Year	Delivery (AF)	Year	Delivery (AF)
2015	243,887	2035	243,887
2020	243,887	2040	243,887
2025	243,887	2045	243,887
2030	243,887	2050	243,887
		Mean	243,887

Source: Unpublished data, KCWA

The San Joaquin River is currently subject to a restoration effort that is a direct result of a Settlement reached in September 2006 on an 18-year lawsuit to provide sufficient fish habitat in the San Joaquin River below Friant Dam by the U.S. Departments of the Interior and Commerce, the Natural Resources Defense Council, and the Friant Water Users Authority (now Friant Water Authority). The Settlement received Federal court approval in October 2006 and required specific legislation which passed in 2009.

The two mains goals of the restoration effort are 1) the Restoration Goal, which is to restore and maintain fish populations, specifically self-sustaining populations of salmon and other fish, and 2) the Water Management Goal, which is to reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided in the Settlement. The restoration effort spans the middle 150 miles of the 350-mile River, from Friant Dam to the confluence of Merced River. Interim Flows are experimental or test flows, scheduled to be released prior to the introduction of salmon into the river, and are limited by downstream channel capacity. Full Restoration Flows are scheduled to begin no later than January 1, 2014.

Interim Flow releases from Friant Dam for the restoration effort began on October 1, 2009. These flows, which will generally range from 350 to 1,600 cfs, are anticipated to provide valuable information regarding flows, temperatures, fish needs, seepage losses, shallow groundwater conditions, recirculation, recapture and reuse conditions, channel capacity (high and low flows), and levee stability (DOI 2009). This information will be used in designing the major improvements needed in the River and informing the fish agencies as they craft a salmon reintroduction plan.

Table 2-11 presents the tentative release schedule through February 2010. The flow rates of the releases have been limited so that no flooding or seepage impacts are expected to occur and will be reduced as necessary if any such impacts are anticipated or observed (DOI 2009). The magnitude of Interim Flow releases after February 2010 through December 2013 will vary, depending on the hydrology of the San Joaquin River watershed with a maximum total annual release of approximately 384,000 AF (DOI 2009).

TABLE 2-11
TENTATIVE INTERIM FLOW RELEASE SCHEDULE FOR FRIANT DAM

Interim Flow Start Date / Duration	Estimated Riparian Release (cfs)	Estimated Interim Flow Release (cfs)	Total Release from Friant Dam (cfs)	Estimated Interim Flow Volume (AF)
October 2009	160	190	350	12,000
Nov. 1-14, 2009	130	570	700	16,000
February 2010	120	210	330	14,000
Total Release Volume				**42,000**

Source: DOI 2009.
Notes: The release schedule for flows after February 2010 have not been determined at this time will depend on the hydrology conditions during the year. The table is subject to change based on coordination with the parties of the Settlement and the Restoration Administrator.

Full Restoration Flows starting in 2014 will generally range from 350 cfs to over 4,000 cfs, depending on hydrology and time of year, with reduced flows in critically dry years. Total Restoration Flow releases in excess of current water rights requirements as defined in the Settlement will range from approximately 71,000 AF in critical dry years (except a repeat of 1977 when there would be no Restoration Flow releases) to approximately 556,000 AF (San Joaquin River Restoration Program 2009*)*. The Interim and Restoration flows will have a priority over existing contracts and as such the largest make-up of these supplies will result in water losses to Class 2 districts. During drier years, the water losses will be from Class 1 districts.

Interim and Restoration flows will result in reductions to water supply deliveries to CVP Friant Division contractors. Depending on which assumptions are used regarding use of buffer flows and reductions in Section 215 water (surplus flows), modeling results based on historical hydrology indicate that total annual deliveries to the Friant Division water service area during the Interim Flow period would be reduced by approximately 175 to over 200 thousand AF on average, corresponding to an approximate 13 to 15 percent reduction in average annual deliveries from Friant. These flows, however, could potentially be recaptured and recirculated by CVP Friant Division contractors downstream from Friant Dam, such as at existing CVP and SWP export facilities, subject to environmental and other regulations and no material adverse water supply impacts to third parties, resulting in reduced net water supply impacts to Friant Division contractors.

These flows could affect the future flows to the Kern Region provided in Table 2-10. AEWSD, the largest Class 2 district, has estimated that impacts to its CVP supplies will average 30,000 to 40,000 AFY. Additionally, it has been estimated that CVP supplies to Kern County will be further reduced by an average of 30,000 to 40,000 AFY due to reductions in Section 215 water. These averages assume full Restoration flows, which have been temporarily reduced due to capacity restraints and seepage impacts. In the future, this impact will then be reduced by the various mitigation tools, assuming they are effective.

2.6.3 Local Surface Water

The most important source of naturally occurring surface water in the Region is the Kern River, which is regulated by the Isabella Dam and Reservoir, operated by the U.S. Army Corps of Engineers and the Kern River Watermaster. Approximately 1,300 acres at the eastern end of the reservoir is managed by the USFS for wildlife stewardship. Local minor streams, many of which are ephemeral, provide additional local surface water. A very small percentage of minor stream runoff is collected and used as irrigation for agriculture; the majority of these irregularly-occurring flows serve to recharge local groundwater basins. It is estimated that roughly 95 percent of local runoff percolates into the underlying aquifers and contributes to groundwater levels near the Kern Lake Bed, AEWSD/KDWD boundaries, and the KNWR.

2.6.3.1 Kern River

The Kern River is approximately 164 miles long and is fed by annual snowmelt from the Southern Sierra Nevada, including Mount Whitney. Figure 2-1 depicts the Kern River, Isabella Reservoir, as well as the downstream canals that divert water from the River. Table 2-12 provides a summary of the natural and regulated flows for the Kern River.

The Kern River originates high in the Sierra Nevada and drains approximately 2,100 square miles of watershed area above Isabella Reservoir, another 300 square miles of the foothills below Isabella Reservoir, and about 600 square miles of alluvial fan in the Kern River Canyon (County of Kern 1985). The main branch of the River (also called the North Fork Kern) joins the South Fork Kern River just upstream of Isabella Reservoir. Minor tributaries are Erksine, Bodfish, Clear, and Cottonwood creeks, which join the River downstream of Isabella Reservoir. With the exception of the small valley in which Isabella Reservoir is located, the Kern River and its principal tributaries flow in steep, narrow canyons from their headwaters to the mouth of Kern Canyon, where it debuts onto the Valley floor. Beyond the mouth of the Canyon, the River channel is deeply entrenched in an alluvial fan that extends westward to the main valley trough where the channel is controlled by levees to prevent flood flows from spreading to adjacent lands (City of Bakersfield and County of Kern 2007). The Kern River had an unregulated flow until 1954, when the Isabella Dam and Reservoir were constructed by the US Army Corps of Engineers. The primary purpose of the dam is flood control. Isabella Reservoir was designed to store approximately 570,000 AF of water; however, since 2006 due to seepage and earthquake concerns, water storage in the Lake has been limited to approximately 60 percent of capacity, 20 feet below the spillway, and 340,860 total AF. The US Army Corps of Engineers is undertaking studies at Isabella Reservoir with the intent of restoring reservoir capacity (US Army Corps of Engineers 2009).

TABLE 2-12
HISTORIC KERN RIVER FLOWS (AF)

Year	Natural (AF)	Regulated (AF)	Year	Natural (AF)	Regulated (AF)
1980	1,639,957	1,560,652	1994	336,456	422,361
1981	449,263	460,469	1995	1,385,160	1,197,100
1982	1,271,139	1,121,088	1996	1,038,261	968,036
1983	2,489,128	2,381,575	1997	1,181,969	1,133,463
1984	821,797	834,036	1998	1,717,967	1,662,556
1985	1,444,939	668,971	1999	433,971	461,621
1986	375,935	1,331,561	2000	476,819	472,536
1987	294,685	432,309	2001	391,451	375,769
1988	397,038	335,473	2002	424,696	357,160
1989	203,571	348,773	2003	519,724	460,406
1990	406,289	219,501	2004	407,305	407,272
1991	296,829	333,494	2005	1,156,109	935,439
1992	853,760	272,822	2006	1,071,841	1,027,688
1993	1,385,160	642,339	2007	252,692	318,050

Source: Unpublished data, KCWA.

The Kern River Watermaster represents entities with water rights downstream of Isabella Reservoir. The Watermaster identifies the daily water releases to be made from the reservoir by the Army Corps of Engineers. The Watermaster also keeps records of Kern River flow. With the exception of very wet years, there is no river flow downstream of Bakersfield due to upstream canal diversions (see Figure 2-1). The River encounters its first diversion into a canal when it first exits the Kern River Canyon and encounters another diversion when it reaches the east side of Bakersfield, near Hart Park. The Beardsley and Rocky Point weirs are the first two of seven diversion weirs in Bakersfield. From there, canal water travels north and south to irrigate farmlands. In total, the River is diverted into seven canals that pass through the City. During very wet years, water flows in the River southwest to the Buena Vista Lake Bed and then north to Tulare Lake or into the California Aqueduct near Tupman (City of Bakersfield and County of Kern 2007).

In 1989 the State Water Resources Control Board (SWRCB) declared that the Kern River, from the Buena Vista Lake bed upstream (including all tributaries) was fully appropriated year-round. The "fully appropriated" status of the Kern River means the SWRCB will not accept new applications for diversion from the Kern River. Six petitions have been filed with the SWRCB challenging the fully appropriated status of the Kern River. The entities filing petitions are:

1. North Kern Water Storage District and City of Shafter
2. City of Bakersfield
3. Buena Vista Water Storage District
4. Kern Water Bank Authority
5. Kern County Water Agency
6. Rosedale Rio Bravo Water Storage District

Along with the petitions to revise the Kern River's fully appropriated status, these entities have filed applications to appropriate water from the Kern River. Depending on the outcome of the fully appropriated streams status and any subsequent water rights decisions, water diversions from the Kern River may be affected.

2.6.3.2 Minor Streams

Local minor streams are the second-largest source of local surface water after the Kern River. Streams with measurable runoff are grouped into four separate watershed areas: Poso, Caliente, El Paso, and San Emigdio. Streams with the largest historical flows, including Poso and Tehachapi Creeks, are equipped with flow meters to record actual data while flow rates of smaller streams are estimated by statistical methods based on historical watershed, precipitation, and runoff data. The mean stream flow of these minor streams is 98,900 AF and is assumed for future stream flow projections (unpublished data KCWA). Historic minor stream runoff is summarized in Table 2-13.

Small creeks and streams drain local mountain ranges. The majority are ephemeral and quickly infiltrate once reaching the valley floor. However, under certain hydrologic conditions, some of these streams carry very large flows that can be quite damaging. Examples include flooding in the Kelso Creek area, and in the area around the cities of Arvin and Lamont. Regional efforts to address flooding and to better manage such flow events have been initiated among various parties in the Region, including the County of Kern, KCWA and the affected areas.

A very small percentage of runoff from local minor streams is collected and used as irrigation for agriculture located in the NKWSD and the SWSD. It is estimated that on average, roughly 37,600 AF or 95.2 percent of the runoff percolates into the underlying aquifers and contributes to the shallow groundwater near the Kern Lake Bed and KNWR areas (unpublished data, KCWA).

TABLE 2-13
HISTORIC MINOR STREAM RUNOFF (AF)

Year	Annual Stream Flow (AF)	Year	Annual Stream Flow (AF)
1980	70,300	1994	37,400
1981	45,100	1995	426,400
1982	93,600	1996	79,500
1983	503,300	1997	103,000
1984	46,500	1998	709,500
1985	37,800	1999	40,100
1986	52,400	2000	27,700
1987	70,900	2001	37,200
1988	29,900	2002	22,800
1989	27,800	2003	55,900
1990	17,500	2004	30,700
1991	41,900	2005	89,900
1992	87,300	2006	54,100
1993	110,900	2007	20,500

Source: Unpublished data KCWA.

2.6.4 Groundwater

With only six (6) inches per year of average rainfall, groundwater is necessary to maintain a sufficient water supply in the semi-desert climate of the Region. It is estimated that on average groundwater accounts for 39 percent of total water supply to the Region; however, it is estimated to be as much as 60 percent during dry years.

The main sources of groundwater recharge in the Region are applied irrigation water, surplus SWP/CVP water (Article 21 and Section 215 type as well as large declarations of Table A and Class 2) and the Kern River. In the riverbed are 500 to 2,000 foot thick poorly sorted deposits of silt, sand, rock, and clay that originated from the Sierra Nevada, and that provide moderate to high permeability through the riverbed. This phenomenon is also seen in some of the unlined canals which branch off from the river and creeks such as the Kelso, Canebrake, and Brite. Major water banking and conjunctive use projects also contribute large amounts of recharge to the Region. Secondary sources of groundwater are infiltration of water used for irrigation in agricultural applications, as well as urban runoff.

The main basin is the San Joaquin Valley groundwater basin (DWR Groundwater Basin 5-22.14), which covers the majority of the managed resources in the Region. Other groundwater basins in the Region include the Kern River Valley groundwater basin (DWR Groundwater Basin 5-25) to the east; Walker Basin Creek Valley (DWR Groundwater Basin 5-26) to the east; Cummings Valley (Basin 5-27), Tehachapi Valley West (Basin 5-28), and Brite Valley (Basin 5-80) to the southeast; and Cuddy Ranch Area (Basin 5-83), Cuddy Valley (Basin 5-84), and Mil Potrero Area (Basin 5-85) basins to the south (DWR 2003). All of these groundwater basins boundaries are within the watershed boundary of the Kern Region. Groundwater basins in the Region are depicted in Figure 2-7.

It should be noted that DRWD is within the Tulare Lake groundwater basin. It is categorized in DWR Bulletin 118 as having “groundwater unavailable and/or unusable”. Therefore DRWD has participated in out-of-district conjunctive use projects, including groundwater banking and water exchange projects in the Kern Region and elsewhere.

2.6.4.1 Groundwater Extractions

Agriculture, M&I users, and groundwater banking operations all draw upon local groundwater resources. Agriculture is estimated to be the largest user of groundwater. The majority of groundwater extractions in the Region are not recorded; thus obtaining an accurate assessment of groundwater extractions in the Region is difficult. In the past, agricultural and urban power records were matched with calculations for groundwater production. However, because the accuracy of such power record calculations was unsatisfactory, since the year 2001 groundwater extractions have been estimated based on trends in groundwater storage (see Table 2-14) and/or assessment of crop water requirements.

TABLE 2-14
HISTORICAL TOTAL GROUNDWATER EXTRACTIONS BY PURVEYORS

Year	Extractions (AF)	Year	Extractions (AF)
1980	977,000	1994	1,897,700
1981	1,161,000	1995	1,242,800
1982	802,200	1996	1,609,600
1983	762,700	1997	1,091,400
1984	1,252,200	1998	1,290,200
1985	1,293,800	1999	1,471,500
1986	947,600	2000	1,360,100
1987	1,208,700	2001	1,953,900
1988	1,540,000	2002	1,575,000
1989	1,588,500	2003	1,203,900
1990	1,796,000	2004	1,842,300
1991	2,002,400	2005	579,900
1992	1,673,600	2006	716,500
1993	987,700	2007	2,212,300
		Mean	**1,398,100**

Source: Unpublished data KCWA

For future projections of groundwater extractions the historic mean of 1,398,100 AFY will be assumed.

2.6.4.2 Groundwater Banking and Recharge

Groundwater banking programs are widely used in the Kern Region; conjunctive use programs have been utilized in the region since the early 1900s. Many notable groundwater storage programs exist in the Kern Region, including those operated by AEWSD, Semitropic WSD, North Kern WSD, the City of Bakersfield, Rosedale-Rio Bravo Water Storage District (RRWSD), and various other districts in the Region. The Kern Water Bank Authority (KWBA) is responsible for the largest water banking program in the world and has contributed over 2 MAF of water into storage since the program began operations in 1995.

Groundwater banking is the storage/recharge of excess water supplies into aquifers during wet periods for later withdrawal/recovery for use during dry periods, usually within a mile or two of where the recharge took place. Sometimes, however, recovery can occur up to a few miles from where the recharge took place. Historically, during wet periods, surface water imports have been substantial enough to satisfy irrigation and urban water needs and thus, excess water has been recharged to groundwater aquifers. The groundwater is then pumped/extracted out through the many private and publicly owned wells located throughout the Region during dry periods when local or imported surface water supplies are insufficient. It is estimated that there are over 30,000 acres of groundwater recharge ponds alone in the Region. During wet periods, these basins provide excellent habitat for bird species including great blue herons, bald eagles, mallards, white pelicans, and others. Banking programs include the following:

- City of Bakersfield 2800 Acres
- Berrenda Mesa Banking
- Pioneer Banking
- Kern Water Bank
- Semitropic Water Storage District Banking
- Arvin-Edison Water Storage District Banking
- Kern Tulare and Rag Gulch Water Districts Banking
- Buena Vista Water Storage District Banking
- Rosedale-Rio Bravo Water Storage District Banking
- Kern Delta Water District Banking
- Cawelo Water District Banking

In total, maximum annual recharge capacity in the Region is estimated at 1.5 MAFY with maximum annual recovery estimated at 900,000 AF. In January 2008, KCWA estimated that total storage capacity for the Region is approximately 50 MAF. Currently, approximately 10 MAF of that storage has been dewatered and, therefore, is available for conjunctive use and groundwater banking operations. There is approximately 5.4 MAF in managed groundwater storage in the Region.

2.6.5 Recycled Water

Recycled water programs are important in the Kern Region due to the fact that the Tulare Lake hydrologic region mainly consists of a "closed basin," that is, supplies entering the basin have no natural outlet. Because there is no natural outflow all effluent must be treated and disposed of within the basin. Agriculture, which accounts for the majority of total water use in Kern County, does not require water treated to potable water standards. The large amount of agriculture in the Region has meant that nearly all wastewater effluent produced by the various treatment facilities in the County can be applied to salt tolerant non-human consumption crop irrigation and environmental habitat restoration. Recycled water is also used to irrigate and flood certain areas of the KNWR.

Currently, in the Region there are 19 wastewater treatment plants (WWTPs) that provide secondary and tertiary treated effluent. In 2007, approximately 61,000 AF of effluent was recycled. Table 2-15 provides a summary of the historic volumes of recycled water in the Region. In addition to treatment plant effluent, agricultural tailwater return systems are also used to recover and reuse water. These return systems collect runoff and transport it to the main irrigation system.

The City of Bakersfield is currently expanding its WWTP No. 3 from 16 million gallons a day (MGD) to 32 MGD. This expansion will make approximately another 18,000 AFY of recycled water available. Most of this water will be treated to secondary standards, appropriate for irrigation of non-food crops as well as groundwater recharge. However, the treatment plant expansion will also make it possible to treat approximately 2,250 AFY to tertiary standards and this recycled water will be appropriate for use on food crops as well as industrial water uses (Bakersfield 2006). For future projections of recycled water flows, 77,000 AFY was assumed. This is a conservative number because multiple entities in the Region are examining the possibility of increasing production and use of recycled water.

TABLE 2-15
RECYCLED WATER USE

Year	Deliveries (AF)	Year	Deliveries (AF)
1980	32,800	1994	49,700
1981	34,100	1995	49,700
1982	32,100	1996	51,300
1983	35,300	1997	50,800
1984	35,800	1998	48,800
1985	34,200	1999	48,533
1986	58,000	2000	49,970
1987	39,200	2001	51,035
1988	44,200	2002	51,600
1989	44,000	2003	56,600
1990	42,500	2004	54,800
1991	45,200	2005	55,200
1992	46,100	2006	56,800
1993	47,600	2007	59,000

Source: Unpublished data, KCWA.
Note: Historical record above does not include deliveries from five WWTP's in the Tehachapi area (CCI WWTP, City of Tehachapi WWTP, Golden Hills Sanitation Company WWTP, Bear Valley WWTP, and Stallion Springs WWTP. According to the 2010 Tehachapi Regional Urban Water Management Plan, these five facilities produce approximately 2,000 AF of recycled water annually.

Increased use of recycled water for irrigated agriculture as well as landscape irrigation in the M&I sector could help lower dependence on high quality SWP and CVP water and will provide an additional water source during drought or periods of regulatory restrictions when imported potable water quantities are reduced. In addition, waste discharges will be greatly reduced and the high quality imported water can be applied towards best use. Wastewater effluent is regulated by the California Code of Federal Regulations (CFR) as well as the California Department of Health Services (DHS, now the California Department of Public Health, DPH). Municipal treatment facilities producing effluent for introduction into irrigation canals must disinfect to a minimum of 23 most probable number (MPN) of coliform per 100 ml of discharge.

2.6.6 Other Water Supply Opportunities

2.6.6.1 Kern River Oil Field

The Kern River Oil Field located just north of the City of Bakersfield is the third largest oil field in the State and the fifth largest field in the Country. Water trapped within oil deposits is released as part of the oil extraction and refining process. In the past, the water released during oil extraction was deposited into the Kern River, but following implementation of more stringent environmental protection measures, Shell Oil Company began reusing the water in the form of steam to accelerate oil extraction. Beginning in 1980, the NKWSD and Cawelo Water District located in northern Kern County began receiving oil field produced water for recharge and irrigation purposes. Historic oil field produced water deliveries are presented in Table 2-16.

TABLE 2-16
HISTORICAL TOTAL OIL FIELD PRODUCED WATER DELIVERIES

Year	Deliveries (AF)	Year	Deliveries (AF)
1980	10,100	1994	16,800
1981	10,100	1995	19,800
1982	10,600	1996	13,800
1983	11,600	1997	4,200
1984	11,700	1998	2,000
1985	11,700	1999	2,700
1986	11,800	2000	4,100
1987	10,000	2001	3,600
1988	12,700	2002	1,100
1989	9,100	2003	100
1990	5,300	2004	500
1991	14,100	2005	4,600
1992	8,700	2006	21,200
1993	9,600	2007	5,800
		Mean	**8,400**

Source: Unpublished data KCWA.

For future projections of oil-field produced water, the historic mean of 8,400 AFY was assumed. Edison oilfield produced water has potential for southern districts like AEWSD, KDWD and/or Wheeler-Ridge Water Storage District; however, water quality and M&I concerns, given banking programs with urban agencies, need to be addressed and mitigated.

2.6.6.2 Agriculture Processing Wastewater

In addition to treated wastewater effluent, effluent from plants processing crops harvested from the field and those preparing processed food potentially provide a source of additional water supply opportunities. Currently, effluent from agricultural processing facilities is being recycled for irrigation use and is being evaluated for use in groundwater recharge programs.

2.6.6.3 Transfers and Exchanges

As described above, the Region has multiple water sources including the Kern River, SWP, CVP, groundwater, and minor local streams. In response the Region has developed a complex and interconnected water distribution system (see Figure 2-1). This network of canals and pipelines makes it possible to “wheel” or convey water from one area to another, both regional and statewide. Local agencies have agreements in place that allow agencies to call on available supplies when another supply source is experiencing shortage, and for other reasons to reduce costs, conserve energy, and/or improve water quality. For example, the KCWA Improvement District Number 4 (ID4) has transfer and exchange agreements in place with NKWSD, Buena Vista Water Storage District and KDWD that allow ID4 to increase its use of Kern River water in years when SWP supplies are limited. AEWSD also has assisted districts with transfers and exchanges given its CVP contract and facility infrastructure interconnections with all major conveyance systems (Kern River, CVP/Friant-Kern Canal, SWP/California Aqueduct, CVC, and interconnections with Kern Delta WD).

This distribution network makes it possible to store excess water in a given year or period and then recover and deliver that water in another year or later in a year. In fact, several water banks have agreements to store surface water from agencies outside the Region. These agreements allow imported supplies that belong to the out-of-Region banking participants to be delivered to banking programs within the Region, usually via the California Aqueduct or Friant-Kern Canal. The water is either percolated into the groundwater basin and stored, or utilized by local agencies in-lieu of groundwater pumping, thus allowing water levels in the groundwater basin to be maintained or improved. During water-short periods, the stored water can either be pumped and delivered directly (if the banking participant is physically located south of the Region), or arrangements can be made to use out-of-Region banked water locally, in exchange for the use of KCWA’s Table A or Arvin-Edison WSD contract amount (if the banking participant is physically located north of the Region).

2.7 Water Quality

There are many tools, whether regulatory, voluntary, or incentive based, currently available for preventing pollution. The US EPA, SWRCB, and Regional Water Quality Control Boards (RWQCBs) have permitting, enforcement, remediation, monitoring, and watershed-based programs to prevent pollution. Pollution can enter a water body from point sources like WWTPs and/or other industries that directly discharge to the river and from nonpoint sources over a broad area, such as runoff from a city and/or agricultural farmland or grazing areas located adjacent to stretches of the river reach. Some nonpoint source (NPS) contaminants are naturally occurring in local rocks and soil, such as heavy metals, (arsenic, chromium, selenium). Preventing pollution from most point sources relies on a combination of source control and treatment, while preventing NPS pollution generally involves the use of best management practices (BMPs), efficient water management practices, and source control. NPS pollution is not typically associated with discrete conveyances.

The Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. SDWA applies to every public water system in the United States. SDWA authorizes the US EPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. Originally, SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. Amendments in 1996 greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. Under the SDWA, technical and financial aid is available for certain source water protection activities.

The Federal Clean Water Act (CWA) contains two strategies for managing water quality including: (1) a technology-based approach that envisions requirements to maintain a minimum level of pollutant management using the best available technology; and (2) a water quality-based approach that relies on evaluating the condition of surface waters and setting limitations on the amount of pollution that the water can be exposed to without adversely affecting the beneficial uses of those waters. Section 303(d) of the CWA bridges these two strategies. Section 303(d) requires that the States make a list of waters that are not attaining standards after the technology-based limits are put into place. For waters on this list (and where the US EPA administrator deems they are appropriate) the States are required to determine all the sources of the pollutants that caused the water to be listed including, contributions from point sources and non point sources. Impaired water bodies within Kern County are listed in Table 2-17.

The federal CWA, as well as the State Porter-Cologne Water Quality Control Act, requires water quality control plans to establish water quality standards which address beneficial uses of water sources. The CVRWQCB has established and adopted the Water Quality Control Plan for the Tulare Lake Basin (Basin Plan). The Basin Plan describes designated beneficial uses to be protected, water quality objectives to protect those uses, and a program of implementation needed for achieving the objectives. Beneficial uses, together with their corresponding water quality objectives, meet federal regulatory criteria for water quality standards. Hence, the Basin Plan serves as regulatory references for meeting both State and federal requirements for surface and groundwater water quality control in the Tulare Lake Basin.

2.7.1 Surface Water Quality

The Kern River, the primary native surface supply in Region, is generally considered a high quality supply. However, portions of the River have water quality issues but are not listed on the 303 (D). However, Isabella Lake which serves as the source for the lower Kern River has two constituents listed on the 303(D) list with a completed total maximum daily load (TMDL) in 2021. Water agencies, the City of Bakersfield, Kern County Department of Parks, the US Bureau of Land Management (USBLM), and USFS, in coordination with the California Department of Public Health perform regular surveys of the Kern River watershed. These surveys focus on identifying any activities that could affect water quality and water quantity.

TABLE 2-17
2010 303(D) LIST OF IMPAIRED WATER BODIES – KERN COUNTY

Name	Pollutant/ Stressor	Potential Sources	Typical Data Range	Basin Plan Objective	Est. Size Affected (acres)	Proposed/ Approved TMDL Completion
Isabella Reservoir	Dissolved Oxygen	Unknown	0.8 – 11.0 mg/L	No sample < 5.0 mg/L	123	2021
	pH	Unknown	7.3 - 9.6	6.5 – 8.5	123	2021

Source: Central Valley Regional Water Quality Control Board 2010

2.7.2 Imported Water Quality

DWR regulates the water quality of the SWP through the Department of Water Resources Water Quality Criteria for Acceptance (Acceptance Criteria) of Non-Project Water into the State Water Project and the Implementation Procedures for the Review of Water Quality from Non-Project Water Introduced into the State Water Project (Implementation Procedures). DWR has provided draft criteria that are still undergoing revision. In the interim, between the time of when the criteria were established and the current proposed criteria, new or modified regulations for some additional constituents of concern have been developed.

The current water quality criteria for the SWP are compared to current water quality conditions in the California Aqueduct and to the current federal primary and secondary drinking water standards, and provided in Table 2-18. Table 2-18 reports water quality in the California Aqueduct from a point just upstream of Kern County (data taken from Station KA017226, Check 21 near Kettleman City). It is important to note that not all constituents currently in the Water Supply Contract between DWR and the KCWA (October, 2003) are sampled for by DWR. It is also important to note that while some constituents do not have SWP pumpback criteria and/or a maximum contaminant level (MCL) standard (bromide, total organic carbon, total dissolved solids (TDS), and chloride) high levels of these constituents can be of concern, especially with regard to potential treatment costs to downstream users.

TABLE 2-18
COMPARISON OF SWP WATER QUALITY CRITERIA

Constituent	SWP Contract Criteria ppm	CA Drinking Water Standards (2010) ppm
Arsenic	0.05	0.010
Hexavalent Chromium	0.05	-
Copper	3.0	1 [(b)]
Fluoride	1.5	2 [(b)]
Boron	0.6[(a)]	-
Sodium Percentage	50%[(a)]	-
Iron and Manganese, together	0.3	0.3 and 0.05[(b)]
Magnesium	125	-
Lead	0.1	0.015
Phenol	0.001	-
Selenium	0.05	0.05
Zinc	15	5[(b)]
Sulfate	110[(a)]	250[(b)]
Total Hardness	180[(a)]	No standard
TDS	440[(a)]	500[(b)]
Chloride	110[(a)]	250[(b)]

Notes:
(a) Monthly Average
(b) Denotes secondary standard.

SWP water meets or exceeds applicable standards (see Appendix D for data). However, there is concern with some constituents that are approaching SWP acceptance criteria, particularly arsenic and selenium. As of January 2006, the Federal arsenic MCL was revised to 10 micrograms per liter (µg/L) (down from 50 µg/L) and selenium's MCL is at 0.05 milligrams per liter (mg/L), which will have significant impacts on water utilities in California that will need to install or modify treatment to remove these trace metals. Additionally, the lowering of the arsenic standard likely will affect what DWR will establish as the appropriate criteria for arsenic in water added to the SWP system, which is currently set at 5 μg/L under the 2003 contract with KCWA.

US Bureau of Reclamation regulates water quality of the Friant Division CVP through the “Baseline Water Quality Report for CVP” as well as other programs such as “Policy for Accepting Non-Project Water into the Friant-Kern and Madera Canals”, which is currently being updated to incorporate agricultural water quality standards.

SWRCB regulates water quality within the State including but not limited to the “Anti-degradation Policy”, which has been in effect and administered since 1968 (Resolution 68-11).

"Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies became effective, such existing high quality will be maintained, until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses of such water and will not result in water quality less than prescribed in the policies."

Due to the drastically varying water qualities of the various local water supplies (SWP, CVC, FKC, Kern River, groundwater), conveyance agreements, such as the CVC Operating Agreement, provide certain protections. Total dissolved solids (TDS) or Electric Conductivity (EC), both being “salt” constituents indicators, exhibit on average a 10 times differential between the California Aqueduct (200 and 300, respectively) and the Friant-Kern Canal (20 and 30, respectively) water supplies. As an example of water quality protections, the following is an excerpt from the CVC Operating Agreement:

... *"Use of the Intertie for delivery of water from the CVC to the Friant-Kern Canal may result in adverse water quality impacts to Arvin-Edison. Due consideration for such impacts shall be negotiated between those Participants desiring to introduce water into the Friant-Kern Canal and Arvin-Edison; provided, however, no such consideration shall be due with respect to any water provided under existing contracts and renewals thereof between Rag Gulch, Kern-Tulare and the Fresno- Tulare Group and United States providing for deliveries from the California Delta or Rag Gulch or Kern-Tulare supplies delivered pursuant to Federal approval.* " ...

2.7.3 Groundwater Quality

Groundwater quality throughout the region is typically suitable for most urban and agricultural uses with only localized impairments including high TDS (salts), sodium chloride, sulfate, nitrate, organic compounds, boron and arsenic. High TDS, arsenic and nitrates are the primary groundwater quality issues.

The CVRWQCB has stated, “The greatest long-term problem facing the entire Tulare Lake Basin is the increase of salinity in ground water” (2004). Salt in imported water supplies such as the SWP and CVP is the major source of salt which circulates throughout the groundwater in Kern County. An estimated 1,206 tons of salt is annually imported to the region and because the Tulare Lake Hydraulic Region does not have any natural outlets, the salt builds up and remains in the underlying aquifers. Agricultural practices can exacerbate the problem, irrigation water applied to the land can be high in salts, then evaporation and crop transpiration remove water from soils and salts accumulate in the root zone. It is then necessary to apply additional water to flush the salts from the root zone and the salts eventually end up in groundwater or surface waters. High salt concentrations (e.g., greater than the primary drinking water standard) are a particular problem in the western portion of the Region. DWR and other federal, state and local agencies continue to study alternative approaches for salt management. The CVRWQCB has stated that evaporation basins are an acceptable interim means for dealing with salts in agricultural drainage, but only when precautions are taken to limit wildlife exposure. The RWQCB's preferred method for salt management is the construction of a valleywide drain to carry salts outside of the Central Valley. Planning for regional drainage facilities began as early as 1950. Planning has focused on the western side of the San Joaquin Valley, generally north of the Region.

Nitrates are usually derived from irrigated agriculture, dairies, disposal of sewage from community waste systems and septic tanks, as well as discharges of wastewater to land. Man-made pesticides used in agriculture and naturally occurring arsenic have occasionally contaminated domestic groundwater supplies in the area.

Arsenic is both a groundwater and surface water quality issue. Arsenic is ubiquitous in the environment and is naturally present in soil, water, air, plants and animals. Weathering of arsenic-containing rocks is considered to be the primary natural source of arsenic in the environment. Arsenic is found in groundwater throughout the state, resulting from its natural occurrence. It may also be present in localized environments in high concentrations as a result of specific releases, such as from mine tailings and chemical spills. Arsenic treatment tends to be expensive, not just because of the more exotic treatment technologies required, but because of the large volumes of groundwater that typically must be treated when the source of the arsenic is naturally occurring. As described earlier if the SWP acceptance standard for arsenic is lowered it could limit the ability to introduce groundwater recovered from water banking operations into SWP facilities.

2.8 Water Demand

Water demands within the Kern Region are serviced by a variety of water purveyors, including the large wholesale agency, KCWA, its member districts, irrigation or water storage districts, investor-owned water companies, mutual water companies, municipalities and private well owners. Water demands are presented for urban and agricultural demand sectors.

2.8.1 Urban Demand

Urban water demands were developed from information provided by the various water agencies participating in this IRWMP. Generally historic and projected urban water demands were taken from UWMPs developed by the agencies. Specifics on how these demands were developed are provided in the subregion specific sections of this report. Urban water demands were divided into residential, commercial/industrial/institutional, landscape, and other water use types (including water losses). Table 2-19 provides a summary of historic and projected urban water demands. Purveyors supplying water to M&I customers include:

- ACSD
- BCWD
- BVCSD
- CWS
- CLWC
- City of Bakersfield
- City of Delano
- City of Shafter
- City of Tehachapi
- City of Wasco
- ENCSD
- FPPUD
- GCWD
- GHCSD
- HMWD
- ID4
- LPUD
- LHUD
- LCWC
- LCWD
- McFarland MWC
- MMWC
- NORMWD
- OMWC
- OWD
- RVMUC
- Rancho Verdugo Water Company
- SSCSD
- Stockdale MWC
- TCCWD
- TCWD
- VWC
- Victory MWC
- Wasco State Prison
- WKWD

2.8.2 Agricultural Demand

Agricultural demand was developed from the total irrigated acreage of 833,452 acres and an average consumptive water use of 2.49 AF per acre. Table 2-20 provides a breakdown of the acreage by crop type. Although historically the trend of agricultural water use has been decreasing, for purposes of this report future agricultural water demands are assumed to stay the same at 2,669,713 AFY. Purveyors supplying agricultural customers include:

- AEWSD
- BWSD
- BMWSD
- BVWSD
- Buttonwillow ID
- Cawelo WD
- DEID
- Henry Miller WD
- DRWD
- KCWD
- KDWD
- KTWD
- Lost Hills WSD
- NWKSD
- Rio Bravo Ranch
- Pond Poso ID
- Rag Gulch WD
- Rosedale Ranch ID
- RRBWSD
- SWSD
- SWID
- So. San Joaquin MUD
- TCCWD
- WKWD
- WRMWSD

Total 2005 urban and agricultural demand for the Kern Region is estimated at around 2,857,755 AF (2,669,713 AFY + 188,042 AFY). Projected 2030 total demand is estimated to be 2,938,818 AF.

2.9 Water Related Infrastructure

The following sections include a discussion of the major water-related infrastructure within the Kern Region. In general, many Kern County communities are older and the physical components of their water systems are aging and outdated. Aging infrastructure is a particular issue for rural communities and DACs. In recent years rapid development in some areas has provided new infrastructure, but this new infrastructure is limited to those areas receiving new development. Water treatment improvements have recently been undertaken by KCWA, the City of Bakersfield, California Water Service Company (CWS), and North of the River Municipal Water District (NORMWD). Surface water improvements by agricultural districts have also been undertaken by AEWSD, KDWD, WKWD, and RRBWSD. KCWA and other CVC Participants also recently expanded the CVC and constructed a 500 cfs intertie with the Friant-Kern Canal. The CVCconveys water between the California Aqueduct and the east side of the San Joaquin Valley, from 922 to 1,422 cfs. Other communities are planning upgrades to their water treatment infrastructure. Part of the impetus for joining and participating in the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs.

TABLE 2-19
SUMMARY OF URBAN WATER DEMAND (AFY)

Subregion	Purveyor	Demand 2005	2010	2015	2020	2025	2030	Notes
Greater Bakersfield	KCWA Improvement District No.4							
	California Water Service	12,500	11,500	19,500	20,500	20,500	20,500	(a)
	City of Bakersfield	6,500	0	6,500	6,500	6,500	6,500	(a)
	East Niles CSD	6,000	5,000	11,000	11,000	11,000	11,000	(a)
	North of the River MWD	2,200	8,500	11,000	11,500	12,500	13,750	(a)
	Oildale MWC	7,800	8,528	9,323	10,193	11,144	12,184	(b)
	City of Bakersfield (demand besides ID4)	26,179	25,168	27,764	32,590	38,778	45,331	(c)
	Casa Loma Water Company	--						
	Greenfield CWD	2,600	2,843	3,108	3,398	3,715	4,061	(b)
	Stockdale MWC and Annex	200	219	239	261	286	312	(b)
	Victory MWC	205	224	245	268	293	320	(b)
	Subtotal	***64,184***	***61,982***	***88,679***	***96,210***	***104,716***	***113,958***	
Kern Fan	Buttonwillow CWD	130	142	155	170	186	203	(b)
	Vaughn WC	10,700	13,200	15,400	17,600	19,600	21,827	(d)
	West Kern WD	24,681	24,729	26,983	27,080	27,177	27,275	(e)
	Subtotal	***35,511***	***38071***	***42,538***	***44,850***	***46,963***	***49,305***	
Mountains/ Foothills	Tehachapi-Cummings CWD	6,712	7,338	8,023	8,771	9,590	10,484	(f)
	City of Tehachapi (in TCCWD)							
	Golden Hills CSD (in TCCWD)							
	Stallion Springs CSD2 (in TCCWD)							
	Bear Valley CSD (in TCCWD)							
	Long Canyon WC		-	-	-	-	-	(m)
	Frazier Park PUD	850	1,768	1,768	1,768	1,768	1,768	(g)
	Lebec CWD		-	-	-	-	-	(m)
	Tejon-Castac WD	176	1,587	3,126	4,809	6,521	8,842	(h)
	Subtotal	***7,738***	***10,693***	***12,917***	***15,348***	***17,879***	***21,094***	
Kern River Valley	California Water Service-KRVD	1,120	878	1,112	1,122	1,146	1,171	(l)
	Mt. Mesa WC		-	-	-	-	-	(m)
	Rainbird Valley MUC		-	-	-	-	-	(m)

Subregion	Purveyor	Demand 2005	2010	2015	2020	2025	2030	Notes
	Valley Estates Property Owners Assoc		-	-	-	-	-	(m)
	Tubatulabals of Kern County		-	-	-	-	-	(m)
	Subtotal	***1,120***	***878***	***1,112***	***1,122***	***1,146***	***1,171***	
North County	City of Delano	9,752	12,330	14,011	15,692	17,598	19,840	(i)
	City of Shafter	56,750	52,676	48,603	44,528	40,454	40,454	(j)
	City of Wasco	4,444	8,755	10,142	13,194	16,602	20,368	(k)
	McFarland MWC	1,614	1,765	1,929	2,109	2,306	2,521	(b)
	City of McFarland (in McFarland MWC)							
	Subtotal	***72,560***	***75,526***	***74,685***	***75,523***	***76,960***	***83,183***	
South County	Arvin CSD	3,176	3,472	3,796	4,150	4,538	4,961	(b)
	Lamont PUD	4,450	4,865	5,319	5,815	6,358	6,951	(b)
	Mettler CWD	--	--	--	--	--	--	
	Subtotal	***7,626***	***8,337***	***9,115***	***9,965***	***10,896***	***11,912***	
West Side	Lost Hills UD	423	462	506	553	604	661	(b)
	Subtotal	***423***	***462***	***506***	***553***	***604***	***661***	
	Grand Total	***189,162***	***195,949***	***229,552***	***243,571***	***259,164***	***281,284***	

Notes:
(a) ID4. 2010 UWMP
(b) Year 2005 from unpublished KCWA data. Water demands 2005 to 2030 assumed to grow 1.8% per year based on Kern Council of Governments Draft Regional Forecast Report.
(c) Demand reported in City of Bakersfield 2005 UWMP less demand reported for City in ID4 2005 UWMP.
(d) Vaughn WC 2005 UWMP. Data for 2030 estimated based on growth rate 2020 to 2025.
(e) West Kern WD 2010 UWMP.
(f) Data for 2005 M&I demands provided by Tehachapi-Cummings CWD. Water demands assumed to grow 1.8% per year, based on Kern Council of Governments Draft Regional Forecast.
(g) County of Kern 2006. Frazier Park Estates Draft EIR. Includes Frazier Park Estates; Flying J Plaza; and school.
(h) Tejon-Castac 2005 UWMP. Data for 2030 estimated based on growth rate 2020 to 2025.
(i) City of Delano 2005 UWMP.
(j) City of Shafter 2005 UWMP.
(k) City of Wasco 2005 UWMP.
(l) California Water Service-KRVD 2010 UWMP.
(m) No data available

TABLE 2-20
SUMMARY OF AGRICULTURAL WATER DEMAND (AFY)

Crop Type	Irrigated Acreage	Consumptive Water Use (AF/acre)	Agricultural Water Demand (AFY)
Alfalfa (including seed)	92,210	4.10	378,215
Almonds	179,948[(a)]	3.28	590,079
Apples, Pears, Plums	3,178	3.45	10,968
Apricots, Nectarines, Peaches	4,642	3.35	15,570
Beans	3,712	2.11	7,848
Carrots	28,645	2.55	72,902
Citrus	57,904	3.37	195,088
Corn, Grain Sorghum	52,008	2.95	153,207
Cotton	74,212	2.71	200,929
Grapes	101,571[(a)]	2.81	285,245
Grain and Grain Hay	58,647	2.07	121,155
Idle, Fallow Lands	183,495	0.33	59,789
Melons, Squash, Cucumbers	4,208	1.46	6,130
Misc. Deciduous Trees	18,433	3.34	61,612
Misc. Field Crops	664	2.09	1,391
Misc. Subtropical Trees	4,123[(a)]	3.38	13,919
Misc. Vegetables	11,759	1.62	19,059
Nursery	5,000	3.28	16,413
Onions, Garlic	6,982	1.70	11,846
Pasture, Turf, Misc. Grasses	9,136	4.13	37,716
Pistachios	78,528[(a)]	4.11	322,423
Potatoes	17,466	1.98	34,524
Safflower, Sunflower	2,068	2.23	4,601
Sugar Beets	489	3.29	1,609
Tomatoes	15,802	2.51	39,716
Turnips	209	1.62	339
Walnuts	1,907	3.89	7,420
Total Irrigated Lands	**833,452**	**2.49**	**2,669,713**
Total Crop Lands	**1,016,946**		
Double Cropped	**21,339**		

Note: Data from 2007.
(a) Includes DRWD agricultural demands.

2.9.1 Imported Water Infrastructure

Imported water from the SWP or Westside CVP enters the Region through the California Aqueduct. The CVP also uses the Friant-Kern Canal to transport supplies into the Region. The Friant-Kern Canal and California Aqueduct are linked by KCWA's CVC and AEWSD's Intertie Pipeline (IPL), which allows water to be transported and exchanged between the facilities of the SWP and the CVP, as well as local surface water facilities (see Figure 2-1).

- The Friant-Kern Canal is 151.8 miles long and carries CVP water south from Millerton Lake just north of Fresno to the Kern River. The Canal has a maximum capacity of 5,000 cfs which decreases to 2,000 cfs at its discharge point into the Kern River.
- The CVC is a local facility that is used move water 22 miles from the California Aqueduct to Henry C Garnett Treatment Plant near Interstate 5. The first 17 miles of the canal are concrete-lined to minimize seepage losses. The CVC has the ability to deliver up to 1,830 AF of water per day through seven lift stations to a combination of participant water districts and water banking projects for agricultural, municipal and water recharge purposes. CVC conveyance capacity is in the process of being expanded from 922 to 1,422 cfs.
- The AEWSD bidirectional IPL conveys water from/to AEWSD's South Canal (and other areas of the district) to/from the California Aqueduct through a 4.5 mile 78" diameter pipeline. The IPL pumps water to the Aqueduct at approximately 175 cfs and can gravity back from the Aqueduct into its canal system at approximately 125 cfs. AEWSD recently completed the South Canal Improvement Project (SCIP), which allows the district to reverse flow 9 miles of the South Canal so as to deliver Aqueduct water to its Tejon Spreading Works for banking as well as grower demands along the 9 mile stretch. The SCIP also increased the forward flow canal capacity among other things.

2.9.2 Surface Water Infrastructure

Isabella Dam and Reservoir, constructed in 1954 by the Army Corps of Engineers, operates primarily as a flood control reservoir, and provides storage capacity for Kern River water. The Reservoir regulates stream flows for delivery to irrigation and groundwater recharge basins providing for water conservation and recreation benefits. Isabella Reservoir was designed to store approximately 570,000 AF of water; however due to the aforementioned seepage and earthquake concerns, water storage in the Lake has been limited to approximately 60 percent of capacity. The US Army Corps of Engineers is undertaking studies at Isabella Reservoir with the intent of restoring reservoir capacity. (US Army Corps of Engineers 2009)

There are also multiple diversion and conveyance facilities used to carry Kern River, as well as Poso Creek water, to multiple users on the Valley floor. Some of the more significant canals include:

- AEWSD Intake Canal
- AEWSD California Aqueduct Turnout/Turnin and South Canal;
- Beardsley Canal;
- Lerdo Canal;
- Calloway Canal;
- East Side Canal;
- Kern Island Canal;
- Stine/Farmers Canals; and
- Buena Vista Canal

2.9.3 Groundwater Infrastructure

Groundwater recharge and recovery requires extraction wells, recharge basins and canals/pipelines to move water to recharge areas and recovered groundwater to areas where it will ultimately be used. It is estimated that nearly 30,000 acres are used for groundwater recharge operations in the Region. The Region has many operational wells for various purposes. In 2001 alone, the Kern County Environmental Health Services Department issued 276 agricultural well permits, 138 domestic well permits, and 71 permits for non-agricultural and non-domestic purposes (e.g., monitoring and cathodic protection wells), while only 89 permits were issued for well destruction.

As described in Section 2.6.4.2, there are many large groundwater banking programs in the Region. Banking uses previously existing facilities, and facilities constructed specifically for banking programs. Typical groundwater infrastructure such as conveyance canals/pipelines, recharge basins, extraction wells, and motors including electrical requirements (distribution lines, transformers, starters, etc.), but also depends on connections to regional conveyance facilities such as the Friant-Kern Canal, the CVC, and California Aqueduct. Banking activities (whether recharge or recovery) also require extensive management including but not limited to on-going maintenance of ponds or wells, power management, labor intensive (man power to safely operate ponds), water quality monitoring and watching groundwater levels. Groundwater banking programs have developed various interties to the regional conveyance systems including:

- Arvin-Edison Water Storage District's Intake Canal and South Canal/Aqueduct Intertie
- The Semitropic Intake Canal; and
- Kern Water Bank Canal

2.9.4 Water Treatment Infrastructure

Multiple water districts, large and small, public and private exist in the Region. Water treatment for these various districts varies depending on the uses for the water. State law does not require that water used for agricultural purposes be treated, though farmers and agricultural water districts may treat raw water to remove certain constituents and to add nutrients prior to using it for irrigation, particularly in high-efficiency drip or microsprinkler irrigation systems. The State does have strict guidelines about the treatment and disinfection of surface and groundwater used for domestic and drinking water. Drinking water infrastructure is subject to permitting and inspection by Kern County Environmental Health Services and the California Department of Public Health. Water treatment facilities in the Region include:

- Henry C. Garnett Water Purification Plant. This facility is owned and operated by ID4. The plant treats up to 45 mgd of Kern River, SWP and CVP water and has been expanded to 72 mgd. Treated water from this facility is distributed to CWS, City of Bakersfield, East Niles Community Services District, NORMWD, and the Oildale Mutual Water Company (OMWC).
- Northeast Bakersfield Water Treatment Plant (NEBTP) is a 20 mgd facility owned and operated by the CWS that treats Kern River water provided to the northeastern area of the Greater Bakersfield area.

- Northwest
- Kernville

CWS is also planning a South Bakersfield Treatment Plant to augment supply in this area.

There are also multiple smaller treatment works in the Region, including activated carbon and ozone facilities that treat groundwater. Most of the purveyors providing groundwater for domestic use add small doses of chlorine to their distribution systems as a preventative measure against microbial contamination.

2.9.5 Wastewater and Recycled Water Infrastructure

As described in Section 2.6.5, there are 19 WWTPs in the Region. These WWTPs, produced volume, treatment levels, and resultant reclaimed water use are described in Table 2-21.

TABLE 2-21
WASTEWATER TREATMENT AND RECYCLED WATER IN REGION

Facility	Volume (MG)	Volume (AF)	Treatment System	Effluent Use
City of Arvin	468	1,436	Secondary	Agriculture
City of Bakersfield				
#2	5,470	16,785	Secondary	Agriculture
#3	5,771	17,709	Secondary	Agriculture
Kern County Waste Management Department				
Kern Sanitation Authority	1,372	4,212	Secondary	Agriculture
BVARA	6	19	Secondary	Percolation
Sheriff's Lerdo Facility	106	326	Secondary	Percolation
Reeder Tract	9	29	Secondary	Percolation
NOR Sanitary District #1	1,936	5,942	Secondary	Agriculture
				Percolation
City of Delano	1,788	5,487	Secondary	Restricted Agriculture
Lamont Public Utilities District	812	2,492	Primary	Agriculture
City of McFarland	378	1,159	Secondary	Agriculture
City of Shafter	438	1,344	Secondary	Agriculture
Shafter Airport	55	168	Secondary	Percolation
City of Wasco	626	1,922	Secondary	Agriculture
CCI WWTP	293	900	Tertiary	Percolation
City of Tehachapi WWTP	315	968	Secondary	Percolation/Land Application
Golden Hills Sanitation Company WWTP	10	30	Tertiary	Percolation
Bear Valley WWTP	36	110	Tertiary	Landscape/Surface Water Discharge
Stallion Springs WWTP	13	40	Secondary	Surface Water Discharge
Total	**19,902**	**61,078**		

As shown in Table 2-21, most WWTPs in the Region are treating water to secondary standards. Water treated to secondary standards can be used for:

- Orchards with no contact between edible portion and recycled water
- Vineyards with no contact between edible portion and recycled water
- Non food-bearing trees, including Christmas trees
- Fodder crops (e.g., alfalfa) and fiber crops (e.g., cotton)
- Seed crops not eaten by humans
- Ornamental nursery stock, sod farms

With additional treatment, it is possible to put recycled water to more extensive use. Under California law, tertiary treated water can be used for all of the above uses as well as:

- Food crops
- Parks and playgrounds, including school yards
- Landscaping
- Golf courses
- Pasture for milk animals
- Decorative fountains
- Fish hatcheries
- Groundwater recharge
- Commercial laundry
- Dust control
- Industrial process water (where there is no contact with workers)

The City of Bakersfield is currently expanding its WWTP No. 3 from 16 to 32 MGD. This expansion will make approximately an additional 18,000 AFY of recycled water available. Most of this water will be treated to secondary standards, appropriate for irrigation of non-food crops as well as groundwater recharge, however, the treatment plant expansion will also make it possible to treat approximately 2,250 AFY to tertiary standards and this recycled water will be appropriate for use on food crops as well as industrial water uses (Bakersfield 2006).

2.10 Regional Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Kern Region with respect to water resource management include the following, which are discussed in greater detail below:

- Aging and/or duplicative infrastructure
- Urban growth and water demand
- Urban growth encroachment on key recharge areas

- Decreased imported water supply
- Flood management
- Groundwater overdraft
- Legislative water use efficiency requirements
- Water quality/groundwater contamination
- Water rights
- Watershed protection
- Climate Change
- Protection of cultural resources
- Education, expertise, and new management to support infrastructure and regional planning efforts (i.e., public awareness, staffing/employment, governance)

2.10.1 Aging and/or Duplicative Infrastructure

The Region is home to some of the oldest settled areas in California, as well as to several DACs. Aging and/or substandard infrastructure is a particular issue for rural and disadvantaged communities in the Region. Due to the age of some of these communities, many of these water systems are quite old and in need of repair and replacement. However, these same small communities are least able to pay for system upgrades due to the high capital costs involved. In recent years rapid urban development in some areas has provided new infrastructure, but this new infrastructure is limited to those areas receiving new development.

Examples include substandard drinking water wells, master connected drinking water systems (where several individual households all rely on only one master connection to a water source), complete lack of treatment or low treatment contact times, pipeline leaks or breaks, inefficient pumps, inefficient and/or out-of-date electrical systems, corrosion (cathodic protection) problems, and other problems.

Duplicative infrastructure is also found in some rural parts of the Region, where numerous small systems have been established that are wholly separate from nearby systems. In these cases no economies of scale have been realized for water distribution nor joint treatment systems constructed, either which can be due to physical (geographic or topographic) separation or perceived local political differences.

Part of the impetus for the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs for both urban and agricultural sectors.

2.10.2 Urban Growth and Water Demand

One of the most pressing issues in California water is population growth and how urban water suppliers will meet increasing demands for potable supplies as well as commercial, institutional and industrial sector needs. The California Department of Finance forecast that by 2020, the state will have a population of over 44 million (M), compared to 38.873,100 persons in year 2000.

In 2001, two water supply planning bills, Senate Bill 610 (SB 610) and Senate Bill 221 (SB 221), were enacted that require greater coordination and more extensive data to be shared between water suppliers and local land use agencies for large development projects and plans. SB 610, codified as Water Code Sections 10910 and 10911, requires the public water system that may supply water to a proposed residential development project of more than 500 dwelling units (or a development project with similar water use), to prepare a water supply assessment for use by the lead planning agency in its compliance with the California Environmental Quality Act (CEQA). Such a water supply assessment (WSA) is performed in conjunction with the land use approval process associated with the project and must include an evaluation of the sufficiency of the water supplies available to the water supplier to meet existing and anticipated future demands. SB 221 codified as Government Code section 66473, requires projects which include tentative tract maps for over 500 dwelling units to obtain verification from the water system operator that will supply the project with water, that it has a sufficient water supply to serve the proposed project and all other existing and planned future uses, including agricultural and industrial uses, in its area over a 20-year period, even in multiple dry years. SB 221 is intended as a “fail safe” mechanism to ensure that collaboration on finding the needed water supplies to serve a new large subdivision occurs before construction begins.

As growth in the Kern Region increases, and larger development projects are being proposed, the preparation of WSAs or written verifications pursuant to these bills is becoming increasingly more common, forcing some urban water purveyors in the area to question their ability to provide service to these developments. If water supplies were to be deemed unavailable, developers in the Region would be required to find water outside the Region in sufficient quantities to serve their projects.

Additionally, water agencies must coordinate with land use planning agencies in the development of their UWMPs, which include projections of future water demand and water supply availability during normal and dry periods. Water agencies and land use planning agencies within the Region are working together to ensure adequate management and planning for water supplies to meet the needs of growing communities.

2.10.3 Urban Growth Encroachment on Key Recharge Areas

As growth in the Kern Region increases and larger development projects are being proposed, the municipalities within the Region have been expanding their borders. This has resulted in urbanization of lands that were formerly native and/or in agricultural use. Results of this urbanization include the paving of permeable recharge areas and encroachment of urban development on areas used for conjunctive use and/or recharge purposes. Loss of permeable areas and incompatible urban development near recharge areas could degrade the overall absorptive capacity of the groundwater basins of the Region.

Several objectives developed by Region stakeholders relate to this issue, and are mainly focused on identifying, protecting and increasing prime recharge areas and the vital storage capacity they provide. When incorporated into project design, these areas may also provide multiple benefits to include wildlife habitat, as well as open space for recreation and education.

As a means of achieving these objectives, water agencies and land use planning agencies will attempt to coordinate in the development of general plans and other land use planning documents to ensure that recharge areas are protected and to ensure adequate management and planning for water supplies to meet the needs of growing communities.

2.10.4 Decreased Imported Water Supply

Since 1994, the two large projects that import water into the Kern Region, the CVP and the SWP, have been incrementally impacted by environmental and regulatory requirements that have served to diminish the ability of the projects to reliably deliver water supplies. A large proportion of recent imported water cutbacks has stemmed from fishery issues in the Sacramento-San Joaquin Delta, where the pumping plants for the CVP and SWP are located, as well as San Joaquin River Settlement or Public Law 111-111 where water previously supplied to the CVP Friant Division for M&I and agricultural irrigation is being diverted into the San Joaquin River for in-stream flows (see section 2.6.1 for more details on the settlement). In May 2007 the US District Court ruled that the existing 2005 biological opinion for Delta smelt, a small fish found in the Delta, issued by the USFWS, did not comply with the Endangered Species Act. The biological opinion had guided pumping operations for the CVP and SWP to ensure no long-term jeopardy to the health and habitat of Delta smelt. Until a revised biological opinion is prepared by the federal agencies, the Court ordered certain “remedies” or actions to protect the endangered fish species. Those remedies, imposed in the decision, collectively amounted to a cut in statewide water supply of as much as 30 percent in certain hydrologic year types, or nearly 2 MAF. The remedies were finalized in December 2008. On-going court battles continue to change CVP and SWP operations at the time of the IRWMP.

In June 2009, additional restrictions on the water projects were announced, further reducing the amount of water available. These additional cutbacks were outlined in a biological opinion for Chinook salmon, steelhead and green sturgeon, issued by the National Marine Fisheries Service. The new biological opinion increases restrictions on water project operations even though the projects are currently limited by existing restrictions to taking no more than two percent (2%) of the listed salmon populations in the Delta. DWR has forecasted that these restrictions would cut an additional 10 percent from statewide water deliveries (300,000 to 500,000 AF) on average, expected to begin in 2010. Public water agencies throughout the state have filed lawsuits challenging the opinion. Recently, a federal court ruled in favor of water agencies, ordering the federal fish agencies to comply with environmental laws and take into account the harm that the water cutbacks have on people due to economic impacts.

Public water agencies filed for an injunction early in 2011 to prevent regulatory agencies from implementing Fall X2, which is one of the more restrictive elements of the previously-overturned biological opinion (X2 is the location where freshwater from the Sierra watershed and saltwater from San Francisco Bay meet in the Sacramento-San Joaquin Delta). The U.S. Fish and Wildlife Service had proposed a measure to release much larger than usual amounts of freshwater from the state’s reservoirs during 2011 to move the X2 location westward. The proposal was based on a highly disputed hypothesis that moving this intersection of salt and fresh waters would lead to increased delta smelt populations.

Under the federal proposal, the SWP would have faced losses from 300,000 AF up to 670,000 AF of water. The judge ordered a modified proposal that greatly minimizes these water supply impacts.

Late in 2011, a court decision threw out parts of a management plan to protect endangered salmon, steelhead and other species in the Sacramento-San Joaquin Delta. The court invalidated parts of the U.S. National Marine Fisheries Service's biological opinion, calling the plan "arbitrary, capricious, and unlawful." The previous salmon and steelhead management plan was thrown out by the same judge in 2008, which led the government to release the new proposal a year later. The court held that pumping operations negatively impact the fish and adversely modify their critical habitat, but this latest decision means the agency must rewrite the biological opinion again.

The most immediate impacts of the cutbacks have occurred in agricultural communities in the Kern Region and the Tulare Lake Hydrologic Region as a whole, as farmers have been forced to abandon and/or alter crop planting plans and districts have been forced to increase groundwater extractions and limit recharge. This has caused severe economic impacts in the Region, to its DACs in particular. It is estimated that due to drought and decreases in imported water supply, about 45,000 acres of farmland in the Region will be idled and an additional 100,000 acres will be under-irrigated. In late 2008, the U.S. Department of Agriculture designated Kern County as a primary natural disaster area because of losses caused by drought that has occurred since October 2007, and during the preparation of this Plan.

Long-term there is a concern that cutbacks and pumping restrictions will limit the ability of the Region to acquire surplus water in wet and very wet hydrologic year types. This surplus water is vital to the conjunctive use and banking programs pioneered and relied upon by both agricultural and urban water districts throughout the Region.

The Region stakeholders determined that the issue of decreased water supply is the most pressing issue for the Region, and as a result IRWMP Stakeholders have made “Increase Water Supply” a primary Regional objective.

2.10.5 Flood Management

Floods occur when runoff exceeds the capacity of a river or stream channel, overflowing into adjacent low-lying lands called floodplains. Human activities in floodplain areas often contribute to flood damage.

Physical damage from floods includes the following:

- Inundation of structures, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects.

- Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands.

Release of sewage and hazardous or toxic materials as WWTPs are inundated, storage tanks are damaged, and pipelines are severed.

Floods also cause economic losses through closure of businesses and government facilities, disruption of communications and the provision of utilities such as water and sewer, result in excessive expenditures for emergency response, and generally disturb the normal functions of a community. Flood management strategies recommended in this document will serve as guidelines to address concerns and prevent some of the damage listed above.

The key issues, needs, challenges, and priorities for the Kern County portion of the Tulare Lake Basin with respect to flood management include the following, which are discussed in greater detail below:

- Lack of coordination throughout the Region;
- Poor water quality of runoff;
- Nuisance water and dry weather runoff; and
- Difficulty providing flood control without interfering with groundwater recharge.

As described earlier, the primary flood control facility in the Region is Isabella Dam on the Kern River. The dam protects the urban Bakersfield area and about 350,000 acres of agricultural land and oilfields. Kern River had an unregulated flow until 1954 when the Isabella Dam and Reservoir were constructed by the Army Corps of Engineers. Unfortunately, due to seepage and earthquake concerns, the flood control capacity of the reservoir has recently been limited.

Other flood management efforts in the Region are currently performed by local jurisdictions within their particular areas, but there is not a regional entity that coordinates flood control for the entire Kern County Region. For example, KCWA has limited flood control responsibilities throughout Improvement Districts Nos. 1 and 3 which lie in the Rosedale area of Bakersfield and east of Isabella Reservoir, respectively. KCWA also sponsored the Kern River – California Aqueduct intertie which was constructed by the Army Corps of Engineers in 1977 as a measure to channel Kern River flood water into the Aqueduct to prevent erosion damages downstream of the intertie.

Several local land use entities, including the County of Kern, participate in the National Flood Insurance Program (NFIP) as administered by the Federal Emergency Management Agency (FEMA). By adopting flood damage prevention ordinances to regulate development in special flood hazard areas, private property owners in participating communities are allowed to purchase affordable flood insurance through NFIP, while the community retains its eligibility to receive certain federally backed monies, and disaster relief funds. In addition, both the City of Bakersfield and the County of Kern participate in the state-mandated Kern River Designated Floodway Program, which is administered by the DWR Reclamation Board. The Kern River

Designated Floodway Program provides development criteria and issues permits for development within the limits of the Kern River Designated Floodway.

The FEMA Flood Insurance Rate Map for the Kern Region designates multiple areas as "High Risk", areas with a 1 percent or greater risk of flooding in any year and a 26 percent chance of flooding over the life of a 30-year mortgage. The area at greatest flood risk is the area surrounding the communities of Lamont, Weedpatch, and the city of Arvin. Other large flood area includes the Buena Vista lakebed as well as areas in the historic Tulare lakebed and nearby drainage areas. Areas along the Kern River and other local streams are also considered to have a high flood risk. These areas are depicted in Figure 2-8.

Flood management is generally guided by local, State, and Federal entities but relies upon the local communities for implementation. Local communities like cities, through the adoption of ordinances and the formation of special districts, manage development in floodplains and implement flood mitigation projects that prevent flood damages.

2.10.6 Groundwater Overdraft

One of the longest-standing issues in the Kern Region is groundwater overdraft. Groundwater pumping in the Region has been high since the area was settled in the late 1800s, and today groundwater provides approximately 39 percent of local water needs. Certain portions of the groundwater basin underlying the Region have experienced overdraft conditions.

According to DWR Bulletin 118, the basin generally underlying the Region experiences a net loss to storage of approximately 325,000 AFY. Key components to recovering from overdrafted conditions are the many conjunctive use and groundwater recharge and banking programs in the Region. However, as urban demand increases and imported water supplies decrease, the ability of these programs to successfully ameliorate groundwater overdraft will be challenged.

2.10.7 Legislative Water Use Efficiency Requirements

As water shortages and increasing demands upon infrastructure occur throughout the country, water conservation planning, technologies and practices are evolving today at an unprecedented rate. Legislation has been enacted to reduce various sectors' dependence on potable water will be impacted.

2.10.7.1 Federal Legislation

Executive Order (EO) 13123, Greening the Government through Efficient Energy Management (1999), is a federal directive to government agencies for the implementation of measures to reduce water use. This order directs federal government agencies to reduce potable water use and incorporate cost-effective water conservation measures in their facilities by 2010. Another aspect of the order is Federal agencies must report baseline water usage and report on water usage every two years.

2.10.7.2 State Legislation

The state of California has been progressive in legislating water conservation policies and measures. Described below are existing State laws relevant to water conservation.

Urban Water Management Planning Act

The Urban Water Management Planning Act was enacted in 1983, and has been amended many times since then. The Act states that every urban water supplier that provides water to 3,000 or more customers, or that provides over 3,000 AF of water annually, should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry years. The Act describes the contents of the UWMPs as well as how urban water suppliers should adopt and implement the plans. The intent of the Act is to encourage water management planning commensurate with the numbers of customers served and the volume of water supplied.

2.10.7.3 Assembly Bill 1881

Assembly Bill 1881 built upon many past legislative acts related to landscape water use efficiency. AB 1881, the Water Conservation in Landscaping Act of 2006, enacted many landscape efficiency recommendations of the California Urban Water Conservation Council (CUWCC) for improving the efficiency of water use in new and existing urban irrigated landscapes in California. AB 1881 required DWR, not later than January 1, 2009 to update the existing Model Local Water Efficient Landscape Ordinance and local agencies to adopt the updated model ordinance or an equivalent no later than January 1, 2010. DWR has completed the update of the Model Local Water Efficiency Landscape Ordinance. The law also requires the Energy Commission to adopt performance standards and labeling requirements for landscape irrigation equipment, including irrigation controllers, moisture sensors, emission devices, and valves to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water.

The Model Local Water Efficient Landscape limits the water budget for new landscapes (or rehabilitated landscapes), greater than 2,500 square feet, to 70 percent of the local reference ET. The model ordinance lays out the procedures for evaluating potential landscape water use during the land development process. In addition, the ordinance contains requirements for planting as well as the design and maintenance of irrigation systems, all with the intent of limiting outdoor water use and avoiding irrigation runoff.

2.10.7.4 Assembly Bill 1420

AB 1420, passed in 2007 and in effect as of January 2009, changes the funding eligibility requirements of Section 10631 of the Water Code (Urban Water Management Planning Act). For any urban water supplier to be eligible for grant or loan funding administered by DWR, the SWRCB, or the Bay-Delta Authority (such as Propositions 50 and 84), the supplier must show implementation the 14 water use efficiency demand management measures/best management practices (DMMS/BMPs) listed and described in the UWMP Act and the CUWCC MOU, or show the schedule by which the supplier will begin implementing the DMMs/BMPs. Any supplier not implementing the measures based on cost-effectiveness must submit proof showing why the measures are not cost-effective.

2.10.7.5 AB 2882

This bill was passed in 2008 and encourages public water agencies throughout California to adopt conservation rate structures that reward consumers who conserve water. Prior to AB 2882 state law authorized water agencies to promote conservation using rate structures; however, some agencies were concerned that such rate structures may be inconsistent with other parts of state law. AB 2882 clarifies the allocation-based rate structures and establishes standards that protect consumers by ensuring a lower base rate for those who conserve water.

2.10.7.6 SBX7-7

Senate Bill 7 of Special Extended Session 7 (SBX7-7) was signed into law in November 2009, which calls for progress towards a 20 percent reduction in per capita water use statewide by 2020. As a result, the legislation now mandates each urban retail supplier to develop and report a water use target in the retailer's 2010 UWMP. The legislation further requires that retailers report an interim 2015 water use target, their baseline daily per capita use and 2020 compliance daily per capita use, along with the basis for determining those estimates. SBX7-7 provides four possible methods for an urban retail water supplier to use to calculate its water use target. DWR has also developed methodologies for calculating base daily per capita water use, baseline commercial, industrial and institutional water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use and landscape area water use. Agencies not in compliance with SBX7-7 will be ineligible for state loan and grant funding.

2.10.7.7 Agricultural Conservation-Related Legislation

Legislation has been enacted and is currently being considered to encourage reduced dependence on imported water and groundwater for agricultural uses.

2.10.7.8 Assembly Bill 3616

This bill was enacted in 1990 and authorized the development of Agricultural Water Management Plans (AWMP) and the formation of the Agricultural Water Management Council (AWMC). Entities join the AWMC by signing the Agricultural MOU Regarding Efficient Water Management Practices (EWMPs) by Agricultural Water Suppliers in California. Entities signing the MOU voluntarily pledge to undertake the following activities:

- Prepare a water management plan and identify efficient water management practices that will be implemented;
- Perform a comprehensive Net Benefit Analysis on EWMPs to establish cost-effectiveness of each EWMP for implementation.
- Net Benefit Analysis takes into consideration the technical, environmental, socioeconomic, financial and third party factors, thus helping to determine whether and in what manner implementation may be appropriate.

- Implement, in a timely manner, those EWMPs found to provide benefit in a cost effective manner.
- Prepare progress reports on implementation of EWMPs and results on a biannual basis.

2.10.7.9 SBX7-7

SBX7-7, as discussed above, also contains requirements for agricultural water suppliers. All agricultural water suppliers, either publicly or privately owned which irrigate 10,000 or more acres are required by SBX7-7 to implement critical Efficient Water Management Practices (EWMPs) and additional EWMPs if locally cost effective and technically feasible. Affected agricultural water suppliers must implement EWMP's by July 31, 2012. Critical EWMPs include:

- Each agricultural water supplier is to measure the volume of water delivered to customers with sufficient accuracy to comply with standards set by DWR.
- Each agricultural water supplier is to develop a pricing structure for water customers, based at least in part on the volume of water delivered.

SBX7-7 also created the Agricultural Water Management Planning Act, which requires affected agricultural water suppliers to adopt AWMPs. These plans facilitate management and conservation of water suppliers, and also guide and document the implementation of EWMPs. The plans are mandatory for many suppliers and are required to be completed and adopted for affected agricultural water suppliers by December 31, 2012.

2.10.8 Water Quality/Groundwater Contamination

Quality of local groundwater supplies in general are good throughout the Region, is useable for agricultural purposes, and meets drinking water standards. Exceptions are areas that have exceeded MCLs for a variety of compounds. Some of these are due to the long history of oil and gas drilling in the Region (sulfate, 1,2-dibromo-3-chloropropane [DBCP], Ethylene Dibromide [EDB], organics, inorganics), and others are due to long term agricultural activities (nitrate, pesticides, volatile organic compounds [VOCs]). Some contaminants, such as arsenic and radiologic compounds, are naturally occurring in certain areas of the Region. Problems associated with shallow groundwater include TDS, sodium chloride and sulfate, which can be problematic for agriculture. The water supplies of some DACs in the Kern Region have been impacted by one or more contaminants. As a result, many areas are required to close wells, blend water from multiple wells, and/or install water treatment facilities. The California Department of Public Health recorded 201 MCL violations in the Kern Region in 2008, the most recent year for which data is available. Additionally, there were 123 monitoring violations where entities either failed to properly complete or report water quality violations. Arsenic was identified as the most common source of contamination.

Since SWP water originates in rivers and streams in central and northern California and travels through the peat soils of the Sacramento-San Joaquin Delta to the Region, it is generally high in TDS, organics and bromide, although levels of these constituents can vary with hydrology in a given year. If imported SWP water is treated for drinking water purposes, the organics and bromide can form disinfection by-products, which at certain levels may raise health concerns.

Water entering the Region via the Friant-Kern Canal of the CVP originates in the central Sierra Nevada as snowpack runoff stored in Millerton Lake. Therefore it is generally of good quality.

2.10.9 Water Rights

At the local Region level, the Kern River has had its share of historical controversy, with Kern River water rights disputes often settled by negotiated agreement. Numerous participants rely on the Kern River and for some IRWMP stakeholders it represents their entire water supply. As such, the Kern RWMG recognizes the importance of the Kern River and role of the Kern IRWMP in the protection, restoration and long-term management of the Kern River watershed in order to improve the health of the watershed and protect this water supply for its users.

The Kern IRWMP water supply analysis is based on assumptions made regarding availability and reliability of the Kern River supply and was used to identify specific planning objectives for the IRWMP. Thus it is possible that the outcome of water rights hearings may require a change in these assumptions as well as the Regional objectives, and may delay implementation of the IRWMP. Additionally, water rights hearings could have outcomes that may place limitations not considered on various groundwater banking and recharge projects included for implementation.

2.10.10 Watershed Protection

Increased flooding, aftereffects of forest and brush fires, diminishing water availability and quality, and the loss of critical habitat for fish and wildlife are key issues facing the Kern Region. The entire Region depends on river, stream and creek production of reliable supplies of clean water to support human communities and natural habitats, restore resources and provide for agricultural production. Historic land-use practices have placed many downstream property owners at risk and created a tension between public safety and resource protection needs. In order to move forward on increasingly critical water issues, citizens, interest groups, and government agencies must develop more comprehensive, collaborative, and coordinated ways of solving problems, and this is an objective of the Kern Region stakeholders.

There are a variety of constraints and challenges to the effective implementation of watershed planning. Development of comprehensive watershed management plans, including recommendations for action and specific projects, could be time consuming and expensive. Depending upon the recommendations that result from the stakeholder and consensus driven planning process, the constraints and challenges can be minimized. Another constraint involves the consensus process itself. It is not always possible to reach consensus among diverse members, or reconcile conflicting interests or needs.

2.10.11 Climate Change

The California Water Plan 2009 Update, citing the American Water Resources Association, specifically describes the local effects of climate change in the region. In general, climate change models are predicting annual average statewide temperature rises of up to 4 degrees Celsius and up to 5 degrees Celsius for individual months. These changes will vary by location with the smallest increases forecast for the Tulare Lake Hydrologic Region. The months of February, March, and May are shown to have the largest temperature response. The net result is milder winter temperatures, an earlier arrival of spring, and increased summer temperatures. Under this model, snow accumulation is significantly decreased in all months, with snow accumulation still beginning in November but with lower monthly accumulations and ending about a month earlier (large decreases in April I snowpack.) The impact would be much less in the higher elevation of southern Sierra. For example, in the San Joaquin River and Tulare Lake hydrologic regions, about 70 percent of the snow zone would remain. It is anticipated that the overall ET will increase while soil moisture will generally decline except in areas where precipitation will significantly increase. The higher water consumption with warmer temperatures will likely only be partially offset by the carbon dioxide-based reductions. Thus, the net result could be slightly higher agricultural water requirements. Warmer winter temperatures between storms would be expected to increase ET, thereby drying out the soil between storms. Changes in recharge will result from changes in effective rainfall as well as a change in the timing of the recharge season.

As part of the California Water Plan (2005), an assessment of the impacts of climate change on the State's water supply was conducted using a series of computer models that incorporated decades of scientific and historic research. Model results from this study indicate that climate change will result in:

- increased temperature
- reduction in Sierra Nevada mountain snow depth
- early snow melt
- sea level rise
- changes in water quality
- increased ET rates from plants, soils, and open water surfaces
- increased irrigation needs
- increased agricultural water demands due to longer growing season and greater ET rates, and
- increased flood risk, creating conflicts between water storage and flood control

These changing hydrological conditions affect future water management planning efforts, which are typically based on historic conditions.

In July 2006, DWR issued "*Progress on Incorporating Climate Change into Management of California's Water Resources*," as required by EO S-3-05, which instituted biennial reports on potential climate change effects on several technical resource areas, including water resources. This report describes the progress made in incorporating current climate change data and information into existing water resources planning and management tools and methodologies. The purpose of the report is to demonstrate how various analytical tools currently used by DWR could be used to address issues related to climate change. It focuses on assessment methodologies and preliminary study results from four climate change scenarios.

Potential impacts of climate change are presented for the SWP and for the Delta, which are both related to the Kern Region's imported water supplies. Since the Region is reliant on imported SWP supplies as part of its overall supply mix, any reduction or change in the timing of availability of those supplies could have negative impacts on the water supply of the Region. Reductions in the quantity of SWP water available would force the Region to rely more heavily on local groundwater and local surface flows, or other sources of imported water. It is possible that local surface flows could also be reduced by changes in snow pack altitude levels and/or quantity of snow pack in the Sierra Nevada and other regional mountain ranges, which would reduce natural recharge, thus exacerbating groundwater availability problems.

The SWP analysis presents potential impacts on SWP operations, including reservoir inflows, delivery reliability, and average annual carryover storage, as well as many other operational parameters. The analysis uses forecast levels of climate change in year 2050, with 2020 land use levels. Some of the main impacts include: changes to south of Delta Table A Amount deliveries (from an increase of about 1 percent in a wetter scenario to about a 10 percent reduction for a drier climate change scenario); increased winter runoff and lower Table A allocations in the three driest climate change scenarios; lower carryover storage in drier scenarios; and higher carryover storage in a wetter scenario.

The Delta analysis of the four climate change scenarios included the operational impacts to the SWP and other water delivery systems, as well as meeting Delta water quality standards. The analysis indicated that meeting these water quality standards will be a "larger challenge" due to climate change. Using assumed climate change scenarios and a sea level increase of one foot, the ability to meet chloride standards for M&I uses would be more difficult and may cause water supply impacts which DWR could not quantify.

Later studies by the California Climate Change Center further evaluated impacts to the Delta, the SWP, and the CVP. The California Climate Change Center projects that warmer air temperatures will cause sea level rise. Projections anticipate a sea level rise between 0.4 feet and 1.2 feet by mid-century to as much as 3.9 feet by the end of the century. Rising sea levels will bring saline ocean water further into the Delta and will require that additional fresh water be released from reservoirs to maintain water quality (California Climate Change Center 2009). By mid-century, Delta exports could decrease by 7 to 10 percent and by as much as 25 percent by the end of the century. Carryover storage (water held in storage from one water year to the next) in the SWP and CVP systems would decrease by up to 19 percent by mid century and by up to 38 percent by the turn of the century.

A recent legislative development in California is the passing of AB 32, Global Warming Solutions Act. The Global Warming Solutions Act of 2006 has committed California to reducing the state's greenhouse gas emissions to 2000 levels by 2010 (approximately 11 percent below business as usual), to 1990 levels by 2020 (approximately 25 percent below business as usual), and to 80 percent below 1990 levels by 2050. The California Air Resources Board (CARB) is charged with developing the appropriate regulations and reporting system to effectively implement the caps on emissions. AB 32 requires that CARB use the following principles to implement the caps: distribute benefits and costs equitably; ensure that there are no direct, indirect, or cumulative increases in air pollution in local communities; protect entities that have reduced their emissions through actions prior to this mandate; and allow for coordination with other states and countries to reduce emissions. Consistent with AB 32, actions ranging from assessments of one's carbon footprint and carbon trading, to use of alternative energies, to reduction of emissions through direct conservation of both water and energy, for example, will likely be expected of many organizations and even individuals dealing directly and indirectly with water throughout the state. Counties, cities, water agencies, water purveyors, and water consumers can all expect to be affected by this legislation.

In August 2009, the California Natural Resources Agency released the Draft 2009 Climate Adaptation Strategy. This report analyzes potential climate change impacts and risks for various sectors including public health, forestry, transportation, agriculture and water management. This report predicts the following agricultural impacts related to climate change:

- Crop yield changes
- Changes in crop type
- New weed invasions
- New disease and pest invasions
- Flooding and crop pollination changes
- Heat waves and crop stress leading to lower crop yield, vulnerability to pests
- Heat waves leading to animal stress, vulnerability to disease, and lower meat/milk/egg production
- Lack of water available for agriculture and livestock
- Increased fire risk to rangeland

In theory, Central Valley agriculture could be helped by higher levels of atmospheric carbon dioxide, which acts as a fertilizer as well as a longer growing season and fewer freezing temperatures. However, these changes are accompanied by other factors that harm agriculture, including weed and pest migration and crop pollinator timing changes. Several valuable crops require a certain amount of chill hours in the winter. The number of winter chill hours has statistically declined since 1950, with the greatest decline in the northern portion of the Central Valley. Grapes, almonds, and cherries are some of the crops that would be affected by reduced chill hours. Specific crop models predict that the yield of Kern County grapes will decline as much as 5 percent by year 2030 and that the yield of cherries will decrease by as much as 15 percent.

2.10.11.1 Potential Adaptation Strategies

The California Natural Resources Agency has identified several climate change adaptation strategies for water management systems. One of the primary strategies is the preparation of IRWMPs. Integrated regional water management planning can be used to improve the coordination of local resources, including groundwater storage and banking, conjunctive use with surface runoff, and utilization of flood flows. Other adaptation strategies identified by the California Natural Resources Agency include:

- Aggressive water use efficiency in urban and agricultural sectors
- Use of recycled water (where energy efficient)

- Integrated flood management (projects to reduce flood peaks while increasing aquifer recharge and environmental water flows)
- Development of a Central Valley Flood Protection Plan
- Local emergency flood preparedness
- Land use policies to decrease flood risk
- Establishment of flood plain corridors
- Expand water storage
- Protection of recharge areas

Many of these strategies are currently in use in the Region or are planned to be implemented, and are identified within the Objectives of this IRWMP, as described below.

- Water Use Efficiency. Stakeholders of this IRWMP have identified water use efficiency as an important component of water supply planning. One of the stated objectives of this IRWMP is to "Pursue and implement cost effective water use efficiency programs." In addition to direct water use efficiency, stakeholders have expressed a desire to improve system operation, reduce system water loss, and decrease energy use related to water infrastructure. Another objective of this IRWMP is to "Replace aging infrastructure to reduce system water losses, improve operational efficiencies, and reduce service interruptions."

- Recycled Water. As described in Section 2.6.5, recycled water is already extensively used in the Kern Region. Nearly all wastewater effluent produced by the various treatment facilities in the County can be applied to non-food crop irrigation and environmental habitat restoration. In 2007, approximately 59,000 AF of effluent was recycled. Increased use of recycled water for irrigated agriculture as well as landscape irrigation in the M&I sector could help lower dependence on high quality SWP and CVP water and will provide an additional water source during drought or periods of regulatory restrictions when imported potable water quantities are reduced. Stakeholders of this IRWMP have identified "Increase the use of recycled water for beneficial uses within the Kern Region" as an objective of their planning efforts.

- Flood Management. Stakeholders of this IRWMP have identified flood management as an important component of water planning. One of the stated objectives of this IRWMP is to "Create tools to re-regulate water supplies within the Region, including storage, storm flows, and operational flows."

- Flood Preparedness. Stakeholders of this IRWMP have identified flood preparedness, flood response and post flood actions as important objectives of the IRWMP regional planning process.

- Expand Water Storage. Kern County is a leader in groundwater banking and storage. As described in Section 2.6.4, there are over 11 groundwater recharge projects in the Region which span 27,302 acres, allow up to 900,000 AF of annual recharge and provide over 500,000 AF of annual recovery. Stakeholders have expressed a desire to increase groundwater recharge as well as groundwater banking in the Region. One of the objectives of this IRWMP planning effort is to "Increase water storage capacity in the Region by increasing recharge acreage and expanding groundwater storage programs."

- Protection of Recharge Areas. In the past the Kern Region has emphasized groundwater and groundwater recharge as priorities. "Identify and preserve prime recharge areas in the Kern fan area and other areas" is a stated objective of this IRWMP.

Table 2-22 shows the jurisdictions that have adopted, or are in the process of drafting, policies and programs to address climate change and/or to reduce GHG emissions.

TABLE 2-22
JURISDICTIONS AND CLIMATE CHANGE ACTIONS

	Phase		Program/Policy Type						Activity			Compliance			Specific Issues Addressed	
Jurisdiction	**Adopted:**	**In Progress:**	**GP policy(ies):**	**GP implementation measure(s):**	**Climate Action Plan:**	**GHG Reduction Plan:**	**Sustainability Plan:**	**Ordinances:**	**Public/municipal**	**Private**	**Both**	**Voluntary**	**Mandatory**	**Combination**	**Greenhouse gas emission reduction or mitigation**	**Vulnerability and resiliency to climate change (adaptation)**
Bakersfield		x	x	x	x			x			x			x	x	
Delano		x	x	x	x	x	x	x			x			x	x	
Kern County		x	x	x	x	x					x			x	x	x
Taft			x	x	x	x	x	x			x			x	x	x

Source: California Planners' Book of Lists, January 2011, California Governor's Office of Planning and Research

In the future, the Kern Region RWMG may consider supplementing these strategies with those adopted by CARB in its AB 32 Scoping Plan. Agencies in the RWMG may also consider joining the California Climate Action Registry, a non-profit organization that serves as a voluntary greenhouse gas registry to promote early actions to reduce greenhouse gas emissions.

Further discussion of the Kern Region's strategies for adaptation and mitigation of the effects of climate change are further described in Sections 10 and 11.

Section 3: Greater Bakersfield Subregion

3.1 Subregion Introduction

This section presents a regional description for the Greater Bakersfield subregion of the Kern IRWMP Region, including a summary of the subregion's IRWMP participants, as well as a description of the physical, environmental, social and demographic characteristics of the subregion, the hydrologic features and overall water reliability, major water related infrastructure, and the identified subregional issues, needs, challenges and priorities.

The Greater Bakersfield subregion is centrally located within the Kern Region. It encompasses major north-south highways (Interstate Route 5, State Highway 99) and water infrastructure connecting the growing cities and unincorporated communities in this subregion to the greater Kern County area. Eight public agencies comprise the Greater Bakersfield subregion, as described in greater detail below. See Figure 3-1 for a map of this subregion.

3.2 Subregion IRWMP Participants

The Greater Bakersfield subregion consists of:

1. The City of Bakersfield (City or Bakersfield)
2. California Water Service Company Bakersfield District (CWS-BAK)
3. Casa Loma Water Company (CLWC)
4. East Niles Community Services District (ENCSD)
5. Greenfield County Water District (GCWD)
6. Kern County Water Agency Improvement District No. 4 (ID4)
7. North of the River Municipal Water District (NORMWD)
8. Oildale Mutual Water Company (OMWC)

These participants' roles and responsibilities for managing water, natural resources, and land use within this subregion are discussed below.

3.2.1 City of Bakersfield

The City of Bakersfield (Bakersfield or City) is located within the southern San Joaquin Valley in Kern County; approximately 100 miles north of the Los Angeles metropolitan area.

Bakersfield is the largest metropolitan city of Kern County, operating under a council-manager form of government, with the Water Board of the city recommending, administering and implementing domestic water policies set by the City Council. Bakersfield's water system is a municipally-owned system, acquired by the City in 1976. The City purchased Kern River water rights, land and the physical water distribution systems for the Ashe Service Area from Tenneco West. The City subsequently added service areas in the Fairhaven and River Lakes areas.

These service areas are the only portions of the City that directly receive water service from the City Water System.

The City contracts with CWSC-BAK to serve retail customers within its service area. ENCSD, NORMWD and Vaughn Mutual Water Company, while not contracted by the City, also serve drinking water within City limits and in the unincorporated urban area. The City provides water primarily for residential uses and also for business, commercial, industrial, and public customers in and adjacent to the westerly portion of Bakersfield. The City of Bakersfield provides water to a population of approximately 118,600 through 39,400 service connections. The City of Bakersfield also operates the river channel and owns and operates canals that run through Bakersfield as well as 2,800 acres of recharge ponds along the Kern River.

Several agricultural districts have contracts with the City of Bakersfield. Through these contracts, the agricultural water districts receive about 70,000 AF annually of Kern River water for irrigation purposes through 2011 (when the contracts will expire). The majority of the water provided to the agricultural districts is transported through a series of canals throughout the subregion. These canals play an important role in the City's groundwater replenishment activities by way of percolation (City of Bakersfield, 2007).

3.2.2 California Water Service Company Bakersfield District

CWS is the largest investor-owned water utility in the western United States and one of the largest in the country. It serves 1.5 M people in 58 California communities with 21 operating districts stretching from Chico in the north to Palos Verdes in the south.

CWS-BAK has provided water utility services in the Bakersfield area since 1927. CWS-BAK encompasses approximately 49 square miles of service area. CWS-BAK provides water to a population of approximately 225,000 through 68,000 service connections. The dominant land use is for residential and commercial purposes. Single and multiple family residential services account for 86 percent of all services. CWS-BAK provides a combination of local groundwater produced by 82 wells and surface water from the Kern River, as well as water purchased from ID4 to its service area. CWS-BAK has indicated that pre-design planning for a South Bakersfield Treatment Plant is underway to help augment supply in the southern portion of Bakersfield (CWS-BAK, 2007).

3.2.3 Casa Loma Water Company

CLWC is a small urban water purveyor located in Southeast Bakersfield and serves approximately 600 residential customers through 200 non-metered connections.

3.2.4 East Niles Community Services District

ENCSD has provided high-quality water utility services in the east Bakersfield area since 1955. ENCSD provides drinking water to a population of approximately 25,000 through 7,400 service connections. To meet their customers' needs, the District uses a combination of local groundwater produced by 6 wells and imported surface water from ID4 and CWS-BAK (ENCSD, 2007).

3.2.5 Greenfield County Water District

GCWD is located south of the Arvin-Edison Intake Canal and east of Highway 99. GCWD supplies drinking water from groundwater to a population of approximately 8,500 through 2,550 connections from its five (5) wells. In 2007, the demand on GCWD's system was approximately 26,000 AF.

3.2.6 Kern County Water Agency Improvement District No. 4

KCWA was formed by Chapter 1003 of the Statutes of 1961 for the primary purpose of establishment of a single entity in Kern County to negotiate and administer a water supply contract with the SWP water. KCWA contracted the DWR in 1963 for a water supply for member units within Kern County, which included 77,000 AF annually for ID4. ID4 was formed to provide a supplemental water supply to the metropolitan Bakersfield area.

Subsequent amendments to the KCWA Act added provisions for the formation of improvement districts as needed to expedite solutions to specific problems relating to flood control, drainage or water supply. Activities leading to the creation of ID4, embracing the urban Bakersfield area, were initiated by the KCWA Board of Directors by adoption of Resolution 25-70 on 10 December 1970, which outlines the need for such an improvement district. ID4 was formed by a resolution adopted by the KCWA Board of Directors on 21 December 1971, for the purpose of financing the construction of the Henry C. Garnett Water Purification Plant, related water conveyance facilities, and a portion of the cost of the CVC. Resolutions Nos. 16-71 and 17-71 were adopted by the KCWA Board of Directors on 21 December 1971. These resolutions finalized formation activity and established the boundaries of ID4 as they exist today.

The ID4 service area includes a number of retail water agencies. Of these agencies, ID4 wholesales to four, which include: (1) CWS-BAK, (2) the City of Bakersfield Water Resources Department, (3) ENCSD, and (4) NORMWD. Within ID4, there are other, smaller retail water agencies that rely on groundwater pumping and have no contract with ID4 for treated water (ID4, 2005).

3.2.7 North of the River Municipal Water District

NORMWD provides groundwater and purchased water from ID4 to its service area. NORMWD also wholesales water to the OMWC and provides water to a total population of approximately 38,000. NORWMD provides water directly to a population of 6,000 through 2,000 retail connections, while 32,000 persons are served by OMWC via wholesale water from NORMWD. In 2007, NORMWD supplied approximately 2,135 AF of treated surface water and pumped approximately 443 AF from its own wells (NORMWD, 2007).

3.2.8 Oildale Mutual Water Company

OMWC, incorporated in 1919, provides municipal, industrial and domestic water service to its service area which is located northerly of the City of Bakersfield. OMWD currently serves a population of approximately 26,000 persons via 7,800 active service connections. The current service area ("Oildale Service Area") encompasses approximately 10 square miles (6,400 acres) and is adjacent to the recently (2006) annexed "Southeast Shafter Service Area", which is comprised of 5,226 acres of agricultural land. The Southeast Shafter Service Area is identified as a proposed development site in the 2005 General Plan Update adopted by Shafter and, is expected to undergo urban development commencing immediately and extending over the next several years (OMWC, 2007). It is anticipated that 11,778 housing units will be constructed with a population of 33,568 residents (OMWC, 2005).

Oildale distributes water from two sources: groundwater, and treated water from KCWA ID4 through NORMWD. OMWC has relied on imported water to supply over 95 percent of its total supply (OMWC, 2005). Over the past 25 years, OMWC has pumped an average of 250 AF of groundwater per year (RBF Consulting, 2002).

3.3 Subregion Description

3.3.1 Land Use

The Land Use, Open Space, and Conservation Element of the Kern County General Plan, and the Land Use element of the City of Bakersfield General Plan provide the policies protecting the land uses within the Greater Bakersfield subregion. The Greater Bakersfield subregion can be generally characterized as containing land uses of 85% M&I, 9% agricultural and 6% undeveloped. The undeveloped rural uses are generally located at the periphery of the subregion while urban uses are located at its core, mainly within the City of Bakersfield. The largest city in the subregion is Bakersfield with a population of over 300,000. This subregion is the most urban as compared to the other subregions. The City's General Plan defines the urban areas as areas in which a minimum of 50 percent of all parcels within one-half mile radius are developed for residential uses in excess of three units per net acre and/or commercial uses with a floor area ratio of 0.2 (RBF Consulting, 2002). However, the overwhelming majority (approximately 80 percent) of the General Plan area consists of open space uses, where open space includes parks and recreational facilities, agriculture and mineral petroleum land uses. Residential is the second greatest land use at 11 percent, with commercial, industrial, and public services following each around 2 to 3 percent of land use by area.

As discussed in Section 2.3, this subregion has been greatly affected by recent population increases and resulting land use issues.

3.3.2 Ecological Processes and Environmental Resources

Ecological processes and environmental resources for the Kern Region as a whole are described in Section 2, Section 2.4. With regard to the Greater Bakersfield subregion, these resources have been impacted more than other regions due to agriculture, urban development and oil/gas extraction, which have resulted in many changes in the natural environment. These impacts have resulted in drained and diverted lakes and wetlands, the loss of native plants and animal species, and a decrease in native lands. This has also resulted in the introduction of invasive species and spread of exotics leading to the decline of native plant communities.

The City and County of Kern have determined that the appropriate approach to conservation of protected Biological Resources in the Metropolitan Bakersfield area is through the Habitat Conservation Planning process which mitigates for urban development. In 1994, the City and

County received permits under Section 10(a)(1)(B) of the Federal Endangered Species Act and Section 2081 of the California Endangered Species Act for incidental take of protected species in connection with development projects.

The Metropolitan Bakersfield Habitat Conservation Plan (MBHCP) and implementing agreements and ordinances provide a method of collecting funds for the acquisition and enhancement of Habitat Land for purposes of creating preserves.[2] Development projects within the Metropolitan Bakersfield area pay mitigation fees which are used to buy habitat lands. These lands are managed by wildlife agencies or entities they approve. "Take" avoidance measures are also listed in the MBHCP.

The amount of habitat preserved must always stay ahead of what is being developed. During the first six years of Program operation, 7,900 acres of habitat were preserved through the MBHCP Program.[3] The effectiveness of the MBHCP is monitored through quarterly and annual reports provided to wildlife agencies.

The boundaries of the MBHCP study area comprise approximately 408 square miles. Six distinct ecological communities have been identified within the MBHCP area. The general location of the ecological communities and overall habitat quality of these communities are illustrated in Figures 5 and 6 of the MBHCP (available for review at the City of Bakersfield) (RBF 2002).

The MBHCP addresses urban development activities for incorporated and unincorporated areas of the Metropolitan Bakersfield General Plan area. For oil and gas production activities, the Metropolitan Bakersfield General Plan area is included in the draft Kern County Valley Floor Habitat Conservation Plan (VFHCP) Program. Those activities are not included in the MBHCP.

The VFHCP Program represents a comprehensive strategy that provides a means of addressing compliance with the California and Federal Endangered Species Acts for Kern County's oil and gas production industry, urban development, water district development and maintenance, public infrastructure activities, and other activities for the signatory districts. The term of the Program is 30 years. The Program was undertaken by local industry and interest groups and local, State, and federal government agencies to translate federal and State laws into a locally acceptable program that provides an alternative to negotiating each development project or activity directly with the CDFG and USFWS. The Endangered Species Element provides broad policy language relative to the conservation of threatened and endangered species in accordance with State and federal laws. The VFHCP represents a specific program to implement the proposed Endangered Species Element (Garcia and Associates 2006).

3.3.3 Social and Cultural Characteristics

The social and cultural characteristics of the Greater Bakersfield subregion are as diverse as the range in employment seen within the City and across the subregion. The City is home to

[2] The MBHCP and associated implementing ordinances and agreements are available through the Kern County Planning Department. The Plan provides descriptions of species of concern and habitat areas within the General Plan area.

[3] General Plan Update, Conservation/Biological Resources Element, December 2001.

many of the County's governmental facilities, while agriculture, petroleum, and the service sector also provide significant employment in the area.

3.3.3.1 Economic Conditions and Trends

The Greater Bakersfield subregion is in a period of transition. Over the past 50 years the major land uses have been agriculture, oil, and residential development to support these major industries. Recent growth has resulted in a transformation of land uses to more residential, retail, commercial, industrial, institutional and recreational. Rapid residential growth has occurred over the last 10 years, as seen by Bakersfield expanding from an early 1990s population of 175,000 to a current population of over 330,000. The City is projected to continue to grow over the next 12 to 15 years to an estimated 434,000 residents. The community has a strong interest in preserving its "feel" and historical past while managing its future growth to produce quality neighborhoods that translate to a healthy economy.

As shown is Table 2-4, approximately 49 percent of the subregion's population has a household income of less than $50,000, approximately 19 percent of the population has a household income between $50,000 and $74,999, and approximately 32 percent has a household income of $75,000 or higher.

The population is predominantly White, Hispanic, and African American. Approximately 62 percent of the population identifies as being white, approximately 33 percent of the population reports being Hispanic and approximately 9 percent reports being African American (US Census Bureau 2005). Persons identifying as Asian, American Indian, and Native Hawaiian make up less than 6 percent of the population. English is the primary language, but a significant portion of the population speaks Spanish.

Although future ethnic demographics are projected to transition to a greater mix of Hispanic and non-Hispanic residents, there will be a substantial Hispanic or Latino population in Bakersfield in the future. A high priority for the City will be to continue to address the specific needs and cultural desires of the Hispanic community.

For a more detailed discussion of the factors affecting the economy of the Kern Region as a whole, refer to Section 2.5.2.

3.3.3.2 Disadvantaged Communities

The community of Oildale, located just north of Bakersfield and with a population of 28,000, has been identified as a DAC within the Greater Bakersfield subregion. Its MHI is $27,041 per the 2000 U.S. Census. An Environmental Justice issues that could potentially impact this DAC is that Oildale is adjacent to three large oil fields, including two of the largest in California. The Kern River Oil Field to the east and northeast has more active oil wells (9,183 at the end of 2006) than any other field in California except for the Midway-Sunset Oil Field in southwestern Kern County (which has 11,145) (California Department of Conservation, Oil and Gas Statistics, 2006). Also adjacent is the large Kern Front Oil Field, north of Oildale, and the smaller Fruitvale Oil Field, to the southwest.

3.3.4 Water Supply

3.3.4.1 Imported Water Supplies

Water supplies imported to the Greater Bakersfield subregion come from the SWP or CVP via the California Aqueduct and the CVP via the Friant-Kern Canal. These supplies are discussed in detail in Section 2.6.1. The subregion is very dependent on these imported supplies, for direct delivery to customers after treatment as well as to recharge groundwater resources.

3.3.4.2 Surface Water

The two primary sources of local surface water in the Greater Bakersfield subregion are the Kern River and the streams from the Caliente Creek watershed. These sources are described in detail in Section 2, Section 2.6.2.

With the exception of very wet periods, there is no flow in the Kern River past Bakersfield due to upstream canal diversions. During very wet periods, water flows in the river southwest to the Buena Vista Lake Bed and then north in the Kern River Floodway or into the California Aqueduct through an intertie near Tupman.

3.3.4.3 Groundwater

The Greater Bakersfield subregion overlies the primary aquifer in the Kern Region, the large Southern San Joaquin Groundwater Basin. This Basin is described in Section 2, Section 2.6.3. Groundwater is the primary source of supply within the subregion. Surface or imported water supplement groundwater resources.

Groundwater recharge in the Basin is obtained through natural recharge by precipitation runoff; river and canal seepage; reclaimed water; and spreading and banking. These four sources, as they are described in the Draft Metropolitan Bakersfield General Plan Update Environmental Impact Report (RBF Consulting, 2002) are reiterated below:

1. Natural Recharge. Natural recharge is provided by precipitation runoff, which is defined as the amount of melted snow and rainwater measured after evaporation, ET, and percolation. Precipitation runoff falling within the Plan area is collected as runoff in a series of drainage basins or “sumps” operated by the City. The runoff collected in these basins percolates to the groundwater thereby recharging the groundwater basin.

2. River and Canal Seepage. Canal seepage is defined as the amount of water that percolates into the ground from unlined earthen canals. When added with seepage from the Kern River channel, it contributes more than half the City’s water supply at an average of 54 percent, or about 106,000 AF each year. Canal and river seepage also enhances unincorporated water supplies. It should be noted that lined canals, which also seep, albeit at a much lower percentage, can also contribute to aquifer recharge.

3. Recycled Water. Recycled wastewater, or reclaimed water, produced from the City’s two WWTPs is used in land application. Recycled water applied to non-edible crops for irrigation then percolates into the ground recharging the groundwater basin.

4. Spreading and Banking. Percolation of water spread in open basins has been historically used in Kern County as a means of recharging and banking groundwater. The City owns and operates the 2,800-acre recharge facility located in and along the Kern River Channel (approximately 8 miles west of Highway 99) which is used to replenish water to the groundwater aquifers. The 2,800-acre recharge facility is a 6-mile long site consisting of old river channels, overflow lands, and constructed spreading basins. Groundwater is recharged in this facility by spreading water onto these spreading basins, which look like small lakes surrounded by levees, and allowing it to percolate. Additionally, the facility receives surface water supplies from the Kern River, the CVP, and the SWP during years when surpluses exist.

   The 2,800-acre recharge area improves groundwater quality by recharging low salinity Kern River water into the aquifers. This dilutes the more saline irrigation water that percolates underground from adjacent farming operations. The underground reservoir can be pumped in dry years for agricultural and domestic use and in wet years, the reservoir can be built up. This allows water to be used without causing a groundwater overdraft problem.

Other banking programs within the subregion include the Kern Water Bank, Pioneer Project, Allen Road Complex Well Field and Berrenda Mesa. ID4 participates in groundwater banking projects that were developed to capture and store high-flow waters, such as Article 21 water from the SWP, Section 215 and flood water from the CVP and flood waters from the Kern River. These groundwater banking projects provide both recharge and recovery facilities dedicated for the storage and recovery of water.

- Kern Water Bank: ID4 has an approximate 9.62 percent interest in the recharge and recovery facilities of the Kern Water Bank as a result of the 1996 agreement between Project Participants, KCWA and DWR. As payment for its share of the project, ID4 returned 4,330 AF of its SWP firm agricultural entitlement to DWR, which was subsequently retired permanently. This reduction is reflected in current SWP allocations. The number of recovery wells currently available is 72, yielding a total annual recovery capacity of approximately 300,000 AF, of which ID4 has a first priority right to 28,860 AF of recovery capacity. The maximum annual recharge capacity of the project is about 450,000 AF, of which ID4 has a first priority right to 43,290 AF of recharge capacity.

- Pioneer Project: ID4 has a 10 percent interest in the recharge and recovery facilities as a result of the 1998 Pioneer Participation Agreement. The total number of completed wells on the project is 30, which yields a total maximum annual recovery of approximately 100,000 AF, of which ID4 has a first priority right to 10,000 AF of recovery capacity. The maximum annual recharge capacity of the project is 146,000 AF. Through an agreement with the City of Bakersfield, the Agency has access to the City of Bakersfield's 2,800 acre recharge and recovery facilities. These facilities are operated and allocated by the Agency as an extension of the Pioneer Project. To provide firm recovery capacity, ID4 has constructed and owns the ID4 banking wells within the 2,800-acres which are available to ID4 for recovery of water stored in this facility.

- Allen Road Complex Well Field: ID4 owns and operates seven wells located along the north side of the Kern River between Allen Road and Calloway Drive. These wells may be used as part of joint program with the City of Bakersfield to recover groundwater for discharge into the river channel during dry years for recreational purposes and to enhance potential exchanges with other districts adjacent to ID4 with Kern River interests. These wells are owned and operated by ID4 and are available to ID4 for supply augmentation, using previously banked water within ID4 (ID4 RWC, 2006).

In an effort to eliminate the potential for overdraft conditions in the Greater Bakersfield subregion, surface water was made available to former groundwater users via the Friant-Kern Canal and the SWP. As is evidenced by the discussion above, recharge of groundwater supplies is very dependent on surface water. The sources of surface water available to the City are the Kern River, the SWP and the CVP. Also, the wet period/dry period cycle can have a significant impact on recharge, with groundwater banking being the most noticeably impacted source of recharge.

3.3.4.4 Recycled Water

As mentioned in the discussion above and as described in Section 2, recycled water produced from the City of Bakersfield's two WWTPs is used to irrigate non-edible crops such as cotton and alfalfa, and is also a source of recharge to the underlying groundwater basin.

3.3.5 Water Quality

Imported water supplies within the Greater Bakersfield subregion (the SWP and CVP), are generally of good quality, and are discussed in detail in Section 2.7.2.

Surface water quality in the Greater Bakersfield subregion, referring to the Kern River and streams from the Caliente Creek watershed, is generally good, with excellent quality exhibited by most streams on the east side of the Region (CVRWQCB, 2004). Generally, the quality of the groundwater within the Greater Bakersfield subregion has remained relatively stable. However, the closed nature of the Tulare Lake Basin, which results in little subsurface outflow, is the greatest long-term problem facing the Region. The closed nature of the Basin results in an accumulation of salts within the Basin over time due to importation and evaporative use of the water. This problem is compounded by overdraft of groundwater for municipal, agricultural, and industrial purposes, and the use of water from deeper formations, which further concentrates salts within remaining groundwater.

Other water quality concerns within the Greater Bakersfield subregion include storm water runoff from residential and industrial areas that can contribute to water quality degradation since it contains organics, pesticides, oil, grease, and heavy metals. Also of concern is naturally occurring erosion, which can cause discoloration of streams, and suspended matter settling to form a smothering blanket on the streambed. Erosion is accelerated by poor drainage and soil stabilization associated with road building, clearing and leveling land, construction, brush clearing, off-road vehicle use, agriculture, overgrazing, and fires.

3.3.6 Water Demand

Demands within the Greater Bakersfield subregion were analyzed by comparing the estimated 2005 total water demands and the 2030 total water demands, as shown in Table 3-1. These demands were further analyzed by comparison of three categories of water demand: M&I, agricultural, and groundwater recharge. M&I demands are urban water demands that include residential (single family and multifamily), commercial / industrial / institutional, large landscape, and other water use types (including water losses) as provided by the various water retail water suppliers participating in this IRWMP. Generally, historic and projected urban water demands were taken from UWMPs developed by the agencies, from the DPH annual reports and/or as reported by KCWA. Agricultural water demand is defined as the total annual water demand for all agricultural accounts. Groundwater recharge is defined as the total amount of water recharged (direct or in-lieu) or banked within a supplier's respective service area.

Estimated 2005 total water demand within the subregion was approximately 86,872 AF, while the estimated 2030 demand is projected to be 124,462 AF. Residential demand will increase approximately 30 percent during that time period, while commercial and industrial demands are projected to increase by 50 percent due to planned urban growth. Agricultural water demand in 2010 was approximately 6,167 AF and is projected to remain fairly constant or decrease slightly as agricultural properties are converted to urban uses. This decrease may be due to a significant decrease in water available to groundwater recharge projects as the result of reduced imported water deliveries. By comparison, groundwater recharge within the Greater Bakersfield subregion in 2005 was more than 104,000 AF, according to unpublished KCWA data (summary of groundwater recharge activities, Table 24). The Greater Bakersfield subregion's M&I and agricultural demand (AG) combined is approximately 3 percent of the total 2005 urban and agricultural demand for the Kern Region.

TABLE 3-1
SUMMARY OF ESTIMATED CURRENT AND FUTURE WATER DEMAND BY WATER USE CATEGORY FOR THE GREATER BAKERSFIELD SUBREGION

Purveyor	2005 M&I	2005 AG[d]	2005 TOTAL	2030 M&I	2030 AG[d]	2030 TOTAL
KCWA Improvement District No. 4						
California Water Service-BAK	12,500[a]	--	12,500	20,500[a]	--	20,500
City of Bakersfield	6,500[a]	--	6,500	6,500[a]	--	6,500
East Niles CSD	6,000[a]	--	6,000	11,000[a]	--	11,000
North of the River MWD	2,200[a]	--	2,200	13,750[a]	--	13,750
Oildale MWC *(see NORMWD)*	7,800[b]	--	7,800	12,184[b]	--	--
City of Bakersfield (demand in addition to ID4)	26,179[c]	19,622	149,564	45,331[c]	19,622	64,953
Casa Loma Water Company	--[b]	--	--	--[b]	--	--
Greenfield CWD	2,600[b]	--	2,600	4,061[b]	--	4,061
Stockdale MWC and Annex	200[b]	--	200	312[b]	--	312
Victory MWC	205[b]	--	205	320[b]	--	320
Total	**64,184**	**22,688**	**86,872**	**113,958**	**22,688**	**124,462**

Notes:
(a) KCWA ID4 2010 UWMP.
(b) Year 2005 from unpublished KCWA data. Water demands 2005 to 2030 assumed to grow 1.8 percent per year based on Kern Council of Governments Draft Regional Forecast Report.
(c) Demand reported in City of Bakersfield 2005 UWMP less demand reported for City in ID4 2005 UWMP.
(d) Unpublished KCWA data. 2005 agricultural demand data based on 2007 summary by Crop Group. 2030 agriculture demand data based on equivalent production as 2005 data.

3.3.7 Watershed Flood Management

Flooding within the Greater Bakersfield subregion originates from the Kern River watershed, which lies in Kern and Tulare Counties at the southern end of the Sierras, and from the Caliente Creek stream group which drains the west slopes of the Tehachapi Mountains. Also, some smaller areas are subject to flooding from local watersheds.

The most severe flooding problems on the Kern River near the City have resulted from high-intensity winter rainstorms over a large portion of the basin, which generally occur from November through April. Floods caused by snow melt, which usually occur in the late spring and early summer, generally have a longer period of runoff and also a lower peak than rain floods. As a result, spring storms have rarely caused significant damage (RBF Consulting, 2002).

The City entered the Regular Phase of the NFIP as administered by the FEMA on May 1, 1985. The County of Kern followed on September 29, 1986. By adopting flood damage prevention ordinances to regulate development in special flood hazard areas, private property owners in participating communities are allowed to purchase affordable flood insurance through the NFIP, while the community retains its eligibility to receive certain federally backed monies, and disaster relief funds.

Both the City and the County of Kern participate in the state-mandated Kern River Designated Floodway Program, which is administered by the DWR Reclamation Board. The Kern River Designated Floodway Program provides development criteria and issues permits for development within the limits of the Kern River Designated Floodway.

Floodplain mapping has been performed under the NFIP to delineate special flood hazard areas. The City of Bakersfield Public Works Department and the Kern County Department of Engineering and Survey Services have the official Flood Insurance Rate Maps (FIRMS) and Flood Boundary Floodway Maps (FBFM) which show the extent of the floodplains. In addition, the communities are empowered to develop and use improved floodplain information.

Both the City and County have adopted general plan designations which identify allowable uses in the floodplain. Local zoning ordinances more closely define known areas to have potential for flooding.

In July 1985, both the City and County adopted the Kern River Plan Element (KRPE) as a part of their general plans. The KRPE establishes provisions for development along the Kern River, and specific policies for floodplain management.

The Flood Damage Prevention Ordinance provides criteria for development within all floodplains, including prohibiting encroachments into a floodway, and requiring protection and/or elevation of construction within a floodway fringe.

The City has merged the Kern River Levee System into its Water Resources Department operation. The established levee system is maintained to United States Army Corps of Engineers (USACE) standards. The USACE provides an annual inspection and maintenance report in the evaluation of the Kern River levees.

3.3.8 Water-Related Infrastructure

Water-related infrastructure such as surface water impoundments, water collection systems, distribution systems, wastewater systems, and recharge systems, are described generally for the Greater Bakersfield subregion participants in their general descriptions above, and in greater detail for the entire Kern Region in Section 2.9.

In general, many Kern Region communities are older and the physical components of their water systems are aging and outdated. Aging infrastructure is a particular issue for rural communities and DACs. In recent years rapid urban development in some areas has provided new infrastructure, but this new infrastructure is limited to those areas receiving new development. Water treatment improvements have recently been undertaken by KCWA, the City of Bakersfield, CWS, and NORMWD. Other communities are planning upgrades to their water treatment infrastructure. Part of the impetus for joining and participating in the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs.

The Kern River encounters its first diversion into a canal when it first exits the Kern River Canyon and encounters another diversion when it reaches the east side of Bakersfield, near Hart Park. The Beardsley and Rocky Point weirs are the first two of seven diversion weirs in Bakersfield. From there, canal water travels north and south to irrigate farmlands. In total, the Kern River is diverted into seven canals that pass through Bakersfield.

ID4 operates the Henry C. Garnett Water Purification Plant which was constructed and put into service in January 1977. This facility, designed to purify surface water for human consumption, is a 72 MGD conventional water purification plant. At peak flows it can produce 90 MGD. The Henry C. Garnett Water Purification Plant, provides water to retail purveyors which include CWS-BAK, City, ENCSD and NORMWD, which wholesales to OMWC.

NEBTP was constructed in 2001. The construction of the NEBTP allowed tremendous growth to take place in relatively undeveloped lands from Northeast Bakersfield to the mouth of the Kern River Canyon, which is entirely in CWS-BAK service area. NEBTP utilizes membrane technology to treat Kern River water. Current Capacity of the NEBTP is 20 MGD with an ultimate build out capacity of 60 MGD (CWS-BAK, 2006).

3.4 Subregional Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Greater Bakersfield subregion with respect to water resource management within the Kern Region include the following. These issue areas are discussed in greater detail in Section 2.

- Urban Growth and Water Demand (see Section 2.11.2)
- Legislated Water Use Efficiency Requirements (see Section 2.11.7)
- Urban Growth Encroachment on Key Recharge Areas (see Section 2.11.3)
- Water Quality/groundwater contamination (see Section 2.11.8)
- Water Rights (see Section 2.11.9)

Section 4: Kern Fan Subregion

4.1 Subregion Introduction

This section presents a description for the Kern Fan subregion of the Kern Region. The Kern Fan subregion encompasses the southwestern portion of the Kern Region extending from the extreme westerly edge of the City of Bakersfield to the western County line. The subregion is bounded by Highway 46 to the north and extends slightly beyond Highway 166 to the south. Descriptions of the Kern Fan subregion's participants, as well as the physical and environmental characteristics, hydrologic features, and issues and needs of the subregion are provided. See Figure 4-1 for a map of this subregion.

4.2 Subregion IRWMP Participants

The Kern Fan subregion consists of ten participants and includes:

1. Buena Vista Water Storage District (BVWSD)
2. Buttonwillow County Water District (BCWD)
3. City of Taft (Taft)
4. City of Maricopa (Maricopa)
5. Henry Miller Water District (HMWD)
6. Kern Water Bank Authority (KWBA)
7. Olcese Water District (OWD)
8. Rosedale-Rio Bravo Water Storage District (RRBWSD)
9. Vaughn Water Company (VWC)
10. West Kern Water District (WKWD)

These participants' roles and responsibilities for managing water, natural resources, and land use within the Kern Fan are discussed below.

4.2.1 Buena Vista Water Storage District

BVWSD is an agricultural water district organized in 1924 to manage the irrigation and tail water recovery systems and water rights originally held to Kern River water. The District is located approximately 16 miles west of the City of Bakersfield near the town of Buttonwillow, and has a gross area of approximately 49,000 acres between the townsites of Tupman and Lost Hills. It does not include the Buena Vista Lakes, which are owned by the County of Kern. The goal of BVWSD is to provide its landowners and water users with a reliable, affordable, and usable surface and groundwater supply. BVWSD provides agricultural water to its customers and is engaged in groundwater recharge, banking, and recovery programs. BVWSD's water sources include Kern River water, SWP, CVP, and groundwater.

The Miller-Haggin Agreement of July 28, 1888, is the basis of distribution of Kern River flows between the upstream “First Point” interests and the downstream “Second Point” interests. The Miller-Haggin Agreement, as amended, allocates all of the waters of the Kern River on a daily basis. Under the Miller-Haggin Agreement, BVWSD as the successor-in-interest to the Second Point interests, is apportioned approximately one third of the Kern River flows from March to August. A subsequent amendment also apportioned some river slows from winter runoff. The average entitlement is approximately 158,000 AFY of surface water from the Kern River.

In 1973, BVWSD contracted with KCWA for additional surface water supply from the SWP. The contract provided for an annual firm entitlement of 21,300 AF and surplus entitlement (Article 21) of 3,750 AF. BVWSD currently has access to five turnouts from the California Aqueduct. Its geographic location, with respect to the California Aqueduct and other KCWA member units, provides the opportunity for exchanges of BVWSD’s Kern River water for east-side member units’ SWP water. BVWSD has also been a historic user of surplus Friant-Kern Canal flows to serve irrigation demands and for groundwater recharge programs.

The average supply from the Kern River and SWP provides approximately two-thirds of the BVWSD landowner irrigation needs. The remaining irrigation demands are filled by landowner wells. In-District groundwater extractions average about 25,000 AFY, while groundwater replenishment efforts (including canal losses) average about 66,000 AFY; thus equating to an annual positive groundwater balance of 41,000 AF (BV/RRB Water Banking and Recovery Program Final EIR, 2002).

4.2.2 Buttonwillow County Water District

BCWD is a California Special District, governed by an elected board, serving a population of approximately 1,300 persons. BCWD was established in 1956 to provide sanitary sewer facilities to the unincorporated area of Buttonwillow and did so through the sale of General Obligation Bonds. In 1971 the BCWD formed Improvement District No. 1 containing the water system previously owned and operated by the East Buttonwillow Water Company. In 1974, by Board resolution, the merger of Kern Mutual Water Company, a private water company with the BCWD was approved. BCWD provides domestic water to the townsite of Buttonwillow, located in Kern County, approximately 3 miles west of Interstate 5 on Highway 58. The service area is approximately 1 mile long and 0.5 mile wide. Services include 396 domestic connections and 45 nonresidential connections. On average BWCWD supplies 211 AFY (69,000,000 gallons) to municipal customers.

BCWD relies only on groundwater pumped from three wells. The nearest water system is 17 miles away and there is no possibility of obtaining other sources of domestic water in the event of an emergency.

The existing infrastructure consists of three wells and approximately eight miles of distribution lines. In general the water system is aging and outdated. Approximately four miles of 2-inch to 4-inch diameter distribution lines made of asbestos cement were installed in the 1940’s. Approximately two miles of 4- and 6-inch distribution pipeline was added in the late 1950’s. The service lines from the mainline to the customers’ box are galvanized. The galvanized pipe is showing signs of extensive corrosion which leads to minimal water pressure and breakage. All of the system’s electrical panels are outdated, making it difficult to get repair parts. Of the three wells, one well is beginning to pump sand and is used as a standby. At some point a new well will need to be drilled to replace it. Only a small portion of the system is metered and of those only a few work. To replace or install meters is basically impossible due to the condition of the service lines (R. Houchin, personal communication, BCWD,).

4.2.3 City of Maricopa

Maricopa is an incorporated city with a population of 1,111 located in southern most part of the Kern Fan subregion at the junction of California State Highways 166 and 33. It is located seven miles south of the Taft, covers 1.5 square miles and is approximately 900 feet above sea level. The Carrizo Plain, a major feature of the San Andreas Fault Zone is northwest of the town, and the Midway-Sunset Oilfield (the third largest oilfield in the United States) is adjacent to the town on the north and east. Incorporated July 25, 1911, this *"mother city"* of the prolific Midway-Sunset Oilfields is the gateway to the Cerro Noreste/Mt. Pinos recreation area.

Maricopa is south of the site of the Lakeview Gusher, the greatest oil gusher in world history, producing 9 M barrels of oil in 18 months.

Water is supplied and distributed by WKWD. The City provides sewer to about half of the properties using an old and broken collection system and trunkline with treatment and disposal in two ponds about a mile east of the City. Maricopa has applied for funds to replace the sewer collection system, build new sewer collection lines to serve the properties on septic systems, replace the trunkline and upgrade their treatment and disposal system.

4.2.4 City of Taft

City of Taft (Taft) is an incorporated city located in southwestern Kern County at the junction of California State Highways 119 and 33. It is located 37 miles southwest of Bakersfield in the Buena Vista Hills and is approximately 955 feet above sea level. Taft encompasses 15 square miles. The Taft Sphere of Influence (planning area) includes Taft and the unincorporated adjacent communities of Ford City, South Taft, and Taft Heights. Included in the Greater Taft Area are several small rural residential/industrial communities. The communities of Tupman, Dustin Acres, and Valley Acres are located along Highway 119 between Bakersfield and Taft. The communities of Fellows, Derby Acres and McKittrick are located northwest of Taft along State Highway 33.

Taft is situated in a major petroleum and natural gas production region of California and is one of the few remaining towns in the United States which exist exclusively because of nearby oil reserves. The town is built between two major California oilfields, the Midway-Sunset and the Buena Vista Hills fields. The Midway-Sunset field has produced approximately 2.8 billion barrels of crude oil. The Occidental Petroleum-operated Elk Hills field is north of Taft. The majority of Taft's economic base is directly related to the petroleum industry.

Water is supplied and distributed to Taft by WKWD. Existing WKWD delivery capacity is 22 MGD. This is sufficient to meet existing water needs, however, WKWD and the City are aware that future water needs have to be evaluated and planned for to accommodate future development.

Taft has two WWTPs, the Taft Municipal Wastewater Treatment Plant and the State Prison Wastewater Plant facility. The Taft Municipal Wastewater Treatment Plan is a Grade I system with a capacity to treat 1.5 MGD of waste per day. The reserve capacity of the plant is 125,000 gallons. The State Prison wastewater plant facility has a capacity of 0.5 MGD with a reserve capacity of 100,000 gallons. Currently the municipal plant treats approximately 1.3 MGD and the State Prison plant treats 0.35 MGD. The current treatment plants can handle present residential inflow without capacity being attained. However, commercial and industrial ventures in and around Taft proper will need to be served by adding capacity to the current plants. Taft plans to eventually double the capacity of both plans to accommodate future development (Rice, Taft, personal communication).

4.2.5 Henry Miller Water District

HMWD is an agricultural water district formed in 1964 for the purpose of obtaining a water supply from the SWP. HMWD is located approximately 30 miles southwest of Bakersfield and consists of 26,390 acres of lands in the now dry Buena Vista Lake area. In 1967 HMWD contracted with KCWA for SWP water. HMWD relies on groundwater, Kern River water and SWP water supplies, with SWP water being the primary source. HMWD supplies approximately 50,000 AF to on average 20,000 acres annually. The HMWD distribution system consists of approximately 83 miles of earthen canals, 28 wells that discharge directly into the system and a recovery system that reclaims all drain water for reuse. There are three SWP turnouts and one turnout from the Kern River (Lutje, HMWD, personal communication).

4.2.6 Kern Water Bank Authority

KWBA is a Joint Powers Authority (JPA), formed in 1995 for the purpose of recharging, storing, and recovering water to improve the water supply during periods of water shortages. The JPA participants include DRWD, ID4, SWSD, Tejon-Castac Water District (TCWD), Westside Mutual Water Company (WMWC), and Wheeler Ridge-Maricopa Water Storage District (WRMWSD). The KWBA owns 20,000 acres known as the Kern Water Bank in Kern County.

The Kern Water Bank can receive water from three geographically diverse sources, the Kern River, the California Aqueduct (collecting water from the northern Sierra Nevada) and the Friant-Kern Canal (collecting water from the central and southern Sierra Nevada). Hydrogeologic studies show that the Kern Water Bank has the capability of storing over 1,000,000 AF on a long-term basis, and in fact, the KWBA has stored approximately 1,300,000 AF since its inception. The program also has the capability of extracting approximately 240,000 AFY. According to KWBA, these factors make it the largest direct-recharge water-banking project in the world (Website, KWBA).

4.2.7 Olcese Water District

OWD is an irrigation water district formed in 1968. OWD is located on the northeastern edge of the Bakersfield area and has a service area of approximately 5,100 acres. OWD water sources are from groundwater, Kern River surface water and Kern River riparian water. OWD provides approximately 3,700 and 850 AF annually to Rio Bravo Ranch and the Rio Bravo Golf Course, respectively. OWD sold its water rights of approximately 50,000 AF of stored water on

2,800 acres owned by the City of Bakersfield along with their domestic water system to CWS-BAK. OWD also sold its Hacienda Water Rights which are Kern River flows during peak years, to KCWA. The OWD consist of six pump stations, five earth-lined reservoirs, two wells and mainlines to reservoirs (Nickel, OWD, personal communication).

4.2.8 Rosedale-Rio Bravo Water Storage District

The RRBWSD is located on the extreme western edge of the City of Bakersfield and has a service area of approximately 43,000 acres of predominantly agricultural land. The RRBWSD was formed in 1959 for the purpose of constructing and operating a groundwater recharge project to offset declining groundwater levels. RRBWSD provides agricultural, municipal, and industrial water to customers within its service area, and in engaged in groundwater recharge, banking, and recovery programs. RRBWSD acquires water for recharge purposes from the Kern River through a water service agreement with the City of Bakersfield, from the Friant-Kern Canal of the CVP as available, and from the SWP through a water supply contract with KCWA.

RRBWSD groundwater recharge project facilities generally follow the alignment of the Goose Lake Slough, utilizing the natural recharge capabilities of those soils. Water supply contracts provide for delivery of water to the project from the adjacent Kern River and nearby state and federal water facilities. The water supply available to the RRBWSD varies greatly, both seasonally and from year to year, depending on runoff conditions. The groundwater aquifer functions as a storage reservoir that provides both seasonal and long-term regulation of variable water deliveries to meet demands. Urban encroachment has resulted in the conversion of over 6,000 acres to residential, commercial and industrial use. The groundwater project now has a diversion capacity of 400 cfs and the capability to recharge in excess of 150,000 AFY.

As of January 1997, the RRBWSD's recharge and transportation facilities covered approximately 730 acres. The net area available for surface water spreading totaled about 568 acres. Water for agricultural and urban uses is supplied by privately owned wells located throughout the District.

The RRBWSD also makes surface deliveries to agricultural landowners located adjacent to its groundwater project facilities when water is available. These deliveries in-lieu of groundwater pumping are an additional form of groundwater recharge. Surface deliveries to landowners have averaged about 10,000 AFY since 1976. This results in an average annual recharge capacity of 155,000 AFY.

Irrigated areas of the RRBWSD are predominantly cotton (44 percent), alfalfa (22 percent), deciduous trees (12 percent), grains (11 percent), and vegetables (9 percent) (RRBWSD GWMP, 1997).

4.2.9 Vaughn Water Company

The VWC was incorporated in 1928, and serves the residential customers of the Rosedale area of the City of Bakersfield and adjacent areas in the County of Kern. The VWC operates under a water supply permit issued by the DPH. The VWC service area covers approximately 27 square miles of Kern County and currently serves property in 15 sections of the County. The area is located north of the Kern River channel and overlays portions of the KCWA's ID4 and the RRBWSD. VWC provides water to a population just under 30,700 through 9,300 service connections.

The VWC has entered into a MOU with the RRBWSD in a cooperative effort to allow development of certain lands within the RRBWSD. These lands are being converted from agricultural use to residential use. Lands within the RRBWSD pay water tolls based on the benefit the lands receive from the RRBWSD's groundwater recharge programs. Lands that are converted to urban use continue to pay these groundwater benefit charges. The RRBWSD has endeavored to create a groundwater balance through importation of water for recharge and in-lieu water supply programs, and through cooperative programs with other water agencies. Studies by the RRBWSD indicate that a groundwater balance is being achieved. The conversion of agricultural lands to residential and commercial use decreases the groundwater demand by about 50 percent, thus reducing the pressure on the groundwater basin.

Between 2000 and 2005, VWC has added 2,300 new connections to its system to a total of 8,601 7,718 metered and 883 flat rate accounts. The customer base consists of 97 percent residential and 3 percent commercial and industrial. Most of the services are in the County, although over the last twelve years the city areas of the district have developed at an increasing rate (VWC UWMP, 2005).

4.2.10 West Kern Water District

The WKWD was formed in 1959, and has a service area of approximately 300 miles that includes the incorporated cities of Taft and Maricopa, together with the Westside communities of Taft Heights, South Taft, Ford City, Tupman, Dustin Acres, Valley Acres, Fellows and McKittrick. WKWD is located approximately 30 miles west of Bakersfield. WKWD provides water supply for domestic, industrial and for recreation/landscaping. WKWD provides water to a population of approximately 18,600 through 7,443 service connections. Approximately 80 percent of WKWD's annual water sales are served to the oil and electrical power generating industry in western Kern County. Domestic water sales account for the remaining 20 percent of WKWD's annual sales. The WKWD meters 100 percent of its service connections. WKWD contracts with KCWA to deliver SWP water, with a current entitlement of 31,500 AFY. WKWD delivers up to 6,500 AF of SWP water entitlement from the California Aqueduct for industrial usage. The WKWD local water supply is obtained from eight groundwater wells located approximately 17 miles north east of Taft in the underflow area of the Kern River Basin. The WKWD's well field is adjacent to and south of the Kern Water Bank recharge area.

WKWD receives the majority of its SWP water by exchange with BVWSD as an in-lieu groundwater pumping/groundwater banking exchange program. BVWSD, a portion of which is located south and northwest of WKWD's well field, typically obtains water from the Kern River, the SWP, and from local groundwater pumping. In the exchange, BVWSD takes WKWD SWP water from the California Aqueduct for its needs instead of pumping local groundwater. WKWD, in turn, can then pump or bank a volume of water equivalent to that which BVWSD would otherwise have pumped. As part of the exchange agreement, BVWSD can turn back SWP water in extremely wet years, when it can meet its needs through Kern River supplies. In these years, WKWD will exchange or take delivery of the SWP water through conveyances provided by the KWBA or the CVC. This SWP water will be delivered to the WKWD groundwater spreading vicinity and credited to WKWD's banking program.

WKWD also has two turnouts along the California Aqueduct, which have been used to deliver untreated water diverted from the California Aqueduct directly to industrial customers. Currently only one of the turnouts is operated, which supplies untreated water to La Paloma Power Co. LLC (La Paloma). An agreement was established in 2001 for a maximum of 6,500 AF between WKWD and La Paloma. Historically La Paloma has taken less than 6,500 AFY and WKWD utilizes the balance of the water for recharge to its water banking program or exchanges with other entities. Delivery of WKWD's SWP entitlement is dependent on the availability of SWP supplies. Since the early 1970's, WKWD's water requirements have generally been less than SWP supplies delivered via the exchange with BVWSD. WKWD can accumulate this banked water from year-to-year. The average volume of water banked by WKWD since 1979 is 11,468 AFY. The total water currently banked, as of the end of the 2004-05 water year, is estimated at 184,800 AF.

The WKWD well field and recharge ponds are located adjacent to the KWBA. WKWD and KWBA maintain an operating agreement relative to pumping and recharge activities. Within this agreement, WKWD has the opportunity to connect to three KWBA production wells. These wells are permitted through the DPH for both WKWD and KWBA use. Although WKWD does not have a transfer agreement at present time with KWBA, there is a potential transfer of up to 12,905 AF possible from the three wells.

4.3 Subregion Description

4.3.1 Land Use

As discussed in Section 2, Section 2.3, the Land Use, Open Space, and Conservation Element of the Kern County General Plan provide the policies protecting the Kern County unincorporated areas, including the communities comprising the Kern Fan Subregion. Because of the close interrelationship between land use, conservation, and open space issues, Kern County's Land Use, Conservation, and Open Space Element provides for a variety of land uses for future economic growth while also assuring the conservation of Kern County's predominant agricultural, natural, and resource attributes.

The Kern Fan can be generally characterized as containing a predominance of rural uses including agriculture/open space and mineral/petroleum uses. The majority of the western portion of the Kern Fan, south of McKittrick and Tupman and north of the City of Maricopa, consists of mineral/petroleum uses. The northern and eastern portions of the subregion consist mostly of agricultural uses. There are some isolated areas within the subregion that are designated in the Kern County General Plan as "State/Federal Land." Agriculture and petroleum resources are important land uses in Kern Fan subregion and are vital to the local economy. The Midway-Sunset Oilfield, the third largest oilfield in the United States, is located in the Kern Fan subregion. Because of the importance of agriculture and petroleum production to the Kern Fan subregion, the Kern County General Plan emphasizes policies for protecting agricultural lands and directing urbanization to areas without important mineral and petroleum resources.

The largest City in the subregion is Taft with a population of 6,400 (US Census Bureau 2000). The land use element of Taft's General Plan, Buttonwillow Community Development Plan, Derby Acres Rural Community Plan, Dustin Acres Rural Community Plan and Valley Acres Rural Community Plan also provide policies protecting the uses within the Kern Fan.

4.3.2 Ecological Processes and Environmental Resources

Ecological processes and environmental resources for the Kern Region as a whole are described in Section 2, Section 2.4. With regard to the Kern Fan subregion, agriculture, urban development and oil/gas extraction have resulted in many changes in the natural environment. These impacts have resulted in drained and diverted lakes and wetlands, the loss of native plants and animal species, and a decrease in native lands. This has also resulted in the introduction of invasive species and spread of exotics leading to the decline of native plant communities.

The CDFG and the USFWS have listed some species as threatened or endangered, requiring species recovery by establishing a network of conservation areas and reserves that include terrestrial and riparian natural areas in the San Joaquin Valley and thus Kern Region. As part of their conservation efforts in the San Joaquin Valley, MBHCP and the draft VFHCP have been established to implement endangered species recovery programs within the Kern Region to promote species recovery, and protect ecological processes and environmental resources. The Kern Fan subregion is within the boundaries of the Endangered Species Recovery Program for the San Joaquin Valley. There are some areas planned for habitat acquisition within easterly edge of the subregion identified in the Metropolitan HCP. Much of the subregion is under the conserved jurisdiction, for those signatories, of the draft VFHCP.

The Kern Fan subregion is further distinct because it contains the Kern River, the Kern Water Bank, the Tule Elk State Natural Reserve and the Coles Levee Ecosystem Preserve. West of Bakersfield much of the Kern River is diverted for agricultural use and the river becomes dry or nearly dry for most of the year. During wet year the Kern River continues through the Kern Fan and terminates at Buena Vista Lake bed. The Kern River supports many vegetation types, both common as well as sensitive species are found along the river corridor.

The Kern Water Bank consists of about 20,000 acres of land bisected by the Kern River southwest of Bakersfield. The bank, which operates under its own HCP/NCCP, has restored over 17,000 acres of farmland to upland and intermittent wetland habitat. These habitats are home to over 34 at-risk species, including the Tipton kangaroo rat, San Joaquin kit fox, burrowing owl, loggerhead shrike, osprey, and tricolored blackbird. The bank is also home to rare and endangered plants, including the San Joaquin woolly thread and Hoover’s wooly star. A portion of the bank is also a conservation bank, where third-parties can mitigate impacts to species and habitat in other parts of the San Joaquin Valley.

The Coles Levee Ecosystem Preserve consists of about 6,060 acres of threatened and endangered species habitat which also encompasses the last two miles of riparian habitat along the Kern River before it enters the Buena Vista Lake. It was established in 1992 by Arco and the California Department of Fish & Game, the Preserve was acquired in 1998 by Aera Energy LLC. More than a dozen rare, threatened, and endangered birds, animals, and plant life can be found in the Preserve. The Preserve represents a unique public-private partnership dedicated to conserving entire ecosystems rather single species on scattered, smaller preserves.

The Tule Elk State Natural Reserve is approximately 953 acres located near the town of Tupman, and protects a herd of Tule elk, once in danger of extinction. In the 1880s, vast herds of Tule elk were greatly reduced in number by hunting and loss of habitat. Cattleman Henry Miller began a 50-year effort to save them in 1874. At that time, few elk remained. In 1932, the herd was given permanent protection on the park property, now known as Tule Elk State Natural Reserve. Elk from the reserve have been successfully transplanted to other areas in California where free-roaming herds of Tule elk can be found today (Brochure, California State Parks).

4.3.3 Social and Cultural Characteristics

The social and cultural characteristics of the Kern Fan are not different from that as described for the Kern Region as a whole, as provided in Section 2.5. The Kern Fan is characterized by its traditional industries, agriculture, oil and gas production, and a local prison, as well as increasing urbanization and population growth.

4.3.3.1 Economic Conditions and Trends

The Kern Fan subregion makes up approximately 6 percent of the total population within the Kern Region. The cities and communities of Buttonwillow, Derby Acres, Dustin Acres, Fellows, Ford City, Maricopa, McKittrick, South Taft, Taft City, Taft Heights, Tupman, and Valley Acres are within the Kern Fan. The majority of the population lives in or around Taft.

In the 2000 census approximately 5.8 percent of the subregion population was unemployed, as compared to the countywide average of 12 percent; the subregion faring better likely attributable to oil industry employment. Approximately 71 percent of the Kern Fan's population has a household income of less than $50,000, approximately 16 percent of the population has a household income between $50,000 and $74,999, and approximately 12 percent has a household income of $75,000 or higher. More than 32 percent of adults in the Kern Fan have graduated from high school, with approximately 7 percent of the population attaining an associate's degree, 5 percent of the population having a bachelor's degree, and 2 percent of adults in Kern Fan receiving a graduate or professional degree.

The population is largely White and Latino. Approximately 75 percent of the population identifies as being white and approximately 20 percent of the population reports being Hispanic (US Census Bureau 2000). Persons identifying as African American, Asian, American Indian, and Native Hawaiian make up less than 5 percent of the population. English is the primary language spoken at home (US Census Bureau 2000).

The Kern Fan subregion economy is agriculture and resource based. Agriculture makes up a large segment of the land use in the eastern portion of the subregion. Oil exploration and production provide a large segment of the employment base in the western portion of the sub-region, with clay mineral extraction also occurring in the area. The majority of the economic base in Taft and Maricopa is directly related to the petroleum industry. The Midway-Sunset Oilfield, the third largest oilfield in the United States, has produced approximately 2.8 billion gallons of crude oil. Recent prison construction in Taft also provides an additional source of employment in this area (Recirculated Draft Program EIR, Kern County Revised General Plan Update, January 2004).

In 2000, the population of Taft and Maricopa, along with the unincorporated communities of South Taft, Ford City, Taft Heights, and McKittrick was approximately 14,000. Domestic water deliveries to Maricopa, Tupman, Dustin Acres, Valley Acres, Derby Acres, Fellows and McKittrick historically indicate a decline in water deliveries primarily due to a decline in population in the past several years. The U.S. Census Bureau indicates a 0.5 percent population growth in the past 10 years for the Taft area. The low population growth within Taft is highly influenced by the lack of available property. Oil companies and government agencies control the majority of the land surrounding Taft, and until recently, land for development has not been for sale. Some small scale residential developments are anticipated within the next 5 years. The Cities of Taft and Maricopa are projected to continue to grow slowly over the next 10 to 12 years to an estimated population of 12,000 and 1,500 respectively.

4.3.3.2 Disadvantaged Communities

As defined in Section 2, Section 2.5.3, DACs are communities whose average MHI is less than 80 percent of the statewide annual MHI. In 2000, 80 percent of the state of California's MHI was $37,994. A number of municipalities within the Kern Region have been identified in Table 2-5 in Section 2.5.3 which meets the definition of a DAC. Of those identified as a DAC, Buttonwillow, Ford City, Maricopa, South Taft, Taft, Taft Heights and Tupman are located in the Kern Fan subregion.

4.3.4 Water Supply

The following section describes the sources of water supply for the Kern Fan subregion including imported surface water, local surface water, and local groundwater.

4.3.4.1 Imported Water

Imported water supplies into the Kern Fan subregion are SWP and CVP via the California Aqueduct and CVP via the Friant-Kern Canal. Turnouts on the California Aqueduct deliver water to KCWA, who then delivers it to its 13 member units for distribution. Imported SWP water is discussed in detail in Section 2, Section 2.6.1. The subregion is very dependent on this supply to recharge groundwater.

4.3.4.2 Surface Water

The primary source of surface water in the Kern Fan subregion is the Kern River. This source is described in detail in Section 2, Section 2.6.2.

With the exception of very wet periods, there is no flow in the Kern River past Bakersfield due to upstream canal diversions. During very wet years, water flows in the river southwest to the Buena Vista Lake bed and then north to Tulare Lake or into the California Aqueduct near Tupman. (Draft Recirculated Program EIR, Kern County Revised General Plan Update, January 2004).

Buena Vista Lake (Lake Evans/Lake Webb) is located approximately 23 miles southwest of Bakersfield at the terminus of the Kern River. This recreation area occupies a portion of the old Buena Vista Lakebed. Technically, the recreation area is an Agricultural Water Conveyance

Facility that connects the Alejandro Canal with the Kern River Channel and the California Aqueduct for the purpose of facilitating more efficient storage and distribution of water. The resultant lake developments provide almost 960 acres of water surface for boating, skiing, sailing, and fishing. The two separate lakes (Lake Evans and Lake Webb) provide the primary attraction for the park with adjacent camping and picnic areas ancillary to this feature. (Draft Recirculated Program EIR, Kern County Revised General Plan Update, January 2004) The aquatic lakes “Lake Webb” and “Lake Evans” are part of the Buena Vista Aquatic Recreation Area. These are owned and operated by the County of Kern. BVWSD is the water master that keeps the records of water into and out of the Lake. A portion of this area is within the boundary of HMWD, which operates and maintains four wells. HMWD has rights to move its water through the lakes.

4.3.4.3 Groundwater

Groundwater is an important water supply to the Kern Fan subregion. The San Joaquin Valley groundwater basin underlies the majority of the Kern Fan. Major water banking and conjunctive use projects contribute large amounts of recharge to the Kern Fan. Secondary sources of groundwater are infiltration of water used for irrigation in agricultural applications. During wet years, Kern River water is also a source of groundwater recharge. Groundwater banking programs are widely used in the Kern Fan subregion. Many notable storage programs in the Kern Fan include those operated by BVWSD, KWBA, RRBWSD, and WKWD. It is estimated that approximately two-thirds of water banking storage in Kern County is in the Kern Fan.

The Kern Fan Monitoring Committee was established to monitor the impacts of banking programs located on the Kern Fan. The purpose of this committee is to insure that the banking and recovery projects do not result in significant impacts to water levels, groundwater quality, or land subsidence. Annual groundwater level and quality maps are prepared by the committee (RRBWSD MEIR, July 2001).

4.3.4.4 Recycled Water

As discussed in Section 2, wastewater effluent produced by treatment facilities can be applied to non-food crop irrigation and environmental habitat restoration. Taft currently has two WWTPs, the Taft Municipal Wastewater Treatment Plant and the State Prison Wastewater Plant. The Taft Municipal Wastewater Treatment Plant serves the Taft Sphere of influence and has a capacity to treat 1.5 MGD. State Prison Wastewater Plant has a capacity of 0.5 MGD. Taft plans to eventually double the capacity of both plants to accommodate future development.

4.3.5 Water Quality

Imported water supplies in the Kern Fan subregion regard SWP water and generally are of good quality. This supply is discussed in detail in Section 2, Section 2.7.2.

The quality of groundwater in the Kern Fan subregion is excellent. The concentration of TDS averages about 220 mg/L, far below the MCL for drinking water of 500 mg/L. The TDS in the California Aqueduct averages 240 mg/L and can range up to 325 mg/L. The subregion participants regularly monitor groundwater conditions using dedicated monitoring wells. The water quality is tested in accordance with protocols developed by the California Department of

Public Health for drinking water. Water levels are measured at least semiannually, and the water is tested for the presence of several constituents annually. With the exception of a few localized oilfield operations, there are no potential pollution sources (KWBA Website, 2009).

Other water quality concerns within the Kern Fan subregion include the storm water runoff from residential and industrial areas that can contribute to water quality degradation since it contains organics, pesticides, oil, grease, and heavy metals. Also of concern is naturally occurring erosion, which can cause discoloration of streams, and suspended matter settling to form a smothering blanket on the streambed. Erosion is accelerated by poor drainage and soil stabilization associated with the following activities: road building, clearing and leveling land, construction, brush clearing, off-road vehicle use, agriculture, overgrazing, and fires.

Some participants rely solely on the groundwater source for their supply of water. Water quality deterioration would greatly impact the ability of some of the participants to supply a reliable source of water to their customers. The areas supplied by the WKWD for example need imported water from outside their region because the local groundwater is of poor quality due to high TDS and not suitable for domestic or agricultural purposes.

4.3.6 Water Demand

Demands within the Kern Fan subregion were analyzed by comparing the estimated 2005 total water demands and the 2030 total water demands, as shown in Table 4-1. These demands were further analyzed by comparison of three categories of water demand: M&I, agricultural, and groundwater recharge. M&I demands are urban water demands that include residential (single family and multifamily), commercial / industrial / institutional, large landscape, and other water use types (including water losses) as provided by the various water retail water suppliers participating in this IRWMP. Generally, historic and projected urban water demands were taken from UWMPs developed by the agencies, from DHS (now DPH) annual reports and/or as reported by KCWA. Agricultural water demand is defined as the total annual water demand for all agricultural accounts. Groundwater recharge is defined as the total amount of water recharged (direct or in-lieu) or banked within a supplier's respective service area.

The estimated 2005 total water demand within the subregion was approximately 450,992 AF; the 2030 water demand is projected to be 465,889 AF. The Kern Fan residential demand is projected to increase by approximately 40 percent by 2030 from the 2005 demand. Commercial and industrial demands will increase less significantly (10 to 15 percent respectively) during the same period. Agricultural water demand in 2005 was approximately 415,481 AF, which represents over 90 percent of the total demand within the subregion, and could remain fairly constant or decrease slightly as agricultural properties are converted to urban uses. Groundwater recharge within the Kern Fan subregion in 2005 was about 389,000 AF (unpublished KCWA data, groundwater recharge activities, Table 24). The Kern Fan subregion's M&I and AG combined is approximately 16 percent of the total 2005 demand for the Kern Region.

TABLE 4-1
SUMMARY OF ESTIMATED CURRENT AND FUTURE WATER DEMAND BY WATER USE CATEGORY FOR THE KERN FAN SUBREGION

	2005			2030		
Purveyor	**M&I**	**AG[d]**	**TOTAL**	**M&I**	**AG[d]**	**TOTAL**
Buena Vista WSD	--	108,052	108,052	--	108,052	108,052
Buttonwillow CWD	130[a]	--	130	130[a]	--	130
Buttonwillow ID	--	178,802	178,802	--	178,802	178,802
Henry Miller WD	--	47,178	47,178	--	47,178	47,178
Kern Water Bank Authority	--	--	--	--	--	0
City of Maricopa (see West Kern WD)	--	--	--	--	--	0
Rosedale-Rio Bravo WSD	--	81,449	81,449	--	81,449	81,449
City of Taft (see West Kern WD)	--	--	--	--	--	0
Vaughn WC	10,700[b]	--	10,700	21,827[b]	--	21,827
West Kern WD	24,681[c]	--	24,681	27,275[c]	--	27,275
Total	**35,511**	**415,481**	**450,992**	**49,232**	**415,481**	**464,713**

Notes:

(e) Year 2005 from unpublished KCWA data. Water demands 2005 to 2030 assumed to grow 1.8 percent per year based on Kern Council of Governments Draft Regional Forecast Report.

(f) Vaughn WC 2005 UWMP. Data for 2030 estimated based on growth rate 2020 to 2025.

(g) West Kern WD 2010 UWMP.

(h) Unpublished KCWA data. 2005 agricultural demand data based on 2007 summary by Crop Group. 2030 agriculture demand data based on equivalent production as 2005 data.

4.3.7 Water-Related Infrastructure

Water related infrastructure such as surface water impoundments, water collection systems, distribution systems, wastewater systems, and recharge systems, are described generally for the Kern Fan subregion participants in their general descriptions above, and in greater detail for the entire Kern Region in Section 2, Section 2.9.

In general, many Kern Region communities are older and the physical components of their water systems are aging and outdated. Aging infrastructure is a particular issue for rural communities and DACs. In recent years rapid urban development in some areas has provided new infrastructure, but this new infrastructure is limited to those areas receiving new development. Water treatment improvements have recently been undertaken by KCWA, the City of Bakersfield, CWS, and NORMWD. Other communities are planning upgrades to their water treatment infrastructure. Part of the impetus for joining and participating in the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs.

4.4 Subregional Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Kern Fan subregion with respect to water resource management within the Kern Region include the following. These issue areas are discussed in greater detail in Section 2, in the following Sections:

- Decreased Imported Water Supply (see Section 2.10.4)
- Water Quality/Groundwater Contamination (see Section 2.10.8)
- Urban Growth Encroachment on Key Recharge Areas (see Section 2.10.3)
- Water Rights (see Section 2.10.9)

Section 5: Mountains/Foothills Subregion

5.1 Subregion Introduction

This section presents a description for the Mountains/Foothills portion of the Kern Region. The section includes a summary of the subregion's participants, as well as a description of the physical, environmental, social and demographic characteristics of the subregion, the hydrologic features and overall water reliability, and major water related infrastructure. The Mountains/Foothills subregion is located at the southeast quadrant of the Kern Region primarily amongst the Tehachapi Mountains which are bounded by the Mojave Desert/Great Basin to the east, the Caliente Creek to the north and the San Joaquin Valley to the west. Highway 58 runs southeast through this subregion from Bakersfield over the Tehachapi Mountains to the City of Tehachapi and provides a connection from the San Joaquin Valley to the Great Basin/Mojave Desert. See Figure 5-1 for a map of this subregion.

5.2 Subregion IRWMP Participants

The Mountains/Foothills subregion is comprised of ten participants and includes:

1. Bear Valley Community Services District (BVCSD)
2. City of Tehachapi
3. Frazier Park Public Utility District (FPPUD)
4. Golden Hills Community Services District (GHCSD)
5. Lebec County Water District (LCWD)
6. Long Canyon Water Company (LCWC)
7. Stallion Springs Community Services District (SSCSD)
8. Tehachapi-Cummings County Water District (TCCWD)
9. Tehachapi Resource Conservation District (TRCD)
10. Tejon-Castac Water District (TCWD)

These participants' roles and responsibilities for managing water, natural resources, and land use within the Mountains/Foothills subregion are discussed below.

5.2.1 Bear Valley Community Services District

BVCSD serves as the local government for the community of Bear Valley Springs. It is similar to a city government, supplying such services as police protection, fresh water, road maintenance, wastewater treatment, and solid waste disposal. The BVCSD exists under California law governing special districts (Government Code, Sec 61000 et seq). It was established by resolution of Kern County Board of Supervisors on May 4, 1970 for the purpose of providing infrastructure services for the newly developing community of Bear Valley Springs.

BVCSD's services are funded by property taxes, special assessments and standby charges collected by Kern County on the regular property tax bill. Some funds are collected through user fees such as water, sewer and refuse charges and capacity fees for new water connections.

The BVCSD's fresh water system is comprised of nearly 30 wells, 40 storage tanks, and 110 miles of delivery pipe, which is monitored and maintained by the Water Department. The system provides fresh water for all residents as well as for all amenities. BVCSD provides water to a population of approximately 8,000 through approximately 2,900 service connections. Each lot is metered and monthly billings are made according to water usage. Wastewater treatment is provided at its facility located on Lower Valley Road. All residents and amenities inside the Lower Valley Road loop (golf course area) are hooked into this sewer system, and treated effluent is used for irrigation purposes on a local golf course.

5.2.2 City of Tehachapi

The City of Tehachapi provides groundwater to more than 12,000 residents which is pumped from the Tehachapi Valley Aquifer; no surface or imported water is used. The City maintains seven groundwater wells that replenish the 3 million gallon (MG) capacity of its storage facilities and the 37 miles of transmission lines that provide potable water to residences, schools, and businesses. The distribution system includes 5 pressure zones, four of which are used and regularly tested.

5.2.3 Frazier Park Public Utility District

FPPUD was formed on February 20, 1939 as the successor to the Frazier Mountain Water Company. FPPUD primarily serves the Frazier Park community, located 2 miles west of the project sites. Frazier Park has a population of approximately 2,300, and services 1,238 connections to these residents. Four groundwater wells (three active and one standby) are maintained by the FPPUD. These wells pump water from the middle subbasin of the Cuddy Canyon Valley Groundwater Basin. FPPUD also uses two springs, Pine Canyon and Sam Young, as a water supply. Thirteen water tanks are scattered throughout the service area. These have a combined storage capacity of 2 MG. The majority of the tanks have a holding capacity of 125,000 gallons.

5.2.4 Golden Hills Community Services District

GHCSD services a 5,980 acre community in the Tehachapi Mountains, one-half mile west of the City of Tehachapi, bounded by State Highway 202 (Cummings Valley Boulevard) to the south, Reeves Street and the western border of the Southern Pacific Railroad right-of-way to the east, and a line parallel with Valley View Road to the north. GHCSD provides potable water service to approximately 7,400 customers through 2,745 service connections. GHCSD's water source is derived from groundwater pumped by 15 wells. The district also purchases water from the Tehachapi-Cummings water district which is ultimately recharged back into the underlying aquifer.

5.2.5 Lebec County Water District

LCWD services the entire community of Lebec located northeast of Frazier Park just off the Interstate 5 Freeway on the southern border of Kern County. LCWD provides groundwater from three existing wells to slightly less than 300 households. One additional well is in construction and is slated to go on-line within the year. According to the Recirculated Draft Environmental Impact Report (EIR) for Frazier Park Estates (Jones and Stokes, 2009), the LCWD water supply system also includes 19 water storage tanks, with approximately 520,000 gallons of total storage, and distribution pipelines.

5.2.6 Long Canyon Water Company

LCWC serves 67 customers at flat rate billing in the town of Weldon on the edge of Lake Isabella. The company operates two wells, providing 10.74 AF of local groundwater to its customers via 67 connections.

5.2.7 Stallion Springs Community Services District

SSCSD encompasses 23,000 acres of mostly undeveloped land, containing roughly 2,300 parcels. SSCSD provides potable water to over 3,500 customers throughout their service area, which lies 10 miles west of the City of Tehachapi. Currently the company has 1,250 connections and seven active wells which lie outside their service area. Similar to the GHCSD, SSCSD purchases water from the TCCWD for local groundwater recharge purposes. Due to recent growth in the Stallion Springs area, the district has spent one million dollars to extend a 3.5 mile pipeline to Cummings Valley where they purchased two small parcels of land and drilled two wells.

5.2.8 Tehachapi-Cummings County Water District

TCCWD is a member of KCWA with a SWP contract entitlement of 19,300 AFY. The District is located generally north of the Tehachapi Mountains with a service area that encompasses roughly 266,000 acres. TCCWD's connection to the California Aqueduct is just upstream of the Edmonston Pumping Plant near Tejon Ranch; a pipeline 31 miles in length which ranges from 27- to 39-inches in diameter. The District sells a portion of its annual contract entitlement to KCWA and reserves a portion of their allotment for carry over into the following year for sales to other water agencies such as BVCSD, City of Tehachapi, GHCSD, SSCSD, and the California Department of Corrections and Rehabilitation. Many of these agencies including TCCWD will recharge some or all of their SWP supplies into their local groundwater basins to create a more reliable potable water source. One of the goals of the Board of Directors of the TCCWD is to direct the use of imported SWP water to agricultural and industrial uses and reserve the high quality groundwater for domestic demand.

5.2.9 Tehachapi Resource Conservation District

The TRCD manages resource conservation projects within an area of approximately 400 square miles of public and private lands. Projects planned for or already implemented include: prevention and control of soil erosion and stormwater runoff; reducing the impact, and eventual eradication of noxious weed species; reducing the impact of non-point sources of pollution; water quality and water conservation activities; improving farmland irrigation methods; preserving prime and unique farmlands and ranchlands; and preserving and improving oak woodlands and wildlife habitats.

5.2.10 Tejon-Castac Water District

TCWD is a member of the KCWA and has contractual rights to the SWP water in the California Aqueduct. In addition, the agency has rights to store and retrieve water in both the Kern Water Bank and the Pioneer Project Water Bank. TCWD provides water to a population of approximately 1,000 persons through 20 service connections, all within the Tejon Industrial Complex (TIC) which is located adjacent to Interstate 5 at the base of the Grapevine. The district also owns and operates a wastewater collection, treatment, and disposal facility that provides sewerage services at the TIC. As part of the CWC, TCWD will be required to be a participant in the Tejon Mountain Village development including 3,450 residences, 160,000 square feet of commercial space, up to 750 hotel rooms, and two 18-hole championship golf courses. The district will supply approximately 2,100 AFY of SWP water through a nearby turnout and would construct additional wastewater recycling and water treatment facilities to serve the Tejon Mountain Village proposed development.

5.3 Subregion Description

5.3.1 Land Use

The unincorporated areas within the Mountains/Foothills subregion are governed by the land use policies of the Kern County General Plan. Because of the close interrelationship between land use, conservation, and open space issues, the Land Use, Conservation, and Open Space Element of the General Plan provides for a variety of land uses for future economic growth while also assuring the conservation of the County of Kern's predominant agricultural, natural, and resource attributes. Land use designations include: non-jurisdictional land, physical constraints overlay, public facilities and services, special treatment areas, residential, commercial, industrial, resource, and protection of cultural resources.

5.3.1.1 Ecological Processes and Environmental Resources

Ecological processes and environmental resources for the Kern Region as a whole are described in Section 2, Section 2.4. With respect to the Mountains/Foothills subregion, the area is dominated by the geologic features of the Southern Sierra Nevada Mountains which are divided into four smaller ranges: The Greenhorn Mountains to the northwest, the Scodie Mountains to the northeast, the centrally located Piute Mountains, and the Tehachapi Mountain Range to the south. Due to the small amount of developed area in comparison to the other subregions, the Mountains/Foothills region boasts some of the most diverse flora and fauna in the Kern Region, due to the ecological extremes of the mountains and the Kern River system.

The mountainous provinces of this subregion are lined primarily with conifers including incense cedars, white firs, and small groupings of aspens while the low-lying foothills or savannahs grow a variety of oak species as well as sycamore, cottonwood, and willow trees. The composition of fauna within this area is analogous to most California mountain ranges and consists of mule deer, mountain lion, wild boar, coyote, fox, black bear, bobcats, and raccoons. Over 68 species of birds reside in the Tehachapi Mountains alone and provide for excellent bird watching opportunities for enthusiasts such as members of the Tehachapi Mountains Birding Club and the Audubon Society.

The Tehachapi Mountains also form an important wildlife corridor because of the biogeographically unique linkage they provide between the Sierra Madre, Castaic, and Sierra Nevada Ranges (SWCA 2008). This area forms a linkage from the foothills and grasslands of the San Joaquin Valley, to the high-elevation hardwood and coniferous forests, to the foothill transition into the Mojave Desert along the base of the southern Tehachapi Mountains (SWCA 2008).

The Kern River, discussed in detail in Section 2.6.3.1, is one of the most outstanding environmental resources in this subregion. The Kern River supports many types of habitat, vegetation and animal species. Vegetation found along the river corridor include riparian woodland, riparian scrub, riparian savannah, freshwater marsh, quail bush scrub, alluvial scrub, and grasslands. Some of the species located in and around the Kern River include the San Joaquin kit fox, blunt-nosed leopard lizard, Tipton kangaroo rat, giant kangaroo rat, San Joaquin antelope squirrel, Swainson's hawk, bald eagle, willow flycatcher, California condor, California golden trout, Kern River rainbow trout, and the Little Kern golden trout.

The CDFG and the USFWS have listed some species as threatened or endangered, requiring efforts to promote species recovery, which has led to the establishment of a network of conservation areas and reserves that include terrestrial and riparian natural areas in the San Joaquin Valley and thus Kern Region. As part of their conservation efforts in the San Joaquin Valley, the MBHCP and the draft VFHCP have been established to implement endangered species recovery programs within the Kern Region to promote species recovery, and protect ecological processes and environmental resources. The Mountains/Foothills subregion's westerly edge is within the Metropolitan HCP and under the jurisdiction of the draft VFHCP.

5.3.2 Social and Cultural Characteristics

The cities and communities of Bear Valley Springs, Frazier Park, Golden Hills, Keene, Lake of the Woods, Lebec, Stallion Hills, and Tehachapi are within the Mountains/Foothills subregion. The majority of the subregion's population lives in or around Tehachapi.

The Mountains/Foothills subregion is known for diverse social and cultural characteristics due to its vast array of landscapes and environments. The greater Tehachapi area, which falls under the 'foothills' classification, is known for its four seasons, electricity-generating wind turbines, rural communities, and the Tehachapi Loop, a historically-significant railroad feature. Cultural resources in the subregion include archaeological, historical, and man-made resources such as buildings, structures, towns, and objects. The Native American Heritage Commission has completed a Sacred Lands file search which has indicated the presence of numerous historic Native American burial grounds in the region. There are also California-Registered historical landmarks in the foothills region including number 643, Old-Town Tehachapi which commemorates the oldest settlement in the Tehachapi Valley. Landmark number 508 is the famous Tehachapi Railroad Loop in which a 4,000 foot long train crosses 77 feet above its rear cars in a tunnel below as the train gains elevation around a central hill. The National Cesar Chavez Center is located in Keene, also the location of the National Farm Workers Association, which later became the United Farm Workers of America.

The mountainous communities within this subregion are essentially broken up into two areas: the Tehachapi area and the southern mountains including the Frazier Park-Lebec Specific Plan Area. The southern mountains, which include the Mount Pinos Recreational area, Hungry Valley State Recreational Vehicle Area, Fort Tejon, and picturesque terrain, attract over 500,000 visitors per year. Recreational activities include mountain biking, camping, fishing, boating, swimming, backpacking, hiking, hunting, horseback riding, and cross county skiing, sledding, and snowmobiling in the winter months.

Section 2.5.1 provides a summary of the human demographics for the Kern Region as determined by 2000 U.S. Census Bureau data. Regional data was estimated from the data for the census tracts within the regional boundaries.

Approximately 65.7 percent of the Mountains/Foothills subregion’s population has a household income of less than $50,000, approximately 19.3 percent of the population has a household income between $50,000 and $74,999, and approximately 14.9 percent has a household income of $75,000 or higher. More than 31.2 percent of adults in the Mountains/Foothills subregion have graduated from high school, with approximately 7.6 percent of the population attaining an associate’s degree, 8.7 percent of the population having a bachelor’s degree, and 4.1 percent of adults in the subregion receiving a graduate or professional degree.

The population is largely White and Latino. Approximately 74.6 percent of the population identifies as being white and approximately 16.2 percent of the population reports being Hispanic (US Census Bureau 2005). Persons identifying as African American, Asian, American Indian, and Native Hawaiian make up less than 9.2 percent of the population. English is the primary language.

5.3.2.1 Economic Conditions and Trends

Tehachapi has seen a huge increase in businesses in the last 7 years, including its first big-box store, Home Depot, with a Wal-Mart Supercenter proposed for 2011.

One of the largest employers in Tehachapi is the California Correctional Institution (CCI), which is a high-security prison for males. The prison held only female criminals prior to the 1952 Tehachapi earthquake. At one time land east of the city along Highway 58, designated "Capital Hills", was envisioned to become a site for cutting edge research and technologies development as well as new residential areas. These plans never came to fruition.

Two new developments project, Frazier Park Estates and Tejon Mountain Village may bring new economic development to this subregion. Frazier Park Estates, located west of Interstate 5 in the unincorporated community o f Frazier Park is a proposed master plan community includes single-family and multi-family residences, commercial space, sports field and other recreational areas (Frazier Park Estates EIR, 2009). Tejon Mountain Village proposed development includes 3,450 residences; up to 160,000 square feet of commercial development; hotel, spa, and resort facilities, which include up to 750 lodging units; and up to 350,000 square feet of facilities in support of two 18-hole golf courses, riding and hiking trails, equestrian facilities, two helipads, fire stations, private community centers, electrical sub-station facilities, permanent and interim water treatment and wastewater treatment facilities and access and utilities to serve the project, and ranchland and other undeveloped open space. The proposed development would occur within an approximately 7,867-acre development envelope of which an approximately 5,082-acre building area would ultimately be developed. Approximately 21,335 acres (80 percent) of the site would be permanently preserved as ranchland and other undeveloped open space (Tejon Village EIR, 2009).

5.3.2.2 Disadvantaged Communities

As defined in Section 2.5.3, DACs are communities whose average MHI is less than 80 percent of the statewide annual MHI. In 2000, 80 percent of the state of California's MHI was $37,994. A number of municipalities within the Mountains/Foothills subregion have been identified in Table 2-5 of Section 2.2.5.3 which meets the definition of a DAC. One community in the Mountains/Foothills subregion has been identified as a DAC according to the States definition; the City of Tehachapi. According to the 2000 U.S. Census, the average household income of this community is $29,208, or 61 percent of the statewide average of $47,493.

5.3.3 Water Supply

5.3.3.1 Imported Water Supplies

While most of the water purveyors within the region primarily provide groundwater to their customers, imported water supplies via the SWP California Aqueduct are also available. These imported water supplies are discussed in more detail in Section 2.6.1.

5.3.3.2 Surface Water

The most important source of naturally occurring surface water in the Region is the Kern River. Many small local surface water sources are very seldom utilized by communities and local water purveyors in the Mountains/Foothills subregion as a direct source of domestic or agricultural and industrial water due to poor infrastructure connections and low flows. Thousands of acres of land are used for ranching throughout the foothill and mountain areas on both private and public lands and for irrigated agriculture in the region such as orchard crops such as applies in the Tehachapi areas and carrots, potatoes and hay in the South Fork area of the Kern River. Tributaries within the region such as Caliente Creek and Tehachapi Creek provide small sources of water, typically used in agricultural irrigation applications in the portions of the County of Kern at lower elevations. Refer to Section 2.6.3 for more information regarding natural surface waters in the Kern Region.

5.3.3.3 Groundwater

Groundwater is the primary source of domestic water for the residents of this subregion, whereby high quality water is present in basins such as the Kern River Valley Groundwater Basin, Walker Creek Valley Groundwater Basin, Tehachapi Groundwater Basin, Brite Groundwater Basin, Cummings Groundwater Basin, and the Cuddy Groundwater Basin. In 1972, the Superior Court of California issued a ruling in the "Tehachapi Basin Case" that provided for a water exchange pool, which allowed the City of Tehachapi, Golden Hills, and various others with shortfalls in supply to pump groundwater in excess of their pumping rights. In response, agricultural parties who owned groundwater pumping rights gave up their right to pump in lieu of additional surface water imports for irrigation uses. Over the last few years, land use and water rights changes have rendered the water exchange pool unnecessary and although the pool is still intact, it is currently not in use. The Tehachapi Groundwater Basin has an annual safe yield of 5,500 AF which was established in the Tehachapi Basin Case. The Cummings Basin has a well managed conjunctive use plan including return flows and aquifer recharge that produces an annual safe yield of 4,090 AF, with approximately 2,989 AF used for agricultural use and 911 AF used for M&I purposes. Brite Groundwater Basin has a much smaller adjudicated annual safe yield of 500 AF in which 229 AF are extracted for agricultural use and 99 AF are extracted for municipal and domestic purposes (Integrated Resource Management, LLC. 2009). The Cuddy Groundwater Basin is not an adjudicated basin and has not been identified by the DWR as an over drafted basin. The November 23, 2005 Groundwater Assessment Report estimated that the storage capacity of the basin underlying the 46-square-mile drainage area was between 22,000 and 30,000 AF. Groundwater in the Mountains/Foothills subregion is recharged primarily through percolation of the Kern River in the Kern River Valley and Lake Isabella areas while snowfall and rainwater constitutes the majority of naturally recharged water in the surrounding parts of this subregion.

5.3.3.4 Recycled Water

Currently, the City of Tehachapi, SSCSD, Golden Hill Sanitation Company, TCWD, and the California Department of Corrections and Rehabilitation existing treatment systems only provide for secondary treated wastewater. Title 22 from the California Code of Regulations sets limitations on water discharges including potential for reuse in applications such as irrigation and groundwater recharge. Secondary treated wastewater may only be surface applied to forage crops on non-consumptive grasses without any percolation to groundwater. TCCWD recently entered in an agreement with the California Department of Corrections and Rehabilitation to purchase between 1,000 and 1,200 AF annually of the treated effluent from their wastewater treatment facility (WWTF), however, it is not yet operational and the agreement is still unsigned.

The TCWD operates a 100,000 gallons per day (gpd) packaged, extended aeration, tertiary, WWTF located in the District's TIC in the southern portion of the Mountains/Foothills subregion. It has an average daily flow of 60,000 gpd to 80,000 gpd and is permitted by the CVRWQCB to treat water to meet Title 22 standards for non-potable use. The plant also consists of a 3.7 MG lined pond and a 4.5 MG unlined pond from where the recycled water effluent can be conveyed through a series of pipes to landscape irrigation areas.

BVCSD operates a sewer plant with tertiary treatment.

5.3.4 Water Quality

Groundwater quality within the Mountains/Foothills subregion is variable seeing small localized areas with contaminants above the CCR Title 22 screening limits. Many community and noncommunity water systems have contaminated water sources from nitrates, bacteria, fluoride, uranium, arsenic, and gross alpha radiation. The most common contaminant found at higher than desirable concentrations within the Tehachapi Basin, Cummings Basin, and the Cuddy Valley Basin is nitrate. High levels of nitrate within these areas is a result of more than 60 years of heavy use of nitrate and ammonium fertilizers as well as secondary treated effluent from small wastewater treatment facilities and septic systems. Nitrate levels in Tehachapi municipal wells once exceeded 30 mg/L and nitrate concentrations in two other wells belonging to Ashtown, a small annexed subdivision outside of Tehachapi, once exceeded 45 mg/L (DHS 1991; Jasper 2000). In this case of such high concentrations, the wells were drained and the water was dispersed amongst surrounding agricultural land for use as irrigation where the water would be subject to natural denitrification processes. TDS levels within all three groundwater basins are very low and have not shown any signs of rising above the California State Standards.

SWP imported water from the California Aqueduct also boasts very high quality and requires strict testing in accordance with the regulations and requirements of SDWA of the DPH. Typical TDS values range between 250 to 350 mg/L while hardness values commonly vary between 100 to 125 mg/L.

In cooperation with the SWRCB, the USGS conducted a groundwater study program for the Southern Sierra Study Unit which covers 1,800 square miles in Kern and Tulare Counties (SWRCB 2006). Samples were collected from 50 wells in the study area and analyzed for synthetic organic constituents, VOCs, pesticides and degradates, pharmaceutical compounds, and waste-water indicator compounds.

Bacteriological testing is conducted monthly on the City of Tehachapi's distribution system and the free chlorine residual is maintained between 0.75 to 1.5 mg/L.

5.3.5 Water Demand

Demands within the Mountains/Foothills subregion were analyzed by comparing the estimated 2005 total water demands and the 2030 total water demands, as shown in Table 5-1. These demands were further analyzed by comparison of three categories of water demand: M&I, agricultural, and groundwater recharge. M&I demands are urban water demands that include residential (single family and multifamily), commercial/industrial/ institutional, large landscape, and other water use types (including water losses) as provided by the various water retail water suppliers participating in this IRWMP. Generally, historic and projected urban water demands were taken from UWMPs developed by the agencies, from DHS (now DPH) annual reports and/or as reported by KCWA. Agricultural water demand is defined as the total annual water demand for all agricultural accounts. Groundwater recharge is defined as the total amount of water recharged (direct or in-lieu) or banked within a supplier's respective service area.

The estimated 2005 total water demand within the subregion was approximately 14,353 AF; the 2030 water demand is projected to be 21,094 AF. Agricultural water demand in 2005 was approximately 8,449 AF, which represents about 6 percent of the total demand within the subregion, and could remain fairly constant or decrease slightly as agricultural properties are converted to urban uses. The Mountains/Foothills subregion's M&I and AG combined is approximately .5 percent of the total 2005 demand for the Kern Region.

TABLE 5-1
SUMMARY OF ESTIMATED CURRENT AND FUTURE WATER DEMAND BY WATER USE CATEGORY FOR THE MOUNTAINS/FOOTHILLS SUBREGION (AF)

	2005			2030		
Purveyor	**M&I**	**AG[(d)]**	**TOTAL**	**M&I**	**AG[(d)]**	**TOTAL**
Tehachapi-Cummings CWD	4,878[(a)]	8,449	13,327	10,484[(a)]	--	10,484
City of Tehachapi *(see TCCWD)*	--	--	0	--	--	0
Golden Hills CSD *(see TCCWD)*	--	--	0	--	--	0
Stallion Springs CSD2 *(see TCCWD)*	--	--	0	--	--	0
Bear Valley CSD *(see TCCWD)*	--	--	0	--	--	0
Long Canyon WC	--	--	0	--	--	0
Frazier Park PUD	850[(b)]	--	850	1,768[(b)]	--	1,768
Lebec CWD	--	--	0	--	--	0
Tejon-Castac WD	176[(c)]	--	176	8,842[(c)]	--	8,842
Total	**5,904**	**8,449**	**14,353**	**21,094**	**0**	**21,094**

Notes:
(a) Data for 2005 M&I demands provided by Tehachapi-Cummings CWD. Water demands assumed to grow 1.8 percent per year, based on Kern Council of Governments Draft Regional Forecast Report.
(b) County of Kern 2006. Frazier Park Estates Draft EIR. Includes Frazier Park Estates; Flying J Plaza; and school.
(c) Tejon-Castac 2005 UWMP. Data for 2030 estimated based on growth rate 2020 to 2025.
(d) Unpublished KCWA data. 2005 agricultural demand data based on 2007 summary by Crop Group. 2030 agriculture demand data based on equivalent production as 2005 data.
(e) Unpublished KCWA data. Summary of Groundwater Recharge Activities (Table 24).
(f) U.S. Bureau of Indian Affairs Hydrologists are planning to inventory (develop quantification) the Tribal allotment lands in 2010.
(g) Tribal allotment water use includes residential and agriculture

5.3.6 Water-Related Infrastructure

Water related infrastructure such as surface water impoundments, water collection systems, distribution systems, wastewater systems, and recharge systems, are described generally for the Mountains/Foothills subregion participants in their general descriptions above, and in greater detail for the entire Kern Region in Section 2, Section 2.9.

In general, many Kern Region communities are older and the physical components of their water systems are aging and outdated. Aging infrastructure is a particular issue for the Mountains/Foothills subregion, its rural communities and DACs. In recent years rapid urban development in some areas has provided new infrastructure, but this new infrastructure is limited to those areas receiving new development such as that for the proposed TIC and Mountain Village Complex. Other smaller communities within the subregion are also planning upgrades to their water treatment infrastructure, and need assistance in implementing their planning efforts. Part of the impetus for joining and participating in the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs.

5.4 Subregional Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Mountains/Foothills subregion with respect to water resource management within the Kern Region include the following. These issue areas are discussed in greater detail in Section 2, in the following Sections:

- Groundwater Overdraft (see Section 2.10.6)
- Watershed Protection (see Section 2.10.10)
- Aging and/or Duplicative Infrastructure (see Section 2.10.1)
- Urban Growth and Water Demand (South Mountains) (see Section 2.10.2)
- Climate Change (see Section 2.10.11)

Section 6: Kern River Valley Subregion

6.1 Subregion Introduction

This section presents a description for the Kern River Valley portion of the Kern Region. The section includes a summary of the subregion's participants, as well as a description of the physical, environmental, social and demographic characteristics of the subregion, the hydrologic features and overall water reliability, and major water related infrastructure. The Kern River Valley subregion is located in the northeast quadrant of the Kern Region. It is bounded by the Mojave Desert/Great Basin to the east, the northernmost segment of the Mountains and Foothills region to the south by the Caliente Creek divide, and the San Joaquin Valley to the west. Highway 58 runs southeast through this subregion from Bakersfield, over the Tehachapi Mountains to the City of Tehachapi and provides a connection from the San Joaquin Valley to the Great Basin/Mojave Desert. Highway 178 runs northeast through the subregion along the channel of the Kern River, from where the river debuts into the San Joaquin Valley, through the axis of the Kern River Valley and out to the Great Basin/Mojave Desert. See Figure 6-1 for a map of this subregion.

6.2 Subregion IRWMP Participants

The Kern River Valley subregion is comprised of six participants and includes:

1. California Water Service – Kern River Valley District (CWS-KRVD)

2. Desert Mountain Resource Conservation and Development Council (DMRCDC)

3. Mountain Mesa Water Company (MMWC)

4. Rainbird Valley Mutual Water Company (RVMWC)

5. Valley Estates Property Owners Association (VEPOA)

6. Tubatulabals of Kern Valley Tribe

These participants' roles and responsibilities for managing water, natural resources, and land use within the Kern River Valley subregion are discussed below.

6.2.1 California Water Service, Kern River Valley District

CWS is the third largest investor-owned American water utility in the country. CWS-KRVD provides water to the Kern River Valley Area. CWS-KRVD was formed in 2000 with the purchase of the Kern River Valley Water Company and currently serves over 6,500 customers throughout the valley through 4,400 service connections. The majority of the water delivered by CWS in this area is pumped from rock fissures in granitic rocks beneath the ground while additional water is derived from the Kern River. The Kern River Valley District operates over 50 wells, 30 storage tanks, 75 miles of distribution mains and 8 treatment plants, including a 1.5 MGD surface water plant which serves urban Bakersfield areas outside of the subregion.

In the Lake Isabella portion of the Kern River Valley area, there are approximately 35 community water systems, about ten of which are owned or operated by CWS, and approximately 17 non-community water systems. Of these water systems, at least 15 are serving water that exceed the primary MCL for arsenic, uranium, or nitrate (or a combination of these contaminants) and are under compliance orders issued by DPH to cease and desist from doing so. The water systems that are not in compliance all serve from wells located within their respective service areas. Currently, these systems are either working to obtain State funding or exploring other options to improve water quality. The water systems owned or operated by CWS provide treatment to remove the contaminants from groundwater or serve filtered surface water from the Kern River. The water systems located in the area service about 7,500 service connections.

6.2.2 Desert Mountain Resource Conservation and Development Council

The mission statement of the DMRCDC is to create partnerships that will enhance the quality of life and promote economic growth while protecting the environment. The DMRCDC is working with East Kern County Resource Conservation District to control the spread of purple loosestrife in the South Fork Kern River Wildlife Area. This project is funded through a grant from the California Department of Food and Agriculture. The DMRCDC established a watershed coordinator position in the Kern River Valley to address water quality, quantity, erosion, and wildlife habitat issues in the Upper Kern and South Fork Kern River Watersheds. This project is funded through a grant from the California Department of Conservation.

6.2.3 Mountain Mesa Water Company

MMWC is located in the town of Lake Isabella and provides water services to a population of 1,035 people through 372 connections. The company operates two wells.

6.2.4 Rainbird Valley Mutual Water Company

RVMWC is located in the town of Weldon, south of State Highway 178, in the Kelso Canyon area near the South Fork of the Kern River, east of Lake Isabella. This mutual water company has 188 customers with 83 individual metered connections. The company operates two wells; the main well has shown high levels of uranium concentrations in the past and the back-up or stand-by well has shown high nitrate concentrations. Both wells fail to meet the State and Federal safe drinking water standards for these contaminants. These wells provide 27.62 AF of local groundwater to its customers.

6.2.5 Valley Estates Property Owners Association

The VEPOA is located in Weldon approximately 16 miles east of the town of Lake Isabella and was formed on March 31, 1983 as a successor to Paradise Cove Development Association. The association has a retail population of 300 and maintains 126 connections on 5/8 acre lots.

The Valley Estates development was built in 1972 and receives water from two wells and nearly 3 miles of original asbestos concrete piping. Both wells are operated by 25 horsepower (HP) submersible pumps that produce between 350 to 390 gpm and deliver their effluent to a 60,000 gallon storage tank that was recently reconditioned in 2006. Pressure throughout the distribution system is maintained by gravity feed from the storage tank which is located on a nearby hill at a higher elevation than the development.

6.2.6 Tubatulabals of Kern Valley Tribe

The Tubatulabals of Kern Valley Tribe work in conjunction with U.S. Department of Indian Health Services (USIHS), Kern Council of Governments, KCWA, and U.S. Bureau of Indian Affairs to provide safe drinking water to the Tribal residents of the public domain lands located in the Kern River Valley subregion. In addition, the Tribe has partnerships and memorandum of agreements with USFS, USBLM, CDFG, and Tule River Indian Reservation to help protect cultural resources near and around Lake Isabella, the Kern River (canyon, north and south forks) and Kern Valley. The Tubatulabals of Kern Valley has 263 Tribal Members; 35 Tribal families live on public domain allotment lands (total of 1,600 acres). The Tubatulabals of Kern Valley also operate a 501(c)(3) non-profit organization that provides services to their Tribal members.

6.3 Subregion Description

6.3.1 Land Use

The unincorporated areas within the Kern River Valley subregion are governed by the land use policies of the Kern County General Plan. Because of the close interrelationship between land use, conservation, and open space issues, the Land Use, Conservation, and Open Space Element of the General Plan provides for a variety of land uses for future economic growth while also assuring the conservation of the County of Kern's predominant agricultural, natural, and resource attributes. Land use designations include: non-jurisdictional land, physical constraints overlay, public facilities and services, special treatment areas, residential, commercial, industrial, resource, and protection of cultural resources.

6.3.1.1 Ecological Processes and Environmental Resources

Ecological processes and environmental resources for the Kern Region as a whole are described in Section 2, Section 2.4. With respect to the Kern River Valley subregion, the area is dominated by the geologic features of the southern Sierra Nevada Mountains, which are divided into four smaller ranges: the Greenhorn Mountains to the northwest, the Scodie Mountains to the northeast, the centrally located Piute Mountains, and the Tehachapi Mountain Range to the south. Due to the small amount of developed area in comparison to the other subregions, the Kern River Valley region boasts some of the most diverse flora and fauna in the Kern Region, due to the ecological extremes of the mountains and the Kern River system.

The mountainous provinces of this subregion are lined primarily with conifers including incense cedars, white firs, and small groupings of aspens, while the low-lying foothills or savannahs grow a variety of oak species as well as sycamore, cottonwood, and willow trees. The composition of fauna within this area is analogous to most California mountain ranges and consists of mule deer, mountain lion, wild boar, coyote, fox, black bear, bobcats, and raccoons. Over 68 species of birds reside in the Tehachapi Mountains alone and provide for excellent bird watching opportunities for enthusiasts such as members of the Tehachapi Mountains Birding Club and the Audubon Society.

The Tehachapi Mountains also form an important wildlife corridor because of the biogeographically unique linkage they provide between several mountain ranges (SWCA 2008). This area forms a linkage from the foothills and grasslands of the San Joaquin Valley, to the high-elevation hardwood and coniferous forests, to the foothill transition into the Mojave Desert along the base of the southern Tehachapi Mountains (SWCA 2008).

The Kern River, discussed in detail in Section 2.6.3.1, is one of the most outstanding environmental resources in this subregion. The Kern River supports many types of habitat, vegetation and animal species. Vegetation found along the river corridor include riparian woodland, riparian scrub, riparian savannah, freshwater marsh, quail bush scrub, alluvial scrub, and grasslands. As described in Section 2.4, the riparian forest along the South Fork Kern River in the vicinity of Onyx and Weldon constitutes another exceptional natural resource in this subregion. This riparian forest is one of the highest quality and most extensive stands of that vegetation type in California, supporting the largest populations of Southwestern willow flycatchers and yellow-billed cuckoos in California. Much of this forest is conserved in the US USFS South Fork Wildlife Area, Audubon California's Kern River Preserve, and CDFG's Canebrake Ecological Reserve.

The CDFG and the USFWS have listed some species as threatened or endangered, requiring species recovery by establishing a network of conservation areas and reserves that include terrestrial and riparian natural areas in the San Joaquin Valley and thus Kern Region. As part of their conservation efforts in the Region, MBHCP and the draft VFHCP have been established to implement endangered species recovery programs within the Kern Region to promote species recovery, and protect ecological processes and environmental resources. The Kern River Valley subregion's westerly edge is within the Metropolitan HCP and under the jurisdiction of the draft VFHCP.

Some areas in the subregion are subject to periodic flooding, including the South Fork of the Kern River, Kelso Creek, and Erskine Creek. Areas prone to flooding are predominantly south of Isabella Reservoir and Highway 178. The area is also prone to wildfires, which impact water quality when rain washes fire debris into waterways. In July 2008, the Piute Fire burned a significant area in the region. It was soon followed by a summer thunderstorm, which washed fire debris into the South Fork and ultimately down the Kern River. Many water purveyors were forced to switch from Kern River water to alternate sources to avoid contamination of settling ponds and costly treatment of the water.

6.3.2 Social and Cultural Characteristics

The cities and communities of Bodfish, Kernville, Lake Isabella, Mountain Mesa, Onyx, Squirrel Mountain Valley, Stallion Springs, Weldon, and Wofford Heights are within the Kern River Valley subregion. The majority of the subregion's population lives in or around Lake Isabella.

The Kern River Valley subregion is known for diverse social and cultural characteristics due to its vast array of landscapes and environments. Cultural resources in the subregion include archaeological, historical, and other resources such as buildings, structures, towns, and objects. The Native American Heritage Commission has completed a Sacred Lands file search which has indicated the presence of numerous historic Native American burial grounds in the region. Tubatulabals of Kern Valley have registered with the National Trust for Historic Preservation to assist with protection of sacred sites and notification of repatriation reburials.

Recreational activities include mountain biking, camping, fishing, boating, swimming, backpacking, hiking, hunting, horseback riding, and cross county skiing, sledding, and snowmobiling in the winter months.

Section 2.5.1 provides a summary of the human demographics for the Kern Region as determined by 2000 U.S. Census Bureau data. Regional data was estimated from the data for the census tracts within the regional boundaries. Updated date from the 2010 Census was not available.

6.3.2.1 Economic Conditions and Trends

According to the Kern River Valley Specific Plan 2006, much of the Kern River Valley's economy depends on tourism and recreation. A large share of the region's population is employed in the services (primarily tourism related), retail, construction, and government sectors. The Kern River Valley is characterized by the presence of many hotels, lodges, and recreational activity areas. The Kern River and Isabella Reservoir are major tourist attractions, as are the nearby Sequoia National Forest and Sequoia National Park. This tourism-driven economic activity fluctuates seasonally and creates an unreliable source of income as well as lower-paying employment opportunities for those who depend on it. Economic activity tends to be highest in the spring and summer as recreational use peaks.

6.3.2.2 Disadvantaged Communities

As defined in Section 2.5.3, DACs are communities whose average MHI is less than 80 percent of the statewide annual MHI. In 2000, 80 percent of the state of California's MHI was $37,994. A number of municipalities within the Kern River Valley subregion have been identified in Table 2-5 of Section 2.2.5.3 as meeting the definition of a DAC. Out of sixteen communities in the Kern River Valley subregion, the following seven have been identified as DACs: (1) Bodfish, (2) Kernville, (3) Lake Isabella, (4) Mountain Mesa, (5) Onyx, (6) Weldon, and (7) Wofford Heights. Many of these DACs are located in very rural environments and do not gain economic benefits from certain types of infrastructure including public transportation, new roadways, and state of the art water treatment facilities. It is also common for communities located at higher elevations to pay higher prices for potable water due to the expenses involved with transporting the water through pumping, which requires water to be moved uphill from lower elevations. In addition, these rural communities do not boast a wide variety of businesses or jobs that generate significant amounts of revenue and thus some people will find themselves facing lengthy commutes to developed areas such as Los Angeles and Bakersfield. In addition to rural environments, Tribal allotment lands are also located within the DACs. These allotment lands lack infrastructure and due to the current status of the non-federally recognized Tribe, there are limited federal or state services provided to these Tribal communities.

6.3.3 Water Supply

6.3.3.1 Imported Water Supplies

This subregion receives no direct imported water from either the SWP or the CVP.

6.3.3.2 Surface Water

The most important source of naturally occurring surface water in the Region is the Kern River. Due to poor infrastructure connections and low flows, the many small local surface water sources present are very seldom utilized by communities and local water purveyors as a direct source of domestic or agricultural and industrial water. However, the North and South Forks of the Kern River have dedicated riparian rights that are extensively used for pasture and hay irrigation, stock watering and agriculture. South Fork water is treated and used for community water supply by CWS in the Kernville and Wofford Heights areas. Much of the water used for agriculture recharges the local aquifer. Refer to Section 2.6.3 for more information regarding natural surface waters in the Kern Region.

6.3.3.3 Groundwater

Similar to the Mountains/Foothills subregion, groundwater is the primary source of domestic water for the residents of this subregion. The Kern River Valley Specific Plan 2006 has identified shallow groundwater as an issue in several Kern River Valley communities. Shallow groundwater presents development constraints and creates occasional problems for existing homes. It can cause deterioration of roads and buildings, increased soil instability, and septic system failure. Shallow groundwater levels generally coincide with periods of high precipitation. Significant portion of the shallow groundwater area is located under commercially zoned property.

6.3.4 Water Quality

Groundwater quality within the Kern River Valley subregion is similar to that of the Mountains/Foothills subregion; with contaminants above the CCR Title 22 screening limits in small localized areas. Many community and non-community water systems have contaminated water sources from nitrates, bacteria, fluoride, uranium, arsenic, and gross alpha radiation. On the Tribal allotment lands in Onyx, USIHS has attempted to drill a few water wells. However, testing of the underground water has indicated a high level of arsenic. Access to quality water through the use of wells can be a challenge to the allotments that do not have electricity to support their water pumps. Infrastructure can be a huge barrier to having quality water in these rural and remote areas as the local residents may not be able to support the rate increases necessary for water purveyors to attain water quality standards. In addition, the continued use of septic systems in the area may contribute to degradation of the groundwater quality.

6.3.5 Water Demand

This subregion is largely served by small community water systems and mutual water companies. Many of these purveyors are below minimum size thresholds for reporting and thus do not collect or maintain complete water demand records. Water demand data that is available for this subregion is shown in Table 6-1. Drinking water source assessments were submitted to the DPH for the Mt. Mesa WC, Rainbird Valley MUC, and VEPOA; however, demand data is not available at this time.

TABLE 6-1
SUMMARY OF ESTIMATED CURRENT AND FUTURE WATER DEMAND BY WATER USE CATEGORY FOR THE KERN RIVER VALLEY SUBREGION (AF)

	2005			2030		
Purveyor	**M&I**	**AG**	**TOTAL**	**M&I**	**AG**	**TOTAL**
California Water Service-KRVD[(a)]	1,120	0	1,120	1,171	0	1,171
Mt. Mesa WC[(b)]	--	--	0	--	--	0
Rainbird Valley MUC[(b)]	--	--	0	--	--	0
Valley Estates Property Owners Assoc[(b)]	--	--	0	--	--	0
Tubatulabals of Kern Valley[(b) (c)]	--	--	0	--	--	0
Total	**1,120**	**0**	**1,120**	**1,171**	**0**	**1,171**

Notes:
(a) California Water Service Company 2010 Urban Water Management Plan, Kern River Valley District.
(b) Data not available.
(c) Tribal allotment water use includes residential and agriculture.

6.3.6 Water-Related Infrastructure

As of 2004, 49 water purveyors served customers throughout the Kern River Valley. CWS is regulated by the California Public Utilities Commission (PUC), and serves the majority of the population. Several other private companies regulated by the PUC also provide water service. The remaining companies that are not regulated by the PUC typically serve fewer than 100 customers or only provide water during the summer months for specific establishments such as campgrounds, hotels, motels, trailer parks, lodges, and schools. These systems are regulated by the Kern County Environmental Health Services Department (County of Kern, 2006). Most of the water supply is provided through small water purveyors that rely on groundwater, and through community wells. The lack of central water treatment and distribution facilities creates vulnerabilities during drought situations because communities do not have alternative water sources if wells go dry. Additionally, residents may not have alternative sources of supply if wells exceed water quality standards.

The subregion consists primarily of DACs and lacks local funding for new facilities. Within the Tubatulabals tribal allotment lands, the USIHS has been working with the tribe on two water infrastructure projects. At the WhiteBlanket allotment, the project involves a new pump station, storage tank, and water treatment building. Similar facilities will be constructed at the Miranda allotment. These facilities will help provide water supply for additional families on tribal lands. In addition, the USIHS has worked with the tribe to provide water systems as well as septic tanks for allotment families in the Miranda, Netto/Chico, WhiteBlanket, Piute Mountain, Weldon, Canebrake, Hands, and other greater Kern Valley area allotments.

The Isabella and Auxiliary Dams are located in the Kern River Valley. Historical concerns with the dams include seepage, a fault running beneath the dams, homogenous foundation composition and complete penetration of the Isabella Dam by the Borel Canal.

Water related infrastructure such as surface water impoundments, water collection systems, distribution systems, wastewater systems, and recharge systems, are described in greater detail for the entire Kern Region in Section 2, Section 2.9.

6.4 Subregional Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Kern River Valley subregion include the following:

- Some areas have natural water quality problems due to the geology of the area, particularly with arsenic, uranium and nitrates.
- Most areas are served by septic systems, which contribute to water quality issues.
- Most of the water supply is provided through small water purveyors and through community wells. The lack of central water treatment and distribution facilities creates vulnerabilities during drought situations because communities do not have alternate water sources if wells go dry.
- The subregion, consisting primarily of DACs, lacks local funding for new facilities.
- Some areas are subject to periodic flooding, including the South Fork of the Kern River, Kelso Creek, and Erskine Creek.
- The area is prone to wildfires, which impact water quality when rain washes fire debris into waterways.
- The Isabella Dam and the Auxiliary Dam are located in the Kern River Valley subregion. Concerns with the dams include: seepage, a fault running under the dams, homogenous foundation composition, and complete penetration of the dam by the Borel Canal.

Section 7: North County Subregion

7.1 Subregion Introduction

This section presents a description of the North County subregion of the Kern Region. The North County subregion is located in the central-northern portion of the Kern Region, east of the West Side subregion. Descriptions of the subregion's participants, as well as the physical and environmental characteristics, hydrologic features, and issues and needs of the subregion are provided. See Figure 7-1 for a map of this subregion.

7.2 Subregion IRWMP Participants

Five participating entities within the North County subregion include:

1. The City of Delano
2. The City of McFarland
3. The City of Shafter
4. The City of Wasco
5. The North West Kern Resource Conservation District (NWKRCD)

The Poso Creek IRWMP Region (adopted in July of 2007) also currently exists within the North County subregion, however, that is a separate IRWMP planning process from the Kern IRWMP, and is not included as part of this description. Refer to Section 1.1.1 in Section 1 for a more detailed discussion of how the Kern IRWMP RWMG and the Poso Creek RMG have coordinated and communicated to get to this point in the Kern IRWMP's development.

These participants' roles and responsibilities for managing water, natural resources, and land use within the North County subregion are discussed below.

7.2.1 City of Delano

The City of Delano is located within the northwestern portion of the County of Kern, 32 miles north of Bakersfield, and 70 miles South of Fresno, California. Delano's nearest neighbor, McFarland, is approximately 6 miles south. State Highway 99 runs north and south through Delano. Delano is located in the southerly portion of California's agriculturally rich San Joaquin Valley, 10 miles from the western foothills of the Sierra Nevada Mountain Range and approximately 25 miles from the Coast Range to the west. The natural resources and gentle topography of Delano has made it hospitable to agriculture. Delano is surrounded by productive farmland and is known for production of table grapes, almonds, and citrus.

Delano was founded in 1873 as a railroad town and was incorporated in 1915. Delano is a growing community with a population of approximately 39,000 according to the 2000 US Census, and represents approximately 7 percent of Kern Region. As such, Delano is the second largest city in the Kern Region (the City of Bakersfield is the largest). Delano is currently in a transitional stage of growth from a small, semi-rural town to a medium-sized urbanized community. Over the next 20 years, the population is projected to more than double to a population of approximately 80,000 in the year 2030 (Delano 2005).

Dalano's water supply consists solely of groundwater. It currently has nine wells in production with a total supply capacity of 21.0 MGD. In 2005, Delano produced approximately 9,752 AF which is equivalent to 8.7 MGD of water. Eight wells meet the water needs of Delano's population and the ninth well is dedicated to serve only the North Kern State Prison and is not connected to Delano's distribution system. Delano currently disinfects its supply water.

Water is conveyed from the wells to the consumers via a distribution system with pipe sizes ranging between 4- and 16-inches in diameter. Delano currently maintains five storage reservoirs within the distribution system for a total capacity of 10.6 MG, with a total boosting capacity of 8,950 gpm (Carollo Engineers 2006). Under normal operating conditions, it is possible that one or two of the wells can be placed out of service during Maximum Daily Demand (MDD) conditions due to equipment malfunction, for servicing, or water quality concerns. In 2005, MDD was around 13.0 MGD (9,020 gpm) and the supply availability was at 22.5 MGD. The total firm capacity of the wells is 19.0 MGD (13,225 gpm). The supply capacity is adequate to meet the projected water demand for the year 2030 (Carollo Engineers 2006).

7.2.2 City of McFarland

The City of McFarland is a municipality located in northern Kern County on Highway 99. Incorporated July 15, 1957, the town was named for J. B. McFarland, who with W. F. Laird, established the townsite in 1908. It is community deeply rooted in agriculture with cotton, sugar beets, potatoes, and roses as some of the leading crops. A citrus processing plant, an almond hulling facility, and a winery further serve the area's agriculture and economic interests.

The McFarland municipal government provides open space and land use planning as well as stormwater capture and treatment, and creek restoration within City borders. Water is supplied to the residents of McFarland by the McFarland Mutual Water Company. The City of McFarland owns and operates a WWTF.

7.2.3 City of Shafter

The City of Shafter is located in the heart of the San Joaquin Valley, approximately fifteen miles northwest of metropolitan Bakersfield and one hundred miles north of downtown Los Angeles. The City of Shafter is named for General William Rufus "Pecos Bill" Shafter, general of American forces in Cuba during the Spanish-American War in 1898, the same year the railroad was completed in this area. In 1914, the Kern County Land Company sold lots for the town of Shafter and in 1938 the City of Shafter was incorporated. Shafter became a Charter City in 1995. Shafter covers nearly 30 square miles and has an estimated population of 14,000 according to census data from the Kern Council of Governments (KernCOG). Like many rural areas with opportunities for residential expansion, Shafter has exhibited relatively steady growth. The recent annexation of approximately 5,000 acres of planned residential property in the southeast portion of its service area is projected to add about 11,200 residential units over a twenty (20) year build-out period (Shafter and Dee Jaspar & Associates 2005).

The commercial sector for Shafter is growing at about 2 percent a year, driven particularly by the need for services by the increasing permanent population. This sector includes schools, parks, etc. Shafter has a relatively light, but rapidly growing industrial sector, primarily centered on light manufacturing and warehouse storage centers. Shafter's General Plan reflects local citizen interest in open space, quality of life, environmental values, and the long-term maintenance of a diverse economic base. However, it is projected that more agricultural and will be converted to urban uses.

The City of Shafter owns, operates, and maintains the domestic and fire fighting water system within the City of Shafter. The water system was first placed in operation in 1925 as the Shafter Public Utility District. The water system presently consists of seven water wells, approximately 70 miles of distribution lines, and four water storage tanks equipped with booster pumps. It provides water service to about 3,700 connections, mostly residential, within Shafter city limits and some outlying, unincorporated communities. Shafter currently delivers about 5,000 AF of water annually to these users. Agricultural water demand within Shafter is projected to gradually decrease over the next twenty (20) to thirty (30) years.

Many private water systems in outlying areas southerly and southwesterly of Shafter have requested connection to the Shafter's water system due to problems with their own private wells. Groundwater quality issues of concern in the Shafter area include salt intrusion primarily from agricultural activities; nitrate contamination from natural and agricultural activities; and organic chemical contamination primarily from DBCP and EDB; and 1,2,3-trichloropropane (TCP) primarily used in conjunction with soil fumigants (City of Shafter, 2005). Arsenic has also been detected in the Shafter water supply.

The SWID and NKWSD service area overlap Shafter's current service area and areas planned for development. Their supply and demand information is included within the Poso Creek IRWMP and not accounted for in this IRWMP.

7.2.4 City of Wasco

The City of Wasco, incorporated in 1945, is a municipality located in northern Kern County, approximately 25 miles from Bakersfield.

Wasco provides water, sewer collection, wastewater treatment, storm drainage, road, and refuse service to the community. The original water system was developed in the 1920's under the authority of the Wasco Public Utilities District. The system consisted of groundwater wells and tower reservoir. The Wasco Public Utility District operated and maintained the water and sewage collection and treatment systems within Wasco until 1989. At that time the district's assets were transferred to Wasco. The tower reservoir is no longer used; the water system has been improved and expanded since the original construction to meet current needs.

Wasco currently serves approximately 18,000 people with about 4,630 water service connections (Eco:Logic 2007). Water service is provided to residential, commercial and industrial sites. Wasco's distribution system currently includes eight wells. One well is inactive due to high concentrations of nitrates and DBCP. One well is dedicated to supply irrigation water to the Valley Rose Golf Course. The remaining six wells supply domestic service and fire flow. Larger agricultural water users typically have installed their own source wells and are not connected to Wasco's water distribution system. The SWSD and the SWID provide water for irrigation and crops in Wasco and surrounding area. Therefore Wasco is responsible for providing potable water for its residents and businesses, but not for irrigating agriculture.

Wasco expects continued residential and commercial growth. Over the next 20 years, Wasco is expecting to increase its overall boundary service area from approximately 5,400 acres to 10,600 acres. Approximately 1,800 acres are proposed for an industrial park on the eastern side of town. The residential population is expected to increase from the 2006 population of 18,000 to 41,000 by 2026. Citywide annual water demands are expected to increase from approximately 4.1 to 15 MGD in 2026 (Eco:Logic 2007). The water system needed to serve the build-out of the 20-year growth areas would include up to 18 additional wells, an expanded distribution system, a proposed 3 MG storage tank and two additional 1 MG storage tanks. This finding assumes the groundwater basin has adequate capacity, which must be confirmed with additional studies (Eco:Logic 2007).

The SWID and NKWSD service overlap Wasco's service area and areas planned for development. Their supply and demand information is included within the Poso Creek IRWMP and is not accounted for in this IRWMP.

7.2.5 North West Kern Resource Conservation District

The NWKRCD encompasses an area of approximately 595,000 acres that is traversed in a northwesterly direction by Poso Creek which outlets into the KNWR. NWKRCD manages resource conservation projects on public and private lands within its boundaries, and assists farmers, and ranchers make the best use of their natural resources to enable local programs that conserve soil and water, prevent soil erosion, and control floodwaters and sediment damage. NWKRCD uses water supplied from the Friant-Kern Canal, the California Aqueduct, the Kern River, and Poso Creek to irrigative approximately 216,000 acres in irrigation districts lie within its boundaries.

NWKRCD has delineated areas of toxic salt accumulation and areas in critical need of protection from water and wind erosion, and brackish agricultural drainage water. Other water management issues that need to be addressed are salt water intrusion, the pollution of groundwater supplies, and areas in the NWKRCD with severe water penetration problems.

Water conservation in the NWKRCD is needed to address the excess use of groundwater and water penetration problems on the sandy loam and loam soils of the NWKRCD. It is hoped that the North West Kern County Soil Survey will help to delineate these problem areas. The NWKRCD's Irrigation Water Management Program provides practical field testing of irrigation systems. The Mobile Lab, which is also utilized in the other subregions,, can determine the distribution uniformity of applied irrigation water and the efficiency of an irrigation system.

There are also numerous techniques for implementing different elements of the NWKRCD program. For example, voluntary agreements between the NWKRCD and the individual landowners or users have been negotiated. The purpose is to supply certain services according to a farm or ranch conservation plan or engineering plans for a specific conservation practice.

7.2.6 Poso Creek IRWMP Region

The Poso Creek IRWMP Region was developed in 2005 and their IRWM Plan was adopted in July 2007. The Poso Creek IRWMP Region comprises the SWSD – Lead Agency, Cawelo Water District, DEID, KTWD, NKWSD, Rag Gulch Water District (which as of January 2009 is now part of KTWD), and the SWID. Most of the Poso Creek IRWM Region is located within the Kern Region.

The Poso Creek IRWMP was developed to provide a mechanism for the Poso Creek RWMG and shareholders to manage the surface and groundwater resources of their region. At the conclusion of the RAP in September of 2009, per the direction of the DWR, the Poso Creek RWMG shall consolidate planning efforts with the Kern Region. Discussions are ongoing as to how the Kern IRWMP Region will effectively integrate the Poso Creek IRWMP Region and the timing to do so.

7.3 Subregion Description

7.3.1 Land Use

The Land Use Element of the Delano and Shafter General Plans, and Land Use, Open Space/Conservation, and Agricultural Elements of the Wasco General Plan provide the policies protecting the land uses within the North County subregion. The North County subregion can be generally characterized as containing a predominance of agricultural and rural uses. The agricultural communities in the North County subregion consist of both large and small farms. Crops typically grown in the area generally include grapes, plums, citrus, stone fruit, almonds, and alfalfa. There are several locations within the subregion where agricultural uses are being conducted on land that has been designated for residential, commercial, or industrial uses. Most farmland is irrigated. The soils in the subregion are part of an extensive area of the San Joaquin Valley with “prime” agricultural (Class I and II) soils.

Prime farmland is land best suited for producing seed, feed, forage, fiber, and oilseed crops and also available for these uses (the land could be cropland, pasture land, rangeland, forest land or other land but not urban built-up land or water). It has the soil quality, growing season and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

7.3.2 Ecological Processes and Environmental Resources

Ecological processes and environmental resources for the Kern Region as a whole are described in Section 2, Section 2.4. Much like the Region as a whole, the natural vegetation of the North County subregion area was historically characterized by vast stretches of savanna, Valley Needlegrass Grassland, Valley Sacaton Grassland, and Non-native Grassland natural vegetation communities. The range of these natural vegetation communities has been significantly reduced from historic levels as a result of conversion of these lands to urban and agricultural uses. The only remnants of these natural communities presently remain in the Central Valley.

The CDFG and the USFWS have listed some species as threatened or endangered, requiring species recovery by establishing a network of conservation areas and reserves that include terrestrial and riparian natural areas in the San Joaquin Valley and thus Kern Region. As part of their conservation efforts in the San Joaquin Valley, the Metropolitan Bakersfield HCP and the draft VFHCP have been established to implement endangered species recovery programs within the Kern Region to promote species recovery, and protect ecological processes and environmental resources. The North County subregion is within the boundaries of the Endangered Species Recovery Program for the San Joaquin Valley. There are some areas planned for habitat acquisition within the subregion identified in the Metropolitan HCP. Much of the subregion is under the conserved jurisdiction of the draft VFHCP HCP.

The North County subregion is further distinct because it contains the KNWR. The KNWR, located approximately 20 miles west of the City of Delano, covers an area of approximately 11,000 acres, consisting of natural valley grasslands, a riparian corridor, and developed marsh. The KNWR is located just south of the historic Tulare Lake Bed, which once covered almost one-half million acres during flood years. As a remnant of this once expansive lake, the KNWR provides wintering habitat for migrating birds, shorebirds, marsh and waterfowl, as well as upland species. About 6,400 acres are specifically managed for wetland purposes. In general, refuge managers start wetting the areas sometime in August, and by February, they begin to draw the water down. During the drawdown, from 500 to 2,000 AF is recycled by releasing the water from the Refuge and allowing it to be used for irrigation of crops on nearby lands.

7.3.3 Social and Cultural Characteristics

The social and cultural characteristics of the North County subregion are not different from that as described for the Kern Region as a whole, as provided for in Section 2, Section 2.5.4. The subregion is characterized by its traditional industries, agriculture, oil and gas production, and the local prisons, as well as increasing urbanization and population growth. There has been a continuing shift in the mix of businesses in the agricultural sector towards the production of more high value added goods and services, which has affected the growth potential for agribusinesses and industrial markets.

7.3.3.1 Economic Conditions and Trends

Delano, McFarland, Wasco, and Shafter are within the North County subregion; the most populous cities are Delano and Wasco.

As shown in Table 2-4 approximately 78 percent of the subregion's population has a household income of less than $50,000, approximately 13 percent of the population has a household income between $50,000 and $74,999, and approximately 9 percent has a household income of $75,000 or higher.

The population is largely White and Latino. Approximately 16 percent of the population identifies as being white and approximately 70 percent of the population reports being Hispanic (US Census Bureau 2005). Persons identifying as African American, Asian, American Indian, and Native Hawaiian make up 14 percent of the population. Spanish is the primary language, but a significant portion of the population speaks English.

The recent prison construction and corresponding job openings have increased growth rates in the communities of Delano, McFarland, and Wasco. The historical and projected population for communities in the subregion is shown in Table 2-4. The overall population of the subregion is expected to grow approximately 60 percent of the next 20 to 25 years. Projections indicate that over one hundred thousand people will reside in the subregion by the year 2030.

7.3.3.2 Disadvantaged Communities

As defined in Section 2, Section 2.5.3, DACs are communities whose average MHI is less than 80 percent of the statewide annual MHI. In 2000, 80 percent of the state of California's MHI was $37,994. A number of municipalities within the Kern Region have been identified in Table 2-6 of Section 2, Section 2.5.3 which meets the definition of a DAC. Of those identified as DACs, Delano, McFarland, Shafter, and Wasco are within the North County subregion. These municipalities are active participants in the Kern IRWMP.

See Section 1, Section 1.4.2 for environmental justice outreach to the Kern Region as a whole.

7.3.4 Water Supply

7.3.4.1 Imported Water Supplies

Imported water supplies to the North County subregion are SWP and CVP via the California Aqueduct and CVP water via the Friant-Kern Canal. These supplies are discussed in detail in Section 2, Section 2.6.1. The subregion is the crossroads of the SWP and the Friant-Kern Canal due to the Semitropic Intertie.

7.3.4.2 Surface Water

Surface water has historically been a significant part of the North County subregion water supply. The historical average use of local surface water supplies, primarily the Kern River and Poso Creek, has amounted to about one-third of the total surface water supplies of the subregion. Imported supplies from the SWP and CVP make up the remaining two-thirds.

The potential for increased conjunctive use of surface water and groundwater supplies is a valuable asset to the Region.

Delano does not have surface water that runs through it. There are irrigation canals that traverse peripheral properties. Lake Woollomes, located southeasterly of the community, is a storage facility for the Friant-Kern Canal. Wasco does not have surface water supply.

7.3.4.3 Groundwater

The primary source of domestic water for the communities within this subregion is groundwater pumped from the Poso Creek Aquifer in the Kern County subbasin of the Tulare Lake Basin described in Section 2, Section 2.6.3. Specifically noted in DWR's Bulletin 118 is a decrease of about 50 feet in the McFarland/Shafter area (Shafter, City of & Dee Jaspar & Associates 2005).

As a generalization, all of the lands in the North County subregion are underlain by useable groundwater. Accordingly, to the extent that surface water supplies are inadequate to meet irrigation water requirements, groundwater is used to make up the shortfall. Groundwater is conjunctively used, via water spreading in constructed ponds or natural channels, and via surface water deliveries in lieu of pumping groundwater.

In general the groundwater quality is relatively high. Production is generally low in the eastern portion of the subregion. Several domestic wells require treatment or are inactive due to concentrations of nitrates, DBCP, EDB, and hydrogen sulfides that exceed drinking water quality standards. Other than these contaminants, the groundwater supply is suitable for domestic purposes without treatment.

Prior to agricultural and urban development, groundwater moved from areas of recharge along the eastern rim of the Valley to areas of discharge along the Valley axis. Recharge was primarily by seepage from stream flows. Under present conditions, groundwater is recharged primarily from stream flow percolation, from percolation basins developed by agricultural irrigation districts, by percolation from treated wastewater disposal facilities and from percolation attributed to excess applied surface irrigation water.

A long-term concern is the overdraft occurring in the San Joaquin Valley Groundwater Basin. The subregion encompasses or is adjacent to two irrigation districts that play a major role in groundwater management in the area. NKWSD and SWID both practice groundwater management through importation of surface water and monitoring of groundwater levels and quality. Both have AB255/3030 Groundwater Management Plans. The objective of these Plans is to preserve and enhance the groundwater resource through augmentation with surface water resources and implementation of groundwater management programs. Table 7-1 demonstrates the benefit of the groundwater recharge activities of these two districts over years 1997-2005. Water banking by NKWSD began in 1952.

TABLE 7-1
IRRIGATION GROUNDWATER RECHARGE SPREADING

	North Kern Water Storage District	Shafter-Wasco Irrigation District	
Year	**Spreading (AFY)**		**Total Water Spread**
1991	316,155	76,600	392,755
1998	352,655	54,500	407,155
1999	154,145	60,600	214,145
2000	111,965	62,400	113,965
2001	61,521	58,000	125,521
2002	83,834	48,000	131,834
2003	110,921	62,000	172,921
2004	84,543	48,000	132,543

Source: Shafter, City of & Dee Jaspar & Associates. 2005.

The City of Shafter and NKWSD have established a retailer/wholesaler relationship wherein North Kern, as the underlying wholesaler, replenishes the groundwater basin through collection of tolls on lands within the NKWSD. These tolls have been established because the overlying lands have received a benefit from the NKWSD recharge program. These tolls will continue to be paid by the overlying landowners. NKWSD has recharged 2,426,579 AF of water, both as direct recharge and in-lieu recharge, from 1991-2005, an annual average of 161,712 AF or 2.91 AF per acre.

Three other water districts surrounding the subregion have a substantial impact on the area's groundwater balance. These districts are SWSD, CWD, and RRBWSD. These districts receive surface water supplies from either the CVP (Friant-Kern Canal), the SWP (California Aqueduct), or the Kern River. A primary goal of these districts is to affect groundwater balance wherein long-term overdraft is eliminated.

7.3.4.4 Recycled Water

Within the North County subregion, treated effluent from WWTPs is discharged through pipelines and open ditches to city-owned lands for agricultural irrigation. Irrigation water helps replenish the groundwater through deep percolation.

<u>City of Delano Wastewater Treatment Facility</u>

Delano provides wastewater services to its residential, commercial, and industrial users within its limits and some unincorporated areas, including the North Kern State Prison. The WWTF operates under Waste Discharge Requirements Order No. 5-01-247, issued by the CVRWQCB.

Raw wastewater sources within the service area consist of residential, commercial and industrial users. The major contributors to the WWTF are the North Kern State Prison, the local hospital, and the Paramount Citrus packing house.

The Delano WWTF consists of flow metering, screening, aerated grit chamber, primary clarification, trickling clarification, biofiltration, secondary clarification, primary and secondary sludge pumping facilities, shops, effluent pumping facility, sludge digesters, and a sludge thickener. The current treatment plant has a capacity of 4.4 MGD. The Delano WWTF exceeded this flow for several months in 1999 through 2005.

A Facility Plan for the WWTF was completed in December 2005. The Facility Plan addresses Delano's wastewater treatment and disposal plan for the next 20 years. Based on the conclusions of the Facility Plan, Delano's WWTF will be upgraded to a capacity of 8.8 MGD (based on Average Day Max Month flow). The upgrade project is currently in construction.

Treated effluent is currently pumped from the effluent pump station to four unlined storage ponds and two lined storage ponds, prior to irrigation of 454 acres of adjacent farmland. The six effluent storage ponds collectively provide a storage volume of 1,450 AF.

As part of the WWTF upgrade project, Delano is in the process of expanding its reclaimed water effluent disposal facilities. Delano has purchased approximately 480 acres of farmland to account for the expected increase in flow provided by the upgrade project. A Title 22 Report was prepared to verify that Delano is able to adequately dispose of the average day, maximum month design flow of 8.8 MGD of treated effluent. The report recommended that a new pipeline be built to convey treated effluent to the new 480-acre site, improvements be made to Delano's existing percolation ponds, as well as installation of a new 30-acre percolation pond on the additional 480-acre site. The construction of these expansion facilities will be bid in summer of

2009. With these improvements, Delano will be able to adequately dispose of the design 8.8 mgd flow.

Delano currently has two separate agricultural lease agreements with B&D Morris Farms, and R&D Farms for contract operations of the two farms. Delano, B&D Farms, and R&D Farms are the distributors of the recycled water on Delano's Properties.

Two WWTPs serve the residents and businesses of Shafter. Both of these plants are operated by other agencies and/or districts.

City of Shafter/North of the River Sanitary District Plant

The North of the River Sanitary District (NORSD)/City of Shafter WWTF, which is located within Shafter City limits, but operated by NORSD, renders wastewater treatment services to approximately 5,000 customers in Shafter and 7,800 customers from unincorporated areas of the County of Kern including water customers of the OMWC currently outside Shafter's boundaries. Two (2) 30-inch trunk lines, which are owned and operated by Shafter, tie into a 42-inch regional NORSD main at Seventh Standard Road. The current sewage flow from Shafter averages between 1.1 and 1.3 MGD.

Shafter owns one-third (1/3) of the NORSD/Shafter plant's current 6.0 MGD of raw sewage capacity or 2.0 MGD. In addition, Shafter will purchase an additional one-third ownership of the plant's increased capacity upon the completion of an ongoing expansion project, leaving an expected total Shafter capacity of 2.5 MGD.

Effluent from primary clarifiers is pumped through a biofilter, which reduces organic matter. After this process, the effluent flows into a final clarifier. Through sedimentation, particulate matter settles to the bottom of the tank and is removed. The effluent from this treatment process is used by a neighboring farming operation for crop watering thus eliminating reliance on groundwater supplies.

Shafter Field Airport District Wastewater Plant

The WWTP located at the Minter Field Airport (Minter Field) was constructed in 1940 and currently services the commercial and industrial customers located within Minter Field and Shafter's Industrial Park. The plant operates as a single-stage trickling filter plant that treats approximately 200,000 gallons of wastewater per day. The influent flow is pumped directly to the intermediate clarifier, which now serves as the primary clarifier in the single-stage trickling filter process. Effluent from the final clarifier flows into an effluent pond, where it recharges the groundwater basin.

City of Wasco Wastewater Treatment Plant

Wasco owns and operates a WWTF located west of the community. The present wastewater treatment facilities were originally constructed in 1937. The facilities have since been enlarged and/or modified on a number of occasions. The last three expansions were completed in 1979 under a Clean Water Grant, in 1988 under a Farmers Home Administration Loan, and in 1999 under a State Revolving Fund loan (Wasco 2007a).

The current plant facilities consist of headworks with a Parshall flume, one mechanical bar screen, and flow meter, aerated grit chamber, two primary clarifiers, two plastic media trickling filters, two secondary clarifiers, two smaller bentonite-lined aerated ponds and one large (25 acre) unlined storage pond, three anaerobic sludge digesters, four unlined sludge drying beds, and three 15-acre effluent disposal ponds. The WWTP also has a septage receiving station and laboratory, which is only used for process sampling. The design capacity of the existing plant is 3.0 MGD (Wasco 2007a).

The major pipelines in the sewage collection system range from 6- to 18-inches in diameter. The main pipelines that carry wastewater to the treatment facilities are parallel 15- and 24-inch diameter interceptor lines, which run from Broadway and then westerly along Seventh Avenue, and an additional 24-inch interceptor line running west on Filburn and north on Magnolia.

Wasco is currently permitted by the CVRWQCB to discharge effluent to Wasco-owned property. Discharge to Wasco land is governed by Waste Discharge Requirements Order No. R5-2002-0198. Wasco is permitted to discharge its effluent to 605 acres of Wasco-owned land that surrounds the WWTP to the south and west (160 acres percolation and storage plus 445 acres irrigation). The irrigation practice helps to replenish the groundwater table through deep percolation and reduces groundwater overdraft. Effluent generally flows by gravity with the use of booster pumps during high flows through several miles of pipeline and open ditches. It is expected that this practice will continue in the future and aid the groundwater basin recharge.

In 2007, the WWTP produced approximately 1.7 MGD of undisinfected, secondary treated effluent. The Wasco-owned land is permitted for 1.95 MGD. The effluent is used for agricultural practices within the reuse area. The crops, which have consisted of corn, cotton, sugar beets, blackeye beans, and alfalfa, are irrigated by the flood and furrow method. The sugar beets undergo commercial pathogens destroying process (Wasco, 2007a).

Over the next 20 years, wastewater collected and treated is projected to grow to 5.4 MGD based on a population growth of 23,000 and a wastewater demand of 115 gallons per capita per day (gpcpd) (Wasco 2007b).

7.3.5 Water Quality

In general the groundwater quality within the North County subregion is relatively high. Several domestic wells require treatment or are inactive due to concentrations of nitrates, DBCP, EDB, and hydrogen sulfides that exceed drinking water quality standards. Other than these contaminants, the groundwater supply is suitable for domestic purposes without treatment.

Water provided in Shafter meets all drinking water standards. Groundwater quality issues of primary concern in Shafter include salt intrusion primarily from agricultural activities; nitrate contamination from natural and agricultural activities; organic chemical contamination primarily from DBCP and EDB; and TCP primarily used in conjunction with soil fumigants. The only water treatment required by the City's water supply is disinfection by chlorination for microbiological contaminants. Coliform bacteria have been detected periodically, and the detection is normally remedied by adjusting the chlorine dosage.

For the past several years Shafter has detected TCP in the water. TCP is a synthetic chemical that is mainly used to make other chemicals. TCP was used in the Shafter area in conjunction with the use of soil fumigants to battle nematodes. DHS has established a regulatory action level (AL) for TCP, which is believed to provide a margin of safety to prevent potential risks to human health while they continue to study TCP and its presence in water. The current AL for TCP was adopted in 1998 and is 5 parts per trillion (ppt). The DHS will recommend a source of water be removed if the detection level is 100 times larger than the AL (500 ppt). The amount of TCP in the Shafter water supply varies at each groundwater well. The average TCP level in 2004 for Shafter wells was 119 ppt.

Arsenic has also been detected in the Shafter water supply. The MCL enforced by the United States EPA is 10 parts per billion (ppb). For the year 2004, the detections ranged from 0 to 6 ppb, with a city-wide average of 4 ppb. Nitrates are also commonly found in groundwater. High nitrate levels in drinking water can affect the ability of blood to carry oxygen in certain individuals such as infants, pregnant women, and people with certain specific enzyme deficiencies. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. The MCL is 45 parts per million (ppm). The City of McFarland is known for high nitrate concentrations in groundwater. The nitrate levels in the City of Shafter's water supply in 2008 ranged from 11 to 40 ppm, with an average of 24 ppm.

Recently, two wells from the Delano water distribution system have been taken out of production due to the presence of hydrogen sulfide and organic chemical contaminant DBCP in the water. DBCP is a banned agricultural soil fumigant that was widely detected in drinking water wells in the late 1970s. Delano is also faced with naturally occurring arsenic concentration problems in its water wells, that stem from arsenic in soils and rocks that make up the aquifer in this part of the groundwater basin. The MCL of 0.010 mg/L of total arsenic is exceeded in all but two of Delano's 9 wells. The range of average concentrations for wells that exceed this limit is 0.011 to 0.038 mg/L. The two wells that do not exceed 0.010 mg/L have average total arsenic concentrations of 0.004 and 0.008 mg/L (Well Nos. 14 and 25). For this reason, an arsenic reduction study was conducted and recommended well modifications and treatment measures are being implemented by Delano. While the wells do not exceed other MCLs or SMCLs, there are concerns about the aesthetic quality of the finished water. These concerns are related to color (Well Nos. 20, 21, 22, 23, and 24), hydrogen sulfide (Well Nos. 20, 21, 22, 24, and 26), and elevated turbidity (Well Nos. 20 and 21) (Carollo Engineers 2006).

7.3.6 Water Demand

Demands within the North County subregion were analyzed by comparing the estimated 2005 total water demands and the 2030 total water demands, as shown in Table 7-2. These demands were further analyzed by comparison of three categories of water demand: M&I, agricultural, and groundwater recharge. M&I demands are urban water demands that include residential (single family and multifamily), commercial/industrial/ institutional, large landscape, and other water use types (including water losses) as provided by the various water retail water suppliers participating in this IRWMP. Generally, historic and projected urban water demands were taken from UWMPs developed by the agencies, from DHS (now DPH) annual reports and/or as reported by KCWA. Agricultural water demand is defined as the total annual water demand for all agricultural accounts. Groundwater recharge is defined as the total amount of water recharged (direct or in-lieu) or banked within a supplier's respective service area.

Estimated 2005 total water demand within the subregion was approximately 1,012,577 AF, while the estimated 2030 demand is projected to be 1,023,200 AF. Residential water demands within the subregion represented approximately 1 percent of the total subregion demand in 2005, and are projected to increase (3 percent) in 2030. Commercial demands were less than 1 percent of the subregion demand in 2005, however projected to increase 240 percent in 2030. Likewise, industrial demands, also less than 1 percent of total subregion demand, are estimated to increase 85 percent by 2030. Agricultural water demand in 2005 was 940,017 AF, and could remain fairly constant through 2030 or decrease slightly as agricultural properties are converted to urban uses. The North County subregion's M&I and agricultural demand combined is approximately 35 percent of the total 2005 urban and AG for the Kern Region.

TABLE 7-2
SUMMARY OF ESTIMATED CURRENT AND FUTURE WATER DEMAND BY WATER USE CATEGORY FOR THE NORTH COUNTY SUBREGION

	2005			2030		
Purveyor	**M&I**	**AG[e]**	**TOTAL**	**M&I[a]**	**AG[e]**	**TOTAL**
Cawelo WSD	--	113,364	113,364	--	113,364	113,364
Delano-Earlimart ID	--	20,018	20,018	--	20,018	20,018
City of Delano	9,752[a]	--	9,752	19,840[a]	--	19,840
City of Shafter	56,750[b]	--	56,750	40,454[b]	--	40,454
City of Wasco	4,444[c]	--	4,444	20,368[c]	--	20,368
Kern-Tulare WD	--	27,273	27,273	--	27,273	27,273
McFarland MWC	1,614[d]	--	1,614	2,521[d]	--	2,521
City of McFarland (in McFarland MWC)	--	-	0	--	--	0
North Kern WSD	--	171,811	171,811	--	171,811	171,811
Pond Poso ID	--	201,650	201,650	--	201,650	201,650
Rag Gulch WD	--	7,112	7,112	--	7,112	7,112
Rosedale Ranch ID	--	27,642	27,642	--	27,642	27,642
Semitropic WSD	--	23,031	23,031	--	23,031	23,031
Shafter-Wasco ID	--	102,035	102,035	--	102,035	102,035
South. San Joaquin MUD	--	144,007	144,007	--	144,007	144,007
Non-District (UDA#4) NOB	--	1,892	1,892	-	1,892	1,892
Non-District (UDA#5) OB (Green Acres Farm)	--	16,315	16,315	--	16,315	16,315
Non-District (UDA#6) OB	--	83,867	83,867	--	83,867	83,867
Total	**72,560**	**940,017**	**1,012,577**	**83,183**	**940,017**	**1,023,200**

Notes:
(a) City of Delano 2005 UWMP.
(b) City of Shafter 2005 UWMP.
(c) City of Wasco 2005 UWMP.
(d) Year 2005 from unpublished KCWA data. Water demands 2005 to 2030 assumed to grow 1.8 percent per year based on Kern Council of Governments Draft Regional Forecast Report.
(e) Unpublished KCWA data. 2005 agricultural demand data based on 2007 summary by Crop Group. 2030 agriculture demand data based on equivalent production as 2005 data.

7.3.7 Water-Related Infrastructure

Water related infrastructure such as surface water impoundments, water collection systems, distribution systems, wastewater systems, and recharge systems, are described generally for the North County subregion participants in their general descriptions above, and in greater detail for the entire Kern Region in Section 2, Section 2.9.

In general, many Kern Region communities are older and the physical components of their water systems are aging and outdated. Aging infrastructure is a particular issue for rural communities and DACs. In recent years rapid urban development in some areas has provided new infrastructure, but this new infrastructure is limited to those areas receiving new development. Communities are planning upgrades to their water treatment infrastructure. Part of the impetus for joining and participating in the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs.

7.4 Subregional Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the North County subregion with respect to water resource management within the Kern Region include the following. These issue areas are discussed in greater detail in Section 2, in the following Sections:

- Water Quality/Groundwater Contamination (see Section 2.11.8)
- Urban Growth and Water Demand (see Section 2.11.2)
- Groundwater Overdraft (see Section 2.11.6)
- Legislated Water Use Efficiency Requirements (see Section 2.11.7)

Section 8: South County Subregion

8.1 Subregion Introduction

This section presents a description for the South County subregion of the Kern Region. The South County subregion is located at the extreme southern end of the San Joaquin Valley south of Bakersfield and the Kern River, and is generally bounded by the southern Sierra Nevada range to the east, the Tehachapi Mountain range and Tejon Pass to the south, and the San Emigdio Mountains to the west. It encompasses major highways (State Route 5, Highway 58, Highway 99, and Highway 166) and water infrastructure connecting the growing cities and unincorporated communities of the South County subregion to the greater Kern Region. Descriptions of the subregion's participants, as well as the physical and environmental characteristics, hydrologic features, and issues and needs of the subregion are provided. See Figure 8-1 for a map of this subregion.

8.2 Subregion IRWMP Participants

The South County subregion is comprised of eight participants including:

1. Arvin Community Services District (ACSD)
2. Arvin-Edison Water Storage District (AEWSD)
3. The City of Arvin
4. Kern Delta Water District (KDWD)
5. Lamont Public Utility District (LPUD)
6. Lamont Storm Water District (LSWD)
7. Mettler County Water District (MCWD)
8. Wheeler Ridge-Maricopa Water Storage District (WRMWSD)

These participants' roles and responsibilities for managing water, natural resources, and land use within the South County subregion are discussed below.

8.2.1 Arvin Community Services District

ACSD is a municipal water district that provides domestic/municipal water distribution and supply systems for the community of Arvin, south of Bakersfield. ACSD provides water to a population over 16,000 through more than 3,500 service connections. ACSD's water supply consists of groundwater stored in the underlying aquifer that is extracted and provided through a well and pipeline system to end users. Several of the District's wells are affected by arsenic and/or nitrates. ACSD is seeking affordable financing from the EPA, State Proposition 84, and State Revolving Funds to correct these problems by construction of new well(s) or water treatment plants.

8.2.2 Arvin-Edison Water Storage District

AEWSD (or District in this section) is located in Kern County, California, and is situated at the extreme southern end of the San Joaquin Valley approximately 14 miles southeast of the City of Bakersfield. The City of Arvin is surrounded by District lands. District lands lie on the San Joaquin Valley floor. The Tehachapi Mountains bound the District to the East and South.

AEWSD was organized in 1942 under California Water Storage District law (Division 14 of the California Water Code) for the express purpose of, among other things, providing an agency to contract with the United States for water service from the Friant Division CVP as well as contracting for a Federal Power Contract and a Federal loan for construction of new facilities. The need for supplemental CVP supplies reflected the overdraft conditions occurring in the District at that time. The District is comprised of approximately 132,000 acres of land, 113,000 acres that are irrigated crops (vineyards, carrots, potatoes, cotton, citrus and orchards predominately).

In 1962, the District entered into a water supply contract with the United States Bureau of Reclamation (USBR) to supply water for the District's project from the Friant Division of the Federal CVP. The permanent repayment water supply contract provides for the annual delivery of 40,000 AF of Class 1 (firm) water and up to 311,675 AF of Class 2 (non-firm) water, which is subject to water shortage provisions. However, the contract will not have to be renewed and is in perpetuity. However, with the recent San Joaquin River Restoration Program, the District is expected to lose up to 40,000 AFY to the San Joaquin River.

Because the imported Friant Class 2 water is highly erratic and variable, water management is key for the District to develop a means to regulate this variable supply to a fairly constant irrigation demand as well as mitigate overdraft conditions. The District has successfully regulated its imported water supplies historically through the use of groundwater banking facilities (i.e. recharge ponds and extraction wells) in combination with water management exchanges and transfers with other agencies.

The District delivers an average of approximately 141,000 AFY to customers in its surface water service area (approximately 52,000 acres), which rely almost entirely on District-provided water. The District also recharges through both direct recharge in spreading basins and in-lieu deliveries during wet periods, both of which, over the last ten years, have averaged a net of approximately 50,000 AFY. It is important to note that landowners in both the surface water service area and groundwater service area, who rely almost entirely on water pumped from privately owned wells, benefit from the District's importation of surface water for direct delivery and spreading.

Groundwater is found underlying essentially the entire District. Groundwater management within the District is rooted in the conjunctive use of surface water and groundwater resources, since water supplies from these two sources are integrated to accomplish optimum utilization of each supply. District landowners have conjunctively used imported surface water supplies with groundwater since the completion of the District's irrigation distribution system facilities in the early 1960's. In 2003, the District adopted its AB3030 Groundwater Management Plan, which is SB1938 compliant.

As the District's Intake Canal weaves it way through Kern Delta WD, both districts have built interconnection facilities to assist each other in water management activities.

In 2004, AEWSD joined the Power and Water Resources Pooling Authority (PWRPA). PWRPA is authorized to, among other things, effectively study, promote, develop, conduct, design, finance, acquire, construct, and operate water and energy-related projects and programs. PWRPA member units utilize electric power to convey and treat water and recognize that water delivery and electric power consumption are directly related and that exchange of water and electric power resources is a variable means of managing both electric power consumption and water supplies. PWRPA member units possess the right to receive capacity and energy from the Western Area Power Administration (WAPA), a federal agency engaged in the marketing and distribution of power generated by federally owned facilities, including the CVP.

8.2.3 City of Arvin

The City of Arvin is located about 15 miles southeast of the city of Bakersfield, and approximately 90 miles northwest of the city of Los Angeles. Arvin was incorporated in 1914 and is part of the Bakersfield Metropolitan Statistical Area. According to the 2000 U.S. Census, the City's population was approximately 13,000 persons in 2000, and increased approximately 20 percent to about 16,500 persons in 2008. The City provides community sewer and other municipal services. ACSD supplies drinking water.

Nestled against Bear Mountain, Arvin depicts a small town atmosphere that is driven by its agricultural community. Agriculture crops such as cotton, grain, carrots, potatoes, almonds, oranges, and grapes, surround the city as well as numerous private dairies and farmland.

8.2.4 Kern Delta Water District

KDWD is located in the County of Kern, approximately 8 miles south of the City of Bakersfield. KDWD was formed in December 1965 under Division 13 of the State Water Code for the purposes of protecting the Kern River Water Rights serving certain lands within the District. Although the KDWD was formed in a relatively recent period of time, the systems of canals that provide services to customers have existed since the late 1800's.

Approximately 80 percent of the District's 124,000 assessed acres are devoted to irrigated agriculture. KDWD has 500 agricultural connections. KDWD currently serves Kern River Water through four different water rights, via the Kern Island, Buena Vista, Stine, and Farmers Canals. The total length of these canals is approximately 126 miles. KDWD also contracts with the KCWA for a maximum entitlement of 25,500 AFY of SWP water and, as available, with US Bureau of Reclamation for surplus CVP water.

Certain lands within KDWD also have independent Kern River water rights (South Fork) or receive treated effluent from the City's WWTP Nos. 2 and 3. KDWD also makes arrangements to secure high flow water from the SWP, the CVP, and the Kern River on an as available basis.

8.2.5 Lamont Public Utility District

LPUD is a special-purpose district that provides the residents of Lamont, Weedpatch and other surrounding unincorporated areas and communities (Plainview, Sunset Farm Labor Camp, and local schools) with water, sewer, and street lighting services. The town of Lamont, settled in 1923, is an agricultural community located in the southern San Joaquin valley. The majority of the approximately 16,000 plus residents (2000 US Census) own or are employed by the farming, retail and other service interests in the area. The District recently completed improvements to their wastewater trunkline, treatment and disposal system to meet State and Regional Water Quality Control Board requirements and is working to secure funding for connection of a group of homes in the Weedpatch area that have failing septic systems. Some of the District's wells are affected by arsenic and the District is seeking affordable financing to correct these problems by either construction of new well(s) or water treatment plants.

8.2.6 Lamont Storm Water District

LSWD was formed in 1984 by the Kern County Board of Supervisors, pursuant to the Storm Water District Act of 1909, after extensive flooding of the town of Lamont by the Caliente Creek outflow in 1983. LSWD provides and plans for storm water control and diversion projects within the Caliente Canyon watershed.

8.2.7 Mettler County Water District

MCWD provides water supply, from groundwater, to approximately 160 (2000 US Census) residents, highway service industries, packing sheds and other agricultural users located within the rural community of Mettler through 42 service connections. MCWD customers are also served by septic tanks, which have historically seen high rates of failure. The Director of the Kern County Environmental Health Services Department declared a potential pollution problem in the area due to the septic tank failures and reports of nitrate levels above the 45 mg/L MCL within the groundwater. The District received USDA funding and replaced one of two wells that were contaminated with high nitrates, installed waterlines and new storage and pumping facilities, and abandoned their nitrate contaminated wells. The District is seeking funds to drill a second well. As a result of the high number of failing and stressed septic systems, the District is seeking funding from the State and Federal agencies to meet the CVRWQCB requirements by installing a community sewage collection, treatment and disposal system.

8.2.8 Wheeler Ridge-Maricopa Water Storage District

WRMWSD is a public agency whose jurisdiction encompasses about 147,000 acres (230 square miles) of land in the South County. WRMWSD provides water supplies to about 90,000 acres of farmland within its boundaries. WRMWSD was formed on August 11, 1959 under California Water Storage District law for the purpose of securing a surface water supply for agricultural purposes from the SWP. The WRMWSD Project, including authority to execute a water supply contract for SWP supplies, and construct a water distribution system, was approved by the WRMWSD landowners at an election on November 14, 1967. WRMWSD provides water to agricultural customers through a combination of imported water from the SWP, imported water from several County of Kern banking projects including the Kern Water

Bank, the Pioneer Recharge Project, the Berrenda Mesa Recharge Project, and from local groundwater. In addition, some agricultural water users in the WRMWSD provide their own irrigation water through groundwater pumping (WRMWSD GWMP, 2007).

Surface water deliveries began in 1970. Over 6 MAF of untreated surface water supplies have been delivered to farms within the WRMWSD. A small percentage of the water is supplied on a temporary basis for industrial, ground water recharge, and in-lieu of ground water pumping purposes. WRMWSD provides no water treatment. All water delivered is in a raw untreated condition and is not suitable for human consumption without treatment.

Except in drought years, the WRMWSD has negated the need for ground water pumping within its service area, and also allowed lands not previously irrigated to be productively farmed. Consequently, the decline of ground water levels within the WRMWSD has been halted, and some recovery has occurred.

8.3 Subregion Description

8.3.1 Land Use

The South County subregion can be generally characterized as containing a predominance of rural uses including agriculture/open space, mineral/petroleum, and public recreation uses.

As discussed in Section 2, Section 2.3, the Land Use, Open Space, and Conservation Element of the Kern County General Plan provide the policies protecting the Kern County unincorporated areas, including the communities comprising the South County subregion. Because of the close interrelationship between land use, conservation, and open space issues, Kern County's Land Use, Conservation, and Open Space Element provides for a variety of land uses for future economic growth while also assuring the conservation of the County of Kern's predominant agricultural, natural, and resource attributes.

The South County can be generally characterized as containing a predominance of agricultural and rural uses. The agricultural communities in the South County consist of both large and small farms. The soils of the subregion are highly conducive to agricultural uses with a majority classified as having wide crop adaptability with no limitations. Crops typically grown in the area generally include grapes, carrots, cotton, citrus, potatoes, wheat, plums, stone fruit, almonds, and alfalfa. Most farmland is irrigated. The soils in the subregion are part of an extensive area of the San Joaquin Valley with "prime" agricultural (Class I and II) soils.

Since the mid 1990's, agriculture within the South County has generally shifted from predominantly field crops, such as cotton, sugar beets and corn, to permanent crops, such as various tree (deciduous and subtropical) and vine crops. Acreage for field crops has declined from 1990 to 2001 and subsequently, vine and tree crops have increased over that same time period. Tree crops increase overall water demand compared with field crops (WRMWSD GWMP, 2007) and also require a more reliable source.

The land use element of the City of Arvin General Plan and the Mettler Community Plan also provide the policies protecting the uses within the South County.

8.3.2 Ecological Processes and Environmental Resources

Ecological processes and environmental resources for the Kern Region as a whole are described in Section 2, Section 2.4. With regard to the South County subregion, slightly increased agriculture and urban development have resulted in many changes in the natural environment. These impacts have resulted in the loss of native plants and animal species, and a decrease in native lands. This has also resulted in the introduction of invasive species and spread of exotics leading to the decline of native plant communities. The southern portion of the San Joaquin Valley, which covers the South County subregion, has no natural outlet for surface waters. Streams from Coast Ranges and Tehachapi Mountains have eroded and deposited materials in the subregion, forming alluvial fans at the surface.

An environmental resource located in the subregion is Bitter Creek National Wildlife Refuge. The Bitter Creek National Wildlife Refuge is located in the southwestern corner of the subregion. This 14,097-acre refuge is intended to protect dwindling California condor foraging and roosting habitat. The refuge is bisected by the San Andreas Fault and Bitter Creek Canyon. In addition to the California condor, the refuge provides habitat other Federally-listed endangered species and species of Federal concern. Such as the San Joaquin kit fox, blunt-nosed leopard lizard, giant kangaroo rat, the western spade foot toad, western horned lizard, and tricolored blackbird. Coyote, bobcat, mountain lion, mule deer, pronghorn antelope, tule elk, and western rattlesnake are also found in the refuge (USFWS 2009b).

The CDFG and the USFWS have listed some species as threatened or endangered, requiring species recovery by establishing a network of conservation areas and reserves that include terrestrial and riparian natural areas in the San Joaquin Valley and thus Kern Region. As part of their conservation efforts in the San Joaquin Valley, the Metropolitan Bakersfield HCP and the draft VFHCP have been established to implement endangered species recovery programs within the Kern Region to promote species recovery, and protect ecological processes and environmental resources. The South County subregion is within the boundaries of the Endangered Species Recovery Program for the San Joaquin Valley. There are some areas in the northerly part of the subregion planned for habitat acquisition within the subregion identified in the Metropolitan HCP. Much of the subregion is under the conserved jurisdiction of the draft VFHCP.

8.3.3 Social and Cultural Characteristics

The social and cultural characteristics of the South County subregion are not different from that as described for the Kern Region as a whole, as provided for in Section 2, Section 2.5. South County is generally characterized by its traditional industries in agriculture as well as increasing urbanization and population growth.

8.3.3.1 Economic Conditions and Trends

The City of Arvin and the communities of Lamont, Hilltop, Edmundson Acres, DiGiorgio, Mitchells Corner, Mettler, Pine Mountain Club and Weedpatch are located within the South County. The majority of the South County's population lives in Arvin and Lamont. The South County makes up approximately 14.6 percent of the total population in the Kern Region.

With the exception of Pine Mountain Club, the majority of the population in the South County is Latino. Approximately 84.2 percent of the population reports being Hispanic/Latino and approximately 13.4 percent of the population identifies as being white. Persons identifying as African American, Asian, American Indian, and Native Hawaiian make up less than 2.4 percent of the population. English is the primary language, but a significant portion of the population speaks Spanish.

Approximately 15 percent of adults in the South County have graduated from high school, with approximately 2.5 percent of the population attaining an Associates degree, 2.9 percent of the population having a bachelor's degree, and 1.6 percent of adults in South County having received a graduate or professional degree.

The South County's economy is primarily agricultural based but does have interest from the oil industry (i.e., Edison Oilfield). The agricultural sector consists mostly of low paying and often seasonal employment which limits the positive multipliers within the economy. In the 2000 census 14.3 percent of the population was unemployed. Approximately 80.9 percent of the South County's population has a household income of less than $50,000, approximately 10.9 percent of the population has a household income between $50,000 and $74,999, and approximately 8.2 percent has a household income of $75,000 or higher (US Census Bureau 2000).

Two development proposals may increase economic opportunities in this subregion the San Emigdio Ranch Development and the TIC. The San Emigdio Ranch Development is a planned community which is proposed to be developed over a period of 45 years. The San Emigdio Development Project, approximately 7,850 acres, will be located west of Interstate Highway 5 near the point where 1-5 and Highway 99 diverge. The community is to be developed in phases or villages which will consist of a combination of single family and multi-family housing areas, schools, commercial developments, hotels and resorts, and a college campus with research and development facilities. In addition to these facilities, there will also be several golf courses, parks, and open space (San Emigdio EIR, 1991).

The TIC consists of consists of 1,109 acres of land located on the east side of Interstate-5 approximately at the Laval Road and Wheeler Ridge interchange 3 miles north of the Tejon Pass. The Interstate 5 freeway corridor links major metropolitan regions of the state, and represents one of the primary commercial truck corridors for the movement of bulk material goods. Presently this roadway carries more than 57,000 vehicles per day past the project site, of which approximately 25 percent are commercial trucks and traffic volumes are expected to increase substantially in the future, as commercial truck trips increase throughout Kern County and the state of California. The new development will consist of approximately 15.4 million square feet of industrial, commercial office, and highway commercial uses. Development of the property will be regulated through the Tejon Industrial Complex-East Specific Plan (TIC East FEIR, 2002).

8.3.3.2 Disadvantaged Communities

As defined in Section 2, Section 2.5.3, DACs are communities whose average MHI is less than 80 percent of the statewide annual MHI. In 2000, 80 percent of the state of California's MHI was $37,994. A number of municipalities within the Kern Region have been identified in

Table 2-5 of Section 2, Section 2.5.3 which meets the definition of a DAC. Of those identified as a DAC, City of Arvin, Lamont, Mettler, and Weedpatch are in the South County subregion.

See Section 1, Section 1.4.2 for environmental justice outreach to the Kern Region as a whole.

8.3.4 Water Supply

The following section describes the sources of water supply for the South County subregion including imported surface water, local surface water, and local groundwater.

8.3.4.1 Imported Water Supplies

The main sources of imported water to the region come from the federally funded CVP and the multi-purpose SWP, which transport their majority of their water through the Friant-Kern Canal and California Aqueduct, respectively. The subregion is very dependent on this supply to make deliveries to agricultural use as well as to recharge and bank groundwater. Importing affordable water supplies through the CVP or SWP, in quantities sufficient to achieve a long term water balance within the region, is one of the long-term goals of these districts. Imported SWP and CVP water is discussed in detail in Section 2, Sections 2.6.1 and 2.6.2, respectively.

8.3.4.2 Surface Water

Surface water is naturally available to the subregion from the Kern River and is regulated by the Isabella Dam and Reservoir which was constructed in 1954 by the Army Corps of Engineers. The Kern River is also a source of supply to various entities in the subregion, either through direct deliveries or through exchanges, transfers or surplus supplies).

Surface water drains toward the South via a number of ephemeral stream channels from the south, east, and west. The San Emigdio Mountains in the south are drained by the larger waterways of Santiago, San Emigdio, and Pleito creeks. The Tehachapi Mountains are drained by Tunis, El Paso, Pastoria and Grapevine creeks. The Southern Sierra Nevada are drained by the streams from the Caliente Creek watershed. These sources are described in detail in Section 2, Section 2.6.2. Eastern drainage ways from the Temblor Range contribute very little runoff due to low elevation and low precipitation. Ephemeral creeks draining east toward the South County include Bitterwater and Bitter creeks (WRMWSD GWMP, 2007).

8.3.4.3 Groundwater

The physical characteristics of the groundwater basin underlying the South County subregion, such as the permeability of the overlying and subsurface flows, greatly influence the manner in which groundwater is replenished. The subregion overlies areas of both unconfined and semi-confined aquifers. There are also areas of perched water and shallow groundwater tables.

Effective groundwater replenishment within the subregion involves the management of water supplies available to the purveyors with rights overlying the basin and extractions from the basin as well as minor surface streams (Caliente Creek, El Paso, etc.). Extractions occur by both district and private wells.

The replenishment of the underlying groundwater aquifer occurs naturally and through deliberate, controlled means. Direct recharge is achieved through the placement of surface water in channels or basins located on permeable soils for the express purpose of percolation to the underground aquifer. Indirect or in-lieu recharge is also conducted by delivering surface supplies to growers who would otherwise pump wells and thus extract groundwater. The Kern River water conveyance system throughout the subregion substantially consists of unlined canals; however concrete lined canal also contribute albeit at a much smaller percentage. As a result, up to 30 percent of the surface water supplies diverted from the Kern River into local purveyor facilities percolates to the groundwater in the form of canal seepage losses. Delivery of surface water for irrigation purposes reduces the need for water users to draw on groundwater, thereby conserving the water available in the aquifer for later use. The use of surface water as in-lieu recharge is practiced extensively throughout the subregion. An additional benefit is derived when irrigation water applied beyond crop water needs results in deep percolation to the aquifer.

WRMWSD has been involved in the development of the Kern Water Bank, the Pioneer Project, and the Berrenda Mesa water-banking project on the Kern River Fan. These projects now enable WRMWSD to purchase surplus water and store it for dry-year use and store its own SWP entitlements for future use during years of higher than normal precipitation. KDWD is also a participant of the Pioneer Project and has its own Groundwater Banking Project. Another notable banking program in the subregion is AEWSD's groundwater banking program which it uses to regulate its Friant-Kern CVP and other supplies to provide banking services on behalf of its landowner and to others on a second priority.

AEWSD has a water banking program with Metropolitan Water District of Southern California (MWD). Under the Program, MWD has banked approximately 425,000 AF in AEWSD. It was also anticipated that MWD would cycle water through the Program and that, at AEWSD's discretion, MWD could store as about 300,000 AF at any one time in AEWSD's groundwater bank. In order to facilitate this Program, AEWSD has constructed facilities worth nearly $42 M, including 500 acres of new spreading works, 15 new groundwater wells, a 4.5 mile bi-directional pipeline connecting the terminus of AEWSD's South Canal with the Aqueduct and reverse flow facilities in a 9-mile stretch of its South Canal to the Tejon Spreading Works site. These new facilities can be used in conjunction with existing AEWSD facilities.

Since 1997, MWD has delivered approximately 425,000 AF of its SWP water supplies to AEWSD. Of this amount, approximately 385,000 AF were stored in the groundwater basin underlying AEWSD on MWD's behalf after a 10 percent loss factor was applied. To date, AEWSD has returned approximately 275,000 AF to MWD, resulting in a remaining balance of approximately 110,000 AF.

MWD's supplies were primarily conveyed to AEWSD via the Aqueduct, the CVC, AEWSD's Intake Canal, Forrest Frick Pumping Plant, and AEWSD's North and South Canals. In addition, limited amounts of MWD's SWP water have been delivered to AEWSD using the more cost effective IPL. Since 2009, under the Consolidated Place of Use Petition, AEWSD has returned approximately 120,000 AF to MWD of its Friant Division CVP water in exchange for the previously banked SWP water. AEWSD has previously returned MWD's banked water to MWD by a combination of SWP water exchanges and by extracting banked groundwater and delivering it directly to the Aqueduct through the IPL. The Program has operated successfully for nearly 15 years resulting in a variety of water management benefits both AEWSD and MWD.

8.3.4.4 Recycled Water

As discussed in Section 2, Section 2.6.5, wastewater effluent produced by treatment facilities can be applied to non-human consumption crop irrigation and environmental habitat restoration. Certain lands within the South County subregion receive treated effluent from the City's WWTP Nos. 2 and 3. This water is also used for groundwater recharge programs. As noted in Section 2.6.6.2, in addition to treated wastewater effluent, effluent from agricultural processing facilities is also being recycled for irrigation use and is being evaluated for use in groundwater recharge programs. Water Quality

Groundwater quality is generally suitable for irrigation use throughout the South County subregion. Groundwater throughout most of the WRMWSD meets Class I or Class II irrigation water quality standards for salinity (WRMWSD, 1981). Class I water is suitable for all crops grown in the WRMWSD with an EC value of less than 1,000 microsiemens per centimeter (uS/cm). Class II meets the water quality requirements of most crops with the exception of some salt sensitive vegetable crops and has typical EC values between 1,000 and 3,000 uS/cm (equivalent to TDS concentrations between about 700 and 2,000 mg/L).

AEWSD wells have an EC range from 250 to 750 uS/cm with a blending or melded supply to landowners in the 350 to 480 uS/cm range from the canal distribution system during strictly well operations (i.e., no mixing with surface water).

TDS concentrations for both unconfined and the deeper confined groundwater systems are generally above 1,000 mg/L across the WRMWSD, with the exception of the White Wolf Subarea where TDS concentrations are generally below 500 mg/L. In addition, maps indicate significantly higher TDS concentrations (2,000 to more than 5,000 mg/L) in the Maricopa Subarea. This increase in TDS from southeast to west reflects the differences in source rocks and surface water runoff (WRMWSD GWMP).

AEWSD wells have a TDS range from 150 to 550 mg/L with a blending or melded supply to landowners in the 200 to 270 mg/L range from the canal distribution system during strictly well operations (i.e., no mixing with surface water).

All of the communities in this subregion rely on groundwater for domestic use. Several of these communities are faced with high arsenic, nitrate and DBCP contamination of local groundwater supplies.

8.3.5 Water Demand

Demands within the South County subregion were analyzed by comparing the estimated 2005 total water demands and the 2030 total water demands, as shown in Table 8-1. These demands were further analyzed by comparison of three categories of water demand: M&I, agricultural, and groundwater recharge. M&I demands are urban water demands that include residential (single family and multifamily), commercial/industrial/institutional, large landscape, and other water use types (including water losses) as provided by the various water retail water suppliers participating in this IRWMP. Generally, historic and projected urban water demands were taken from UWMPs developed by the agencies, from DHS (now DPH) annual reports and/or as reported by KCWA. Agricultural water demand is defined as the total annual water demand for all agricultural accounts. Groundwater recharge is defined as the total amount of water recharged (direct or in-lieu) or banked within a supplier's respective service area.

Estimated 2005 total water demand within the South County subregion was approximately 755,169 AF, while the estimated 2030 demand is projected to be 759,455 AF. Residential demand will increase approximately 11 percent during that time period. Agricultural water demand in 2005 was 747,543 AF, approximately 99 percent of the total demand within the subregion. Groundwater recharge within the South County subregion in 2005 was as estimated 167,000 AF (unpublished KCWA data; summary of groundwater recharge activities, Table 24). The South County subregion's M&I and agricultural demand combined is approximately 26 percent of the total 2005 urban and Agriculture for the Kern Region.

TABLE 8-1
SUMMARY OF ESTIMATED CURRENT AND FUTURE WATER DEMAND BY WATER USE CATEGORY FOR THE SOUTH COUNTY SUBREGION

Purveyor	2005 M&I	2005 AG[b]	2005 TOTAL	2030 M&I	2030 AG[b]	2030 TOTAL	Notes
City of Arvin	3,176[a]	--	3,176	4,961[a]	--	4,961	2
Arvin CSD	--	--	--	--	--	--	2
Arvin-Edison WSD	--	287,260	287,260	--	287,260	287,260	2
Lamont PUD	4,450[a]	--	4,450	6,951[a]	--	6,951	2
Lamont Storm Water UD	--	--	0	--	--	0	12
Kern Delta WD	--	272,739	272,739	--	272,739	272,739	2
Mettler CWD	--	--	0	--		0	18
Wheeler Ridge-Maricopa WSD	--	230,958	230,958	--	230,958	230,958	2
AEWSD/WRMWSD Overlap Area	-	-43,414	-43,414	--	-43,414	-43,414	21
Total	**7,626**	**747,543**	**755,169**	**11,912**	**747,543**	**759,455**	

Notes:
(a) Year 2005 from unpublished KCWA data. Water demands 2005 to 2030 assumed to grow 1.8 percent per year based on Kern Council of Governments Draft Regional Forecast Report.
(b) Unpublished KCWA data. 2005 agricultural demand data based on 2007 summary by Crop Group. 2030 agriculture demand data based on equivalent production as 2005 data.

8.3.6 Water-Related Infrastructure

Water related infrastructure such as surface water impoundments, water collection systems, distribution systems, wastewater systems, and recharge systems, are described generally for the South County subregion participants in their general descriptions above, and in greater detail for the entire Kern Region in Section 2.9.

In general, many Kern Region communities are older and the physical components of their agricultural and drinking water supply systems are aging and outdated. Aging infrastructure is a particular issue for rural communities and DACs. In recent years rapid urban development in some areas has provided new infrastructure, but this new infrastructure is limited to those areas receiving new development. Communities are planning upgrades to their water treatment infrastructure. In addition to drinking water system upgrades, agricultural water supply infrastructure is also in need of upgrades. Aging canal and pumping facilities, as well as other related infrastructure, represent a threat to the reliability of water supplies and viability of agricultural operations. Part of the impetus for joining and participating in the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs. Subregional Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the South County subregion with respect to water resource management within the Kern Region include the following. These issue areas are discussed in greater detail in Section 2, in the following sections:

- Decreased Imported Water Supply (see Section 2.10.4)
- Water Quality/Groundwater Contamination (see Section 2.10.8)
- Urban Growth Encroachment on Key Recharge Areas (see Section 2.10.3)
- Water Rights (see Section 2.10.9)

Section 9: West Side Subregion

9.1 Subregion Introduction

This section presents a description for the West Side subregion of the Kern Region. The section includes a summary of the subregion's participants, as well as a description of the physical, environmental, social and demographic characteristics of the subregion, the hydrologic features and overall water reliability, and major water related infrastructure. The West Side subregion is located at the northwestern corner of Kern County west of Bakersfield and north of the Kern River, and is generally bound by the Kern-San Luis Obispo county line and Temblor Mountain Range to the west and south, the Kern-Kings county line to the north, and the North County subregion and the KNWR to the east. A small portion, representing DRWD, extends north into Kings County. The subregion is bisected diagonally by major north-south highway (State Route 5) and the California Aqueduct and horizontally by east-west highway (State Route 46). See Figure 9-1 for a map of this subregion.

9.2 Subregion IRWMP Participants

The West Side subregion consists of five participants:

1. Belridge Water Storage District (BWSD)
2. Berrenda Mesa Water District (BMWD)
3. Dudley Ridge Water District (DRWD)
4. Lost Hills Public Utility District (LHPUD), and
5. Lost Hills Water District (LHWD)

These participants' roles and responsibilities for managing water, natural resources, and land use within the West Side are discussed below.

9.2.1 Belridge Water Storage District

BWSD is located within the southern San Joaquin Valley about 40 miles northwest of the City of Bakersfield and encompasses approximately 97,396 acres. BWSD is located in the northwestern corner of the County of Kern on the eastern edge of the Temblor Range. State Highways 46 and 58 traverse the northern and southern District boundaries, respectively, with State Highway 33 traversing through the western portion of the District.

BWSD was formed in 1962 under California Water Storage District Law by interested landowners to provide a vehicle for construction, operation, and maintenance of an irrigation project. A five person Board of Directors, elected by District landowners, governs the District. BWSD is a "member unit "of KCWA (BWSD, 2006).

BWSD's principal water supply is imported from the SWP, for which it contracts with KCWA. BWSD receives water by continuous gravity flow for delivery into three (3) turnouts (Belridge

(Bel) 1A, Bel 3, and Bel 5). Although seven turnouts from the California Aqueduct were originally planned, only three are actually operational. The remaining four turnouts (Bel 2, Bel 4, Bel 6, and Bel 7) were completed at the California Aqueduct, but never activated (BWSD, 2006 and Kern Fan Element, 1994).

BWSD distributes SWP water, mainly by gravity, via a network of facilities; three main canals totaling 39 miles in length, 50 miles of pipelines, pump stations, and control structures. The District's two main canals (415 Canal and 500 Canal) are located west of the California Aqueduct. Once pumped uphill approximately 115 feet from the California Aqueduct, by Pump Station 1A, water flows into a regulating reservoir (415 Reservoir). From there water is delivered by gravity through concrete lined 415 Canal to the North, the South and a portion is diverted to a second pump station (Pump Station 1B) to lift water to the second regulating reservoir (500 Reservoir). Through concrete lined 500 Canal, water deliveries are by gravity flow to the North only. Gravity pipeline laterals feed lands that are lower in elevation than the canals. Lands that are located higher in elevation than the canals are served by a mixture of landowner owned booster pumps and District owned lateral pipelines.

To supplement its surface water supply by transfer or exchange, BWSD participates in groundwater banking programs: the Pioneer Project and the Berrenda Mesa Project. These water banking projects are located outside of the District's boundary just southwest of the City of Bakersfield and are operated and maintained by KCWA. Annually, the maximum amount BWSD can extract from the Pioneer and Berrenda Mesa banking projects is about 15,000 AF. Currently, BWSD has banked a total of approximately 50,000 AF in these projects. In addition, the District's largest landowner, Paramount Farming Company, has the ability to deliver significant amounts of banked groundwater through its participation in the Kern Water Bank.

Approximately 9,200 acres within the District are used primarily for petroleum production related activities. The area is served by a separate system that is operated by the industrial water users.

9.2.2 Berrenda Mesa Water District

BMWD is located within the southern San Joaquin Valley about 50 miles northwest of the City of Bakersfield in the northwestern corner of the County of Kern on the eastern edge of the Temblor Range. State Highways 46 and 33 traverse the District boundaries.

BMWD is a California Water District formed under Division 13 of the CWC on September 3, 1963. The BMWD owns and operates an irrigation distribution system that encompasses 55,400 acres of agricultural lands in western Kern County. A five person Board of Directors, elected by District landowners, governs the District. The CWC gives the District the authority to receive grant funds and construct infrastructure projects. BMWD is a "member unit" of the KCWA.

BMWD's main water supply is imported from the SWP via the California Aqueduct and the Coastal Branch Aqueduct. Before BMWD receives delivery of the water, it must be lifted through a series of pump stations, DWR's Las Perillas and Badger Hill Pumping Plants and BMWD's Pump Station A.

BMWD's water conveyance and delivery system was designed mainly for gravity flow. Water is distributed through 15 miles of lined canal and 50 miles of pipelines. Once water is pumped uphill 225 feet by Pump Station A (located at the terminus of Coastal Aqueduct), the water flows by gravity through a concrete lined canal. Gravity pipeline laterals feed lands that are lower in elevation than the canal. Water is delivered to higher elevation land with pump stations and pipelines.

BMWD also purchases water wholesale from LHPUD and delivers it to a small rural community at Blackwell's Corner. LHPUD receives the wholesale groundwater from wells owned by an outlying district and delivers water for residential use.

To supplement its surface water supply by transfer or exchange, BMWD participates in groundwater banking projects, KWBA, Pioneer Project and Berrenda Mesa Project. These water banking projects are located outside of the District's boundary just southwest of the City of Bakersfield and are operated and maintained by KCWA.

9.2.3 Dudley Ridge Water District

DRWD is located in southernmost Kings County on the western edge of the San Joaquin Valley. The District lies south of Kettleman City and is bounded on the northeast by the Tulare Lake Basin Water Storage District, on the south by the Kings-Kern County Line, and on the west by the California Aqueduct. Interstate 5 traverses the District in a northwest-southeast direction.

The DRWD is a small agricultural water district that provides supply systems for irrigation interests located within its service area. The property within the District's service area is agricultural, and of the total 37,600 acres, approximately 21,000 acres are currently in crops.

The District delivers SWP water from the California Aqueduct through five delivery structures (turnouts). From each turnout, water is delivered to landowners through 22 miles of District owned concrete-lined canals and/or underground pipelines to metered farm turnouts.

The District's only water source is surface water supplies; neither the District, nor its landowners, uses local groundwater due to its low yields and poor quality. Water pumped by the few remaining private wells in the northern portion of the District has historically been blended with surface supplies to be made usable. The surface water supply is comprised of SWP Table A, other SWP water (including Article 21 and Turnback Pool) as available, and non-project water obtained outside the District and delivered within the District for irrigation to banking/exchange programs outside of the District. In drier years, the supply is heavily supplemented by banked water retrieved from groundwater storage programs in which the District is participating; in average to wet years, the supply is mostly, or exclusively, from surface water sources (DRWD 2005).

9.2.4 Lost Hills Public Utility District

LHPUD is a small municipal and commercial water district that provides water distribution for the community of Lost Hills and the Interstate 5-Highway 46 Interchange. It is also responsible for collection and treatment of wastewater for the community of Lost Hills. Interstate 5-Highway 46 Interchange owns and operates its own collection and treatment system. Effluent from both treatment plants is disposed of by evaporation and percolation. LHPUD's potable water supply consists of groundwater stored in an aquifer that is pumped from two wells owned by an outlying district located 13 miles east of the community of Lost Hills. Prior to distribution to its service area, LHPUD treats the water for arsenic removal at a 625 gpm capacity water treatment plant installed near the wells in 2007.

LHPUD provides wholesale water to BMWD which is delivered by BMWD to a small rural community at Blackwell's Corner.

9.2.5 Lost Hills Water District

LHWD contains approximately 72,183 acres within its boundaries, beginning at the town of Lost Hills, California and extending north and west to the Kings-Kern County Line. The District lies in the northwest portion of the County of Kern just west of the KNWR. The California Aqueduct and Interstate 5 bisect the District diagonally. State Route 46 is located at the south end of the District.

LHWD was formed on February 8, 1963, pursuant to Division 13 of the CWC, for the purpose of providing irrigation water from the SWP to land within the District. LHWD is a "member unit" of the KCWA.

Of the 72,183 acres in the District, 70,314 acres are farmable, although not all this acreage is currently being farmed. Approximately 56,000 acres have been farmed on an annual basis over the past five years.

LHWD primarily supplies agricultural water to growers within its boundaries with a small amount of industrial water delivered annually to oil production and commercial customers. The District supplies no municipal water. All of the water delivered by the District is SWP water and is delivered to the District through the California Aqueduct. In some years, the District is able to purchase supplemental water supplies from the Agency. In many years, Article 21 water and Turnback water has been available for purchase that can be used to supplement the District's contract supply. In water short years, the District purchases supplemental water. Also, District landowners periodically transfer water into the District to help meet their crop water requirements.

The District currently owns and operates approximately 15 miles of concrete lined canals, 42 miles of pipeline and 38 miles of unlined canals.

9.3 Subregion Description

9.3.1 Land Use

The Land Use, Open Space, and Conservation Element of the Kern County General Plan provide the policies protecting the County of Kern unincorporated areas, including the communities comprising the West Side subregion. Because of the close interrelationship between land use, conservation, and open space issues, Kern County's Land Use, Conservation, and Open Space Element provides for a variety of land uses for future economic growth while also assuring the conservation of both the Counties of Kern and Kings' predominant agricultural, natural, and resource attributes.

The area within the subregion is almost entirely in existing or former agriculture on the western edge of the San Joaquin valley floor in or near northwestern Kern County, planted primarily with almonds, pistachios, pomegranates, vineyards and some row crops. Native valley floor habitat is lower Sonoran Grassland (BMWD 1996 and CVWD BMW 2006). The water supply is entirely SWP water. Local groundwater is considered to be unsuitable for agricultural irrigation because of high TDS, boron and sulfate concentrations (BMWD1996). Farming declined in the 1980s and 1990s because farming had become less economical, and older, less productive trees and vineyards were being removed. In addition, as the cost of SWP water increased, some of the landowners defaulted on their payments for water and were forced to foreclose. Therefore, as farmed acreage decreased, SWP Annual Table A water became surplus to existing demand and potentially available for transfer to other SWP users (CVWD BMW 2006).

Prior to construction of the SWP, there was no land development in the subregion except for oil fields. Agricultural activities were limited to sheep grazing on non-irrigated pasture. When water was made available through construction of the SWP, land use in the subregion shifted toward agriculture. Currently, land use within the subregion is primarily for agriculture and petroleum production. Approximately 184,000 acres are in agricultural production with the most common crops being almonds, pistachios, cotton, citrus, grapes, grains, pomegranates, olives and alfalfa. Other crops include carrots, plums, persimmons, hay, melons, tomatoes, wheat, and a variety of vegetables. An additional 4,210 acres have facilities and are awaiting future development. A majority of non-irrigated land (approximately 15,000 acres) in the subregion is used to support petroleum production. The balance or approximately 128,000 acres is used for grazing or is not farmed. Rural communities within the subregion include Lost Hills, Blackwells' Corner, and the Interstate 5-Highway 46 Interchange (BWSD 2006 and DRWD 2005).

9.3.2 Ecological Processes and Environmental Resources

Ecological processes and environmental resources for the Kern Region as a whole are described in Section 2, Section 2.4. The West Side subregion is geologically located in the Great Valley geomorphic province. Much like the Kern Fan and North County subregion, impacts to environmental resources have been impacted due to agriculture, urban development and oil/gas extraction which have resulted in many changes in the natural environment. These impacts have resulted in drained and diverted lakes and wetlands, the loss of native plants and animal species, and a decrease in native lands. This has also resulted in the introduction of invasive species and spread of exotics leading to the decline of native plant communities.

The CDFG and the USFWS have listed some species as threatened or endangered, requiring species recovery by establishing a network of conservation areas and reserves that include terrestrial and riparian natural areas in the San Joaquin Valley and thus Kern Region. As part of their conservation efforts in the San Joaquin Valley, the Metropolitan Bakersfield HCP and the draft VFHCP have been established to implement endangered species recovery programs within the Kern Region to promote species recovery, and protect ecological processes and environmental resources. The West Side subregion is within the boundaries of the Endangered Species Recovery Program for the San Joaquin Valley. There are some areas planned for habitat acquisition within the subregion identified in the Metropolitan HCP. Much of the subregion is under the conserved jurisdiction of the draft VFHCP.

9.3.3 Social and Cultural Characteristics

The social and cultural characteristics of the West Side subregion can described as industries predominantly related to agriculture with a small portion of the subregion dedicated to oil and gas production. These industries are not different from those described for the Kern Region as a whole in Section 2, Section 2.5.4.

Section 2.5 provides a summary of the human demographics for the Kern Region as determined by 2000 U.S. Census Bureau data. Regional data was estimated from the data for the census tracts within the regional boundaries.

The community of Lost Hills is located within the West Side subregion. According to the 2000 U.S. Census Bureau, Lost Hills had a population of 1,285. Approximately 70.7 percent of the population has a household income of less than $50,000, approximately 18.6 percent of the population has a household income between $50,000 and $74,999, and approximately 10.9 percent has a household income of $75,000 or higher. More than 7.5 percent of adults in the subregion have graduated from high school, with approximately 1.4 percent of the population attaining a bachelor's degree, and 1.2 percent of adults in the subregion receiving a graduate or professional degree.

The population is largely Latino. Approximately 96.7 percent of the population identifies as being Hispanic or Latino and approximately 2.6 percent of the population reports being white (US Census Bureau 2005). Persons identifying as African American, Asian, American Indian, and Native Hawaiian make up less than 0.7 percent of the population. Spanish is the primary language. Approximately 92.6 percent of the population speaks Spanish at home and 72.2 percent report speaking English less than "very well". Only 6.8 percent of the population speaks English only.

9.3.3.1 Economic Conditions and Trends

SWP water is among the most expensive surface water supplies in the State. Water costs to landowners in the subregion are further impacted by the subregion's location and topography. About 70 percent of the lands currently taking delivery of SWP water in the subregion are located west of and at a higher elevation than the California Aqueduct. When reduced water supplies are received, the costs increase dramatically. This alone is incentive enough for most growers to efficiently manage their water allocation.

The primary products grown within the subregion are trees (mostly almonds and pistachios), cotton, carrots, citrus, and pasture crops. The evolution of irrigation and changing economic conditions has brought many crop changes to the subregion. Lands historically used for row crop production, mainly cotton, are being converted to permanent plantings (almonds, pistachios and citrus). As lands are converted, pressurized irrigation systems such as drip and micro sprinkler replace flood and sprinkler irrigation as the predominant method of irrigation. Similarly, the on-farm irrigation water efficiencies improve as the irrigation system conversions materialize.

In the early to mid-1990s, a portion of the previously irrigated land was dry-farmed or fallowed because landowners could not afford to operate farms due to increasing costs, including the cost of SWP water. Due to the burden of excess SWP Entitlement, participants began looking for options to allow for permanent water transfers AF of Annual Entitlement for use outside the subregion.

9.3.3.2 Disadvantaged Communities

As defined in Section 2, Section 2.5.3, DACs are communities whose average MHI is less than 80 percent of the statewide annual MHI. In 2005, 80 percent of the state of California's MHI was $42,903 (MHI=$53,629). A number of municipalities within the Kern Region have been identified in Table 2-6 of Section 2, Section 2.5.3 which meets the definition of a DAC. Of those identified as a DAC, Lost Hills is within the West Side subregion. Lost Hills MHI is $31,875, 67.12 percent of the State median income.

See Section 1, Section 1.4.2 for environmental justice outreach to the Kern Region as a whole.

9.3.4 Water Supply

9.3.4.1 Imported Water Supplies

The main source of water to the subregion is imported from the multi-purpose SWP which transports the majority of their water through the California Aqueduct. This supply is discussed in detail in Section 2, Section 2.6.1.

Importing AF of affordable water supplies through the SWP, in quantities sufficient to achieve a long term water balance within the subregion, is a prerequisite for successful implementation of the various recharge programs underway or newly initiated.

Landowners in the subregion have some of the highest costs for surface water given the subregion's location and topography. Water delivered to the subregion must be pumped to a higher elevation then gravity fed to the distribution system.

9.3.4.2 Surface Water

The only source of surface water available to the West Side subregion is the SWP via the California Aqueduct.

Surface water flow into the subregion occurs in creeks (Bitterwater, Franciscan, Packwood, Salt, Chico Martinez, and Santos) that flow seasonally from the south and west. Surface water quality data from these creeks is limited. The surface waters have high concentrations of calcium sulfate due to leaching from surrounding soils. Due to the poor water quality, these creeks do not provide either irrigation water nor are they utilized to transport irrigation water.

9.3.4.3 Groundwater

Groundwater in much of the subregion is not usable due to its low yields and poor quality. Some groundwater is imported to the subregion through programs for water stored in off-site groundwater basins and from purchases and transfers from other water contractors. LHPUD pumps water from wells owned by an outlying district from a groundwater aquifer located 13 miles east of its service area.

Until recently, use of local groundwater as a supplemental water supply was thought to be uneconomical. However, because recent reliability studies from DWR indicate severely reduced reliable supplies of Table A amounts from the SWP and given the tolerance of some crops, namely pistachios and some cotton varieties, to higher concentrations of salts, several landowners are revisiting the idea of blending groundwater with surface water to supplement their supplies. However, the viability of these sources as long-term supplies is still in question (BWSD 2006).

9.3.4.4 Groundwater Banking

Some of the agencies in the subregion obtain non-project water outside of the West Side subregion by participating in banking/exchange programs, namely, Pioneer Banking, Berrenda Mesa Banking, the Kern Water Bank, and CWD/DRWD Banking. In drier years, their supply is heavily supplemented by banked water retrieved from groundwater storage programs in which they are participating. Section 2.6.4.2 provides a complete list of these programs and describes how they are used to benefit participants in the Region as a whole as well as those participating members from the West Side subregion.

9.3.4.5 Recycled Water

As discussed in detail in Section 2, Section 2.6.5, agriculture, which accounts for the majority of total water use in the Kern Region, does not require water treated to potable water standards and thus the large amount of agriculture in the Region has meant that nearly all wastewater effluent produced by the various treatment facilities in the County can be applied to salt tolerant non-food crop irrigation and environmental habitat restoration. In the West Side subregion, growers within the LHWD and BWSD use major irrigation systems with on-farm tail water return systems to capture filter back-flush or collect tail water for reuse on the same field or for use on adjacent fields.

9.3.5 Water Quality

Imported water supplies within the West Side subregion regard SWP water, are generally of good quality, and are discussed in detail in Section 2, Section 2.7.1.1.

As stated above, groundwater quality in this subregion is poor. When supplemental groundwater is needed to meet demands of the subregion, many districts participate in purchases and transfers from other water contractors outside of their boundary.

Elevated concentrations of arsenic beyond the MCL of 10 ppm can be found in some of the wells in the eastern portion of the subregion. The water from these wells is treated prior to distribution.

9.3.6 Water Demand

Demands within the West Side subregion were analyzed by comparing the estimated 2005 total water demands and the 2030 total water demands, as shown in Table 9-1. These demands were further analyzed by comparison of three categories of water demand: M&I, agricultural, and groundwater recharge. M&I demands are urban water demands that include residential (single family and multifamily), commercial/industrial/institutional, large landscape, and other water use types (including water losses) as provided by the various water retail water suppliers participating in this IRWMP. Generally, historic and projected urban water demands were taken from UWMPs developed by the agencies, from DHS (now DPH) annual reports and/or as reported by KCWA. Agricultural water demand is defined as the total annual water demand for all agricultural accounts. Groundwater recharge is defined as the total amount of water recharged (direct or in-lieu) or banked within a supplier's respective service area.

Estimated 2005 total water demand within the West Side subregion was approximately 423,080 AF, while the estimated 2030 demand is projected to be 423,318 AF. Residential and commercial water demands within the subregion were minimal in 2005, and these demands will likely remain minimal through 2030. Industrial demands are projected to increase approximately 70 percent by 2030. Agricultural water demand in 2005 was approximately 422,657 AF, approximately 99 percent of the total demand within the subregion, and could remain fairly constant through 2030 or decrease slightly as agricultural properties are converted to urban uses. The West Side subregion's M&I and agricultural demand combined is approximately 15 percent of the total 2005 urban and AG for the Kern Region.

TABLE 9-1
SUMMARY OF ESTIMATED CURRENT AND FUTURE WATER DEMAND BY WATER USE CATEGORY FOR THE WEST SIDE SUBREGION

	2005			2030		
Purveyor	**M&I**	**AG[(b)]**	**TOTAL**	**M&I**	**AG[(b)]**	**TOTAL**
Belridge WSD	--	130,275	130,275	--	130,275	130,275
Berrenda Mesa WD	--	99,550	99,550	--	99,550	99,550
Dudley Ridge Water District	--	63,272[(c)]	63,272	--	63,272[(c)]	63,272
Lost Hills UD	423[(a)]	--	423	661[(a)]	--	661
Lost Hills WD	--	129,560	129,560	--	129,560	129,560
West Side Mutual Water Company	--	--	0	--	--	0
Total	**423**	**422,657**	**423,080**	**661**	**422,657**	**423,318**

Notes:
(a) Year 2005 from unpublished KCWA data. Water demands 2005 to 2030 assumed to grow 1.8 percent per year based on Kern Council of Governments Draft Regional Forecast Report.
(b) Unpublished KCWA data. 2005 agricultural demand data based on 2007 summary by Crop Group. 2030 agriculture demand data based on equivalent production as 2005 data.
(c) D. Melville, personal communication, Dudley Ridge Water District, October 2009.

9.3.7 Water-Related Infrastructure

The California Aqueduct diagonally bisects the subregion.

Water related infrastructure such as surface water impoundments, water collection systems, distribution systems, wastewater systems, and recharge systems, are described generally for the West Side subregion participants in their general descriptions above, and in greater detail for the entire Kern Region in Section 2, Section 2.9.

In general, many Kern Region communities are older and the physical components of their water systems are aging and outdated. Aging infrastructure is a particular issue for rural communities and DACs. In recent years rapid urban development in some areas has provided new infrastructure, but this new infrastructure is limited to those areas receiving new development. Communities are planning upgrades to their water treatment infrastructure. Part of the impetus for joining and participating in the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs.

9.4 Subregional Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Westside subregion with respect to water resource management within the Kern Region include the following. These issue areas are discussed in greater detail in Section 2, in the following sections:

- Decreased Imported Water Supply (see Section 2.10.4)
- Groundwater Overdraft (where there is groundwater) (see Section 2.10.6)

Section 10: Plan Objectives

This section presents the objectives for the Kern IRWMP. In this context, objectives refer to the general intent for planning within the Kern Region and they identify what the RWMG, Executive Committee, and Stakeholders have determined they would like this IRWMP to accomplish. The following pages describe how the objectives were developed utilizing the Stakeholder process, and presents the objectives in issue-based categories. To the extent feasible, objectives have been quantified in order to provide a means by which the future success of the Kern IRWMP's implementation can be measured.

10.1 Objectives Development

Development of objectives for the Kern IRWMP was an iterative and consensus based process. While technically their development took 3 stakeholder meetings to end up with those that are presented here, many meetings and discussions of the subregions, within and among each other, occurred to further the development of the objectives. Because the Kern Region is such a large and geographically diverse region, ranging from valley and desert landscapes to mountains and foothills, and from rural to urban, the bond that ties the region together is water, and its use. However, objectives that might be well suited for the Kern Fan subregion, such as "increased groundwater recharge" may not be as important of an objective to the Mountains/Foothills subregion. Thus after the topic and concept of "objectives" was introduced to the group, and various goals and objectives from neighboring IRWMPs were presented and reviewed, and the Stakeholders held a brainstorming session on issues, goals, and objectives that would be appropriate for the entire Kern Region.

Once a final draft list of objectives was prepared and presented to the stakeholders at a subsequent Stakeholder meeting, they were sent to the Executive Committee for final refinement. The objectives were then evaluated against the California Water Plan Strategies, the IRWM Plan Preferences, and the California Statewide Preferences in order to identify any gaps or deficiencies in resource areas that the objectives may not be covering, but which they were intended to. The Executive Committee was tasked with preparing the draft of quantified objectives for Stakeholder review, and they were refined during subsequent meetings.

The resulting objectives generally apply to the Kern Region as a whole and are meant to focus attention on the primary needs of the Kern Region. The Stakeholders agreed that increasing water supply would be a priority objective for the region, and that other objectives would have lower priority. The objectives are shown in Table 10-1 as agreed upon by the Stakeholders. In addition, the objectives address adapting to the effects of climate change, including changes in the amount, intensity, timing, quality and variability of runoff and recharge, as discussed in Section 2.10.11.

10.2 Regional Objectives

Objectives for the Kern Region are categorized into five resource categories: increase water supply, improve operational efficiency, improve water quality, promote land use planning and resource stewardship, and improve regional flood management. Table 10-1 presents the objectives for the Kern Region, and where possible, the proposed means for measuring progress toward achieving each objective, depicted as ‘planning targets’ is presented.

TABLE 10-1
KERN IRWMP OBJECTIVES

Objectives	Planning Targets
Increase Water Supply (WS)	
Through cooperation and collaboration with other regions restore water supplies to levels that will mitigate for water lost from the region and eliminate overdraft	400,000 – 1 million acre-feet (MAF)
Pursue and implement cost effective water use efficiency programs	Conserve 30,000 acre-feet per year (AFY) by 2030
Increase water storage capacity in the region by increasing recharge acreage and expanding groundwater banking programs before all prime recharge land has been developed	8,000 recharge acres as soon a practicable
Integrate management of water banking facilities to maximize conjunctive use over the planning horizon	
Increase/augment water supplies to meet region demands (e.g., M&I, agricultural, environmental) by 2050.	
Improve Operational Efficiency (OE)	
Increase transfers and exchanges flexibility over the planning horizon	
Create tools to re-regulate water supplies within the region, including storage, storm flows, and operational flows over the planning horizon	
Increase distribution efficiencies and reduce energy usage over the planning horizon	
Increase the use of alternate energy sources (e.g. solar)	33% of energy provided by alternative sources to the region by 2020
Replace aging infrastructure to reduce system water losses, improve operational efficiencies, and reduce service interruptions	Less than 10% losses in urban systems; replace 10% of all systems
Increase the use of recycled water for direct reuse within the Kern Region	20% of produced wastewater annually
Optimize local management of water resources to improve water supply reliability over the planning horizon	
Increase pool of qualified candidates to operate water and wastewater systems	20% increase in employees trained by 2020; reduction in water/wastewater job vacancies
Improve Water Quality (WQ)	
Monitor and/or manage headwaters/areas of origin, natural streams, and recharge areas to prevent or mitigate contamination	$10 million for planning and projects by 2020
Identify and preserve prime recharge areas in the Kern fan area and other areas	8,000 acres as soon as practicable
Improve water quality for DACs and the watershed over the planning horizon	
Continue to provide drinking water that meets or exceeds water quality standards; and support efforts to attain appropriate standards throughout the planning horizon	

Objectives	Planning Targets
Maximize the use of lesser quality water for appropriate uses (landscaping, certain ag crops, "aesthetic" projects) throughout the planning horizon	
Coordinate and enhance aquatic pest control efforts from this point forward	
Promote Land Use Planning and Resource Stewardship (LU)	
Promote stewardship of the local rivers and streams by applying appropriate measures in various reaches of the river from this point forward	
Encourage the removal of non-native invasive plant species that affect water quality, reliability, and operations	No more than 5% of plant matter in waterways will be non-native beginning in 2010
Identify and promote the regeneration and restoration of native riparian habitat	460 acres of restored/regenerated riparian habitat
Coordinate agricultural and urban water suppliers to more effectively address land use planning issues from this point forward	
Improve the linkage between land use planning and water supply in the region throughout the planning horizon	
Increase educational opportunities to improve public awareness of water supply, conservation, and water quality issues throughout the planning horizon	
Improve and coordinate integrated land use planning to support stewardship of environmental resources, such as local rivers and streams and the Kern Fan, and integrate with habitat conservation plans and other ongoing planning efforts from this point forward	
Preserve and improve ecosystem/watershed health throughout the planning horizon	
Improve Regional Flood Management (FM)	
Improve regional flood management by addressing preparedness, response, and post flood actions throughout the planning horizon	
Reduce the effects of poor quality runoff throughout the planning horizon	
Identify and promote innovative flood management projects to protect vulnerable areas	Reduce flood flows by an average of 2% per year through 2020
Plan new developments to minimize flood impacts from this point forward	

The following paragraphs provide additional detail about the regional objectives developed by the Stakeholders and the various means of measuring whether or not the objectives are being achieved.

10.2.1 Increase Water Supply

A reliable water supply is necessary to protect the economic vigor of the Region. Water supplies that are utilized in the Region; the SWP, CVP, and local surface supplies from Kern

River and other local streams, as well as the largest common groundwater basin, the San Joaquin Valley groundwater basin, all are impacted by reliability issues.

Since 1994, the two large projects that import water into the Kern Region, the CVP and the SWP, have been incrementally impacted by environmental and regulatory requirements that have served to diminish the ability of the projects to reliably deliver water supplies. Even more recently, in June 2009, additional restrictions on the water projects were announced, further reducing the amount of water available. These cutbacks have occurred in agricultural communities in the Kern Region and have caused severe economic impacts to the Region and to its DACs in particular.

Groundwater has long been a variable resource as it has been pumped in the region since the 1800s when the area was settled. Today groundwater provides approximately 45 percent of local water needs; however the resource is overdraft in many parts of the Region and thus is dependent on imported water to enhance reliability.

As water shortages and increasing demands upon infrastructure occur throughout the Kern Region, water conservation planning, technologies and practices are evolving today at an unprecedented rate. Legislation has been enacted to reduce various sectors' dependence on potable water. During IRWMP development, a high number of water conservation-related bills were pending in the State legislature during the 2009 session, most notably AB1420 which would require the implementation of all BMPs in the UWMP in order to be eligible for grant funding.

Thus the Stakeholders have identified the following measurable objectives related to "Increasing Water Supply" within the Kern Region:

- *Through cooperation and collaboration with other regions restore water supplies to levels that will mitigate for water lost from the region and eliminate overdraft (400,000 – 1MAF)*

Stakeholders estimate that between 400,000 AF to 1 MAF have been lost to the Kern Region as a result of environmental regulations (i.e., reductions in SWP to the region), drought conditions, out of basin transfers, etc. Implementation of projects that would contribute to this target would help to meet the overall water supply needs for the Region.

- *Pursue and implement cost effective water use efficiency programs (conserve 30,000 AFY by 2030)*

In February 2008, Governor Schwarzenegger called for a 20 percent reduction in per capita water use statewide by 2020. The State Water Resources Control Board has released a draft statewide implementation plan for achieving this goal (Draft 20x2020 Water Conservation Plan, April 2009) which establishes regional baseline and target per capita water use values by State hydrologic region. The 2020 targeted daily per capita water use value established for the Tulare Lake hydrologic region is 188 gallons per day per capita (gpcd).

The Kern Stakeholder have set a target conservation goal of 10% conservation savings from agriculture and 20 percent conservation savings from urban uses, the latter of which can be used to help meet the 20x2020 goal, where conservation measures have not already been implemented, for a total of approximately 30,000 AF by 2030.

- *Increase water storage capacity in the region by increasing recharge acreage and expanding groundwater banking programs before all prime recharge land has been developed (8,000 recharge acres as soon as practicable)*

Prime recharge land is important because of its watershed functions; filtration of surface water and stormwater detention. Within the Kern Region, these land use types have been decreasing as the urban landscape expands. According to Kern County planning staff, an estimated 8,000 acres of prime recharge land are not currently contained within existing specific plans or other planning documents. Therefore, the goal is to keep these acres undeveloped and retain their watershed function.

- *Integrate management of water banking facilities to maximize conjunctive use over the planning horizon*

Groundwater banking programs are widely used in the Kern Region; conjunctive use programs have been utilized in the region since the early 1900s. Many notable storage programs exist in the region, including those operated by AEWSD, SWSD, NKWSD, the City of Bakersfield, RRBWSD, and various other districts in the Region. Joint operation of some of these banking operations, if applicable, is desirable for efficient water management. However, duplicative infrastructure is also found in some rural parts of the Region, where numerous small systems have been established that are wholly separate from nearby systems. In these cases no economies of scale have been realized for water distribution nor joint treatment systems constructed, either which can be due to physical (geographic or topographic) separation or perceived local political differences.

Part of the impetus for the Kern IRWMP is to identify infrastructure issues and potential collaborative projects to address infrastructure needs.

- *Increase/augment water supplies to meet region demands (e.g., municipal and industrial, agricultural, environmental) by 2050.*

The Kern Region is highly dependent on imported water, as discussed above and in Section 2, Sections 2.6 and 2.10.4. Given this dependence, all elements of its reliability should be considered. Fluctuations in delivery due to climatic changes have to be incorporated in supply and demand analyses in UWMPs. The planning horizon for these assessments, according to the new requirements for the 2010 UWMPs, is out to 2050. Therefore, this objective has a measurable planning target out to 2050 to be consistent with the UWMPs.

10.2.2 Improve Operational Efficiency

Improved operational efficiency would result in decreasing the amount of energy, labor, and other materials (e.g., water treatment chemical supplies) needed to move water from its source to the customer. For example, through proper sizing and placement of storage tanks it may be possible to fill and drain tanks during off-peak hours for electricity or use gravity-feed to fill tanks. Another example of operational efficiency is using the river channel itself as a groundwater recharge area, rather than purchasing land to create and operate recharge facilities or injection wells. An example of operational inefficiency is using resources to treat water to the drinking water standard if in fact that water is going to be used for non-potable uses (for example, landscape irrigation and industrial processes). In this example, there could be greater operational efficiency if the recycled water distribution system were expanded to serve the non-potable uses currently receiving treated water.

Related to operational efficiency, the Stakeholders have identified the following objectives:

- *Increase transfers and exchanges flexibility over the planning horizon, including possibly consolidating the SWP and CVP place of use*

- *Create tools to re-regulate water supplies within the region, including storage, storm flows, and operational flows over the planning horizon*

- *Increase distribution efficiencies and reduce energy usage over the planning horizon*

- *Increase the use of alternate energy sources (e.g. solar) (33% of energy provided by alternative sources to the region by 2020)*

This measurable objective is based on Governor Arnold Schwarzenegger's EO directing CARB to adopt regulations increasing California's Renewable Portfolio Standard (RPS) to 33 percent by 2020, which was first established by the Governor's directive in 2008. The Governor's EO upholds California's leadership in environmental policies and builds on AB 32 goals by ensuring California will have the flexibility needed to use renewable energy sources for 33 percent of our state's energy consumption by 2020. In addition, this objective addresses the region's need to mitigate climate change effects through the reduction of GHG emissions.

- *Replace aging infrastructure to reduce system water losses, improve operational efficiencies, and reduce service interruptions (less than 10% losses in urban systems; replace 10% of all systems)*

This target stems from the regulatory requirement that calls for a 10% loss in urban systems and expanding that requirement system wide to produce a larger benefit.

- *Increase the use of recycled water for direct reuse within the Kern Region (20% of produced wastewater annually)*

This target was meant to focus recycled water on direct reuse, as all wastewater is put to beneficial use through recharge. Direct reuse is considered to be application to crops and landscape irrigation. A target application of 20% of produced wastewater annually was chosen as it could be measured and incrementally increased throughout the planning horizon.

- *Optimize local management of water resources to improve water supply reliability over the planning horizon*

- *Increase pool of qualified candidates to operate water and wastewater systems (20% increase in employees trained by 2020; reduction in water/wastewater job vacancies)*

This target is an estimate from the County's Waste Management staff based on existing vacancies and growth projections/demands for the County. It translates into roughly 40 operators trained and certified by 2020.

- Establish a consolidated place of use for the CVP and SWP

Currently, the CVP and SWP places of use are inconsistent with one another in the Kern Region. This limits the operational flexibility of local water purveyors and the extensive groundwater banking projects throughout the Kern Region. Operational flexibility is a crucial component of water management in the Kern Region, where supplies are variable due to hydrology and regulatory impacts to the CVP and SWP. Establishing a consolidated place of use would improve operational efficiency by enhancing opportunities for operational exchanges and groundwater banking.

10.2.3 Improve Water Quality

Water quality is an important consideration not only for water delivered to the customer, but for ecosystems. The Kern River, the primary native surface supply in Region, is generally considered a high quality supply. As discussed in detail in Section 2.7, groundwater quality throughout the region is typically suitable for most urban and agricultural uses with only localized impairments including high TDS (salts), sodium chloride, sulfate, nitrate, organic compounds, and arsenic. High TDS, and nitrates are the primary groundwater quality issues. The CVRWQCB has stated, "The greatest long-term problem facing the entire Tulare Lake Basin is the increase of salinity in ground water" (2004). Salt in imported water supplies such as the SWP and CVP is the major source of salt which circulates throughout the groundwater in Kern County.

Therefore, related to water quality, the Stakeholders have identified the following measurable objectives:

- *Monitor and/or manage headwaters/areas of origin, natural streams, and recharge areas to prevent or mitigate contamination ($10M for planning and projects by 2020)*

In order to project the quality of the underlying aquifer, it is also important to protect the surface waters entering the headwaters/areas of origin, natural streams, and recharge areas. Natural streams and surface waters feed the Kern River as well as recharge areas in the Kern Region. Thus, any degradation in water quality in the streams could result in the loss of this surface water supply as well as degradation in the recharge areas.

There has not been any comprehensive assessment of the headwaters, natural stream, and recharge areas with regard to contamination prevention in order to identify what is needed for future protection. The Executive Committee identified an initial estimate of $10M for planning/studies to determine what projects are needed and are feasible to implement, as well as for the actual implementation of initial projects (test or actual).

- *Identify and preserve prime recharge areas in the Kern Fan area and other areas (8,000 acres as soon as practicable)*

Identifying and preserving prime recharge areas and taking appropriate measures to reduce or eliminate the potential for contamination is crucial to ensuring a reliable water supply. Where the potential for contamination can occur, or where contamination has already occurred, programs and projects must be implemented to prevent its migration to other areas of the Region. In some cases, treatment or remediation may be required to prevent migration.

According to Kern County planning staff, an estimated 8,000 acres of prime recharge land are not currently contained within existing specific plans or other planning documents. Therefore, the goal is to keep these acres undeveloped and retain their watershed function.

- *Improve water quality for DACs and the watershed over the planning horizon*

- *Continue to provide drinking water that meets or exceeds water quality standards; and support efforts to attain appropriate standards throughout the planning horizon*

As discussed in Section 2.7, water quality is generally good Region-wide; the main concerns being high TDS, arsenic, and nitrates in groundwater. In general, the water quality over time has remained relatively unchanged across the entire Region and generally meets MCLs. The exceptions to the good groundwater quality are high nitrates associated with fertilizer use and high arsenic levels due to recent changes (lowering) of the MCL.

However, in addition to meeting the Federal and State standards for water quality, other secondary standards (such as taste, color, and odor) may also affect a customer's overall satisfaction with the water. Although these constituents do not result in any health effects to the customer, they do impact the customer's desire to drink and use the water.

- *Maximize the use of lesser quality water for appropriate uses (landscaping, certain ag crops, "aesthetic" projects) throughout the planning horizon*

As discussed in Section 2.9.5, approximately 59,000 AFY of recycled water, most treated to secondary standards, is available for use on non-edible crops and for landscaping needs. The City of Bakersfield's expansion of its treatment plant will make approximately an additional 18,000 AFY of recycled water available. Most of this water will be treated to secondary standards, appropriate for irrigation of non-food crops as well as groundwater recharge, however the treatment plant expansion will also make it possible to treat approximately 2,250 AFY to tertiary standards and this recycled water will be appropriate for use on food crops as well as industrial water uses (Bakersfield 2006). With further treatment upgrades, it will be possible to put more recycled water to more extensive uses.

- *Coordinate and enhance aquatic pest control efforts from this point forward*

Aquatic pests, including invasive plants (e.g., Tamaracks and animal species, have been fought on the Kern River for decades. Prevention and control of invasive species is an ongoing battle by many resource agencies such as the Kern River Preserve Audubon Society, and the Kern River Ranger District. Coordination of their control efforts would help to maximize efficiencies and enhance results.

10.2.4 Promote Land Use Planning and Practice Resource Stewardship

Water is intended for many beneficial uses including agricultural water supplies, groundwater recharge, water replenishment, recreation, wildlife habitat, rare and endangered species, and wetland ecosystems.

To this end, Stakeholders have investigated multiple objectives related to resource stewardship, including removal of invasive species, acquisition of floodplain areas for recreation and flood easements, and acquisition of habitat.

Stakeholders have identified the following measurable objectives related to resource stewardship:

- *Promote stewardship of the local rivers and streams by applying appropriate measures in various reaches of the river from this point forward*

This objective acknowledges the benefits of the Kern River that are worthy of protection; environmental, biological, economical, cultural, hydrological, agricultural, etc. By acknowledging that the Kern River is a resource to be protected, these beneficial uses can be contributed to by the projects implemented in this IRWMP.

- *Encourage the removal of non-native invasive plant species that affect water quality, reliability, and operations (no more than 5% of plant matter in waterways will be non-native beginning in 2010)*

This objective is to remove non-native plant species and promote revegetation by native plant species in the Kern River. The measurement is intended to prevent establishment of new species of invasive plants within the watershed, as it is the most cost effective way to control these plants and prevent further habitat degradation, and impacts to operations. This measurable objective takes into consideration current quantities and types of invasive species as well as what can realistically be reduced/removed from the watershed.

- *Identify and promote the regeneration and restoration of native riparian habitat (460 acres of restored/regenerated riparian habitat)*

- *Coordinate agricultural and urban water suppliers to more effectively address land use planning issues from this point forward*

As discussed in Section 2, there is an estimated 833,452 acres of irrigated crop land in the Kern Region. Agriculture is an important industry for the Kern Region. In addition to direct production of food and fiber, secondary employment is created by the agricultural production, including transportation and food manufacturing. As mentioned above, in Kern County it is estimated that one out of every four jobs is tied to the agricultural industry (Kern County Agricultural Commissioner 2007). In addition, agriculture plays an important role in community identity. The types of crops grown in an area may be unique to that place. Community festivals are often planned around the commodities unique to a place, or for which a community is known. The physical landscape of a place can be defined by its agriculture as the crops create a distinct color mosaic and pattern. Residents also can take advantage of the open space and views allowed by nearby agriculture. In addition, some agricultural crops may provide wildlife habitat (nesting, temporary foraging).

The demand for urban development is resulting in a conversion of agricultural land, and is introducing conflicts between agricultural and residential development. As a result, agricultural land is increasingly found only on the urban fringes. There is a desire to preserve agriculture as an industry and as a cultural asset. Kern County, Kings County and Los Angeles County have adopted policies intended to preserve agricultural resources. These policies include right-to-farm ordinances, reduced property tax programs for farm businesses, and policies discouraging provision of urban services in agricultural areas. To encourage the retention and expansion of agricultural use both within and outside a potential agricultural preserve, the policies promote compatible land use arrangements and offer technical assistance in support of farming interests. In addition, expansion of agricultural into underutilized lands, such as utility rights-of-way and flood prone areas is encouraged.

- *Improve the linkage between land use planning and water supply in the region throughout the planning horizon*

Coordination between land use planning agencies and water management agencies is crucial to implementation of a successful IRWMP. A regional land use management plan to guide the Kern Region's development would be a key step towards improving coordination and identifying future water needs throughout the Region. Growth management, the protection of various land uses and the efficient use of natural resources such as land, water and energy are three of the principal goals of regional land use planning. A regional land use management plan that directs the Kern Region's growth towards existing centers will not only encourage natural resource efficiency and the preservation of surrounding agricultural land uses and recreational open space, but it will also improve the efficient use of economic resources dedicated towards utilities infrastructure improvements and expansions.

- *Increase educational opportunities to improve public awareness of water supply, conservation, and water quality issues throughout the planning horizon*

The Kern IRWMP provides a positive model for the general public to reference as water districts and municipalities move forward in asking Stakeholders to become more efficient in their water usage. Increasing educational opportunities for local residents on the basics and importance of using appropriate amounts of water for irrigation, of awareness of water supply, conservation, and water quality will be important if the end result must be a significant reduction in overall water demand.

- *Improve and coordinate integrated land use planning to support stewardship of environmental resources, such as local rivers and streams and the Kern Fan, and integrate with habitat conservation plans and other ongoing planning efforts from this point forward*

- *Preserve and improve ecosystem/watershed health throughout the planning horizon*

The Kern Region is subject to increasing demand for community development, recreation, and resource utilization. Population in the Kern Region is expected to increase by about 35% between 2010 and year 2030. Some of this growth will result in the conversion of agricultural land, while some of this growth will occur in areas that are currently natural and undeveloped areas. Loss of both agricultural acreage and natural areas decreases the amount of open space in the Region. Open space can mean natural open space, passive and active recreation which may or may not be compatible with natural habitats or natural open space preservation.

As an example, open space can mean soccer fields and playgrounds and should not be considered as natural habitat. This growth and the associated loss of open space could adversely affect local water resources through the loss of wetland areas and the watershed functions these areas provide (filtration of surface water, stormwater detention).

Also of concern is the negative effect of urban growth on the unique biological resources of the Region. Besides a direct loss of habitat, increasing proximity to urban development is harmful to the sensitive desert species, several of which are found only in the Kern Region. Thus the RWMG found it important to make preserving and improving the ecosystem/watershed health throughout the planning horizon (2050) an objective of the Kern IRWMP.

10.2.5 Improve Flood Management

As described in Section 2.10.5, the key issues for the Kern Region with respect to flood management are; lack of coordination throughout the Region, poor water quality of runoff, nuisance water and dry weather runoff, and difficulty providing flood control without interfering with groundwater recharge.

Floods also cause economic losses through closure of businesses and government facilities, disruption of communications and the provision of utilities such as water and sewer, result in excessive expenditures for emergency response, and generally disturb the normal functions of a community. Flood management strategies recommended in this document will serve as guidelines to address concerns and prevent some of the flood related damage.

Therefore, related to flood management, the Stakeholders have identified the following objectives:

- *Improve regional flood management by addressing preparedness, response, and post flood actions throughout the planning horizon*
- *Reduce the effects of poor quality runoff throughout the planning horizon*
- *Identify and promote innovative flood management projects to protect vulnerable areas (reduce flood flows by an average of 2% per year through 2020)*
- *Plan new developments to minimize flood impacts from this point forward*

This planning target, held by the County of Kern, assumes the ability to continue to reduce flood flows by an average of 2% per year (based on the previous year's flood flows) through 2020. The target applies to currently uncontrolled, uncaptured or otherwise unmanaged flood flows. In

2020 the target will be evaluated to see whether the objective has been achieved or if it should be continued, or modified.

Additionally, County of Kern, along with many of the Kern IRWMP participants, various regional public service providers, and landuse planners have worked collaboratively to develop the Kern County Multi-Hazard Mitigation Plan (HMP). The HMP includes specific discussions of flood management throughout Kern County, as well as the identification of potential projects. The HMP was originally developed in 2005, and is currently being updated.

10.3 Objectives Related to Climate Change

The objectives for the Kern Region address adapting and mitigating the general effects of climate change, including changes in the amount, intensity, timing, quality, and variability of runoff and recharge. These “no regrets” adaptations recognize the current water management context for the region. In addition, mitigation strategies addressed by the objectives for the Kern IRWMP include energy efficiency improvements, emissions reductions, and carbon sequestration through vegetation growth. The Climate Change Handbook (CDM, 2011) was used to help develop these adaptation and mitigation strategies, which are listed in Table 10-2.

TABLE 10-2
KERN IRWMP OBJECTIVES AND CLIMATE CHANGE ADAPTATIONS

Objectives	Related CA Water Plan Resource Management Strategy	Climate Change Adaptation	Climate Change Mitigation
Increase Water Supply			
Through cooperation and collaboration with other regions restore water supplies to levels that will mitigate for water lost from the region and eliminate overdraft		Water Supply Reliability Additional Water Supply	
Pursue and implement cost effective water use efficiency programs	Urban/Agricultural Water Use Efficiency	Water Demand Reduction Water Quality Protection	Energy Efficiency Emissions Reduction
Increase water storage capacity in the region by increasing recharge acreage and expanding groundwater banking programs before all prime recharge land has been developed	Conjunctive Management & Groundwater	Flood Control Water Supply Reliability Additional Water Supply Water Quality Protection	
Integrate management of water banking facilities to maximize conjunctive use over the planning horizon	Conjunctive Management & Groundwater	Water Supply Reliability Additional Water Supply	
Increase/augment water supplies to meet region demands (e.g., M&I, agricultural, environmental) by 2050.			
Improve Operational Efficiency			
Increase transfers and exchanges flexibility over the planning horizon	Water Transfers	Water Supply Reliability Additional Water Supply Sea Level Rise	
Create tools to re-regulate water supplies within the region, including storage, storm flows, and operational flows over the planning horizon	System Reoperation	Flood Control Water Supply Reliability	
Increase distribution efficiencies and reduce energy usage over the planning horizon	System Reoperation	Water Supply Reliability	Energy Efficiency Emissions Reduction

Objectives	Related CA Water Plan Resource Management Strategy	Climate Change Adaptation	Climate Change Mitigation
Increase the use of alternate energy sources (e.g., solar)			Emissions Reduction
Replace aging infrastructure to reduce system water losses, improve operational efficiencies, and reduce service interruptions			Energy Efficiency
Increase the use of recycled water for direct reuse within the Kern Region	Recycled Municipal Water	Water Supply Reliability Additional Water Supply	Energy Efficiency Emissions Reduction
Optimize local management of water resources to improve water supply reliability over the planning horizon		Water Supply Reliability Sea Level Rise	
Increase pool of qualified candidates to operate water and wastewater systems			
Improve Water Quality			
Monitor and/or manage headwaters/areas of origin, natural streams, and recharge areas to prevent or mitigate contamination	Pollution Prevention Urban Runoff Management	Habitat Protection Water Supply Reliability Water Quality Protection	
Identify and preserve prime recharge areas in the Kern fan area and other areas	Conjunctive Management & Groundwater	Water Quality Protection	
Improve water quality for DACs and the watershed over the planning horizon	Drinking Water Treatment and Distribution		
Continue to provide drinking water that meets or exceeds water quality standards; and support efforts to attain appropriate standards throughout the planning horizon	Drinking Water Treatment and Distribution	Water Quality Protection	
Maximize the use of lesser quality water for appropriate uses (landscaping, certain ag crops, “aesthetic” projects) throughout the planning horizon	Matching Water Quality to Use	Water Supply Reliability Additional Water Supply Water Quality Protection	
Coordinate and enhance aquatic pest control efforts from this point forward	Pollution Prevention Urban Runoff Management	Habitat Protection	

Objectives	Related CA Water Plan Resource Management Strategy	Climate Change Adaptation	Climate Change Mitigation
Promote Land Use Planning and Resource Stewardship			
Promote stewardship of the Kern River by applying appropriate measures in various reaches of the river from this point forward	Ecosystem Restoration Watershed Management	Habitat Protection Flood Control Water Supply Reliability Additional Water Supply Water Quality Protection	
Encourage the removal of non-native invasive plant species that affect water quality, reliability, and operations	Ecosystem Restoration	Habitat Protection Water Supply Reliability Water Quality Protection	Carbon Sequestration
Identify and promote the regeneration and restoration of native riparian habitat	Ecosystem Restoration	Habitat Protection Flood Control	Carbon Sequestration
Coordinate agricultural and urban water suppliers to more effectively address land use planning issues from this point forward	Land Use Planning and Management	Habitat Protection Flood Control Water Quality Protection	Energy Efficiency Emissions Reduction Carbon Sequestration
Improve the linkage between land use planning and water supply in the region throughout the planning horizon	Land Use Planning and Management	Water Supply Reliability	Carbon Sequestration
Increase educational opportunities to improve public awareness of water supply, conservation, and water quality issues throughout the planning horizon		Water Supply Reliability Water Quality Protection	
Improve and coordinate integrated land use planning to support stewardship of environmental resources, such as the Kern River and Kern Fan, and integrate with habitat conservation plans and other ongoing planning efforts from this point forward	Land Use Planning and Management Watershed Management	Habitat Protection	Carbon Sequestration
Preserve and improve ecosystem/watershed health throughout the planning horizon	Watershed Management	Habitat Protection	Carbon Sequestration

Objectives	Related CA Water Plan Resource Management Strategy	Climate Change Adaptation	Climate Change Mitigation
Improve Regional Flood Management			
Improve regional flood management by addressing preparedness, response, and post flood actions throughout the planning horizon	Flood Risk Management	Flood Control	
Reduce the effects of poor quality runoff throughout the planning horizon	Urban Runoff Management	Water Quality Protection	
Identify and promote innovative flood management projects to protect vulnerable areas	Flood Risk Management	Flood Control	Carbon Sequestration
Plan new developments to minimize flood impacts from this point forward	Flood Risk Management	Flood Control	Carbon Sequestration

10.4 Strategies

Following identification of objectives, the Stakeholders then moved to refining strategies appropriate to achieving the objectives. This process and its outcomes are described in Section 11.

Section 11: Water Management Strategies Used to Meet Plan Objectives

This section introduces a diverse menu of water management strategies available to meet the water management objectives within the Region. The State of California has identified 28 different water management strategies that can be used to improve water resource management. Section 10.2 defines and discusses each of the 28 water management strategies of the *California Water Plan*, in order to provide the reader with an understanding of the State's vision for possible ways to meet future water management challenges. This section also serves to provide background in common water management tools available. In this report, we have organized the 28 different management strategies into six areas based on the objectives defined by the Stakeholders (reduce water demand, increase water supply, improve operational efficiency, improve water quality, promote land use planning and resource stewardship, and increase regional flood management).

Section 11.3 demonstrates how the Stakeholders have built upon the water management strategies in the *California Water Plan* and water management strategies already implemented in the area and have tailored these strategies to meet the water management objectives of the Region. Finally, Section 11.4 describes the "Call for Projects" process and gives an overview of projects submitted for inclusion in the IRWMP which will implement these strategies to meet the regional objectives.

11.1 California Water Plan Water Management Strategies

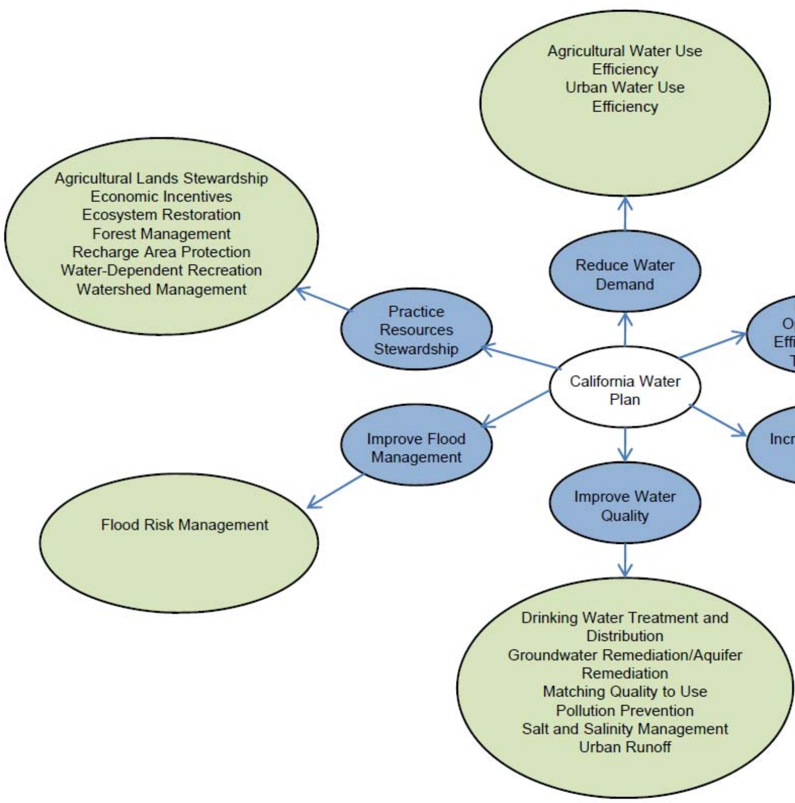
This section describes the *California Water Plan* and each of the 28 water management strategies (referred to in the *California Water Plan* as "resource" management strategies; see Figure 11-1). The *California Water Plan*, which is updated every five years as required by the CWC, is a resource for water planners, managers and policy-makers faced with the task of acting as stewards of this resource. More concisely, it is a strategic plan for all regions of the State that addresses the uncertainty of future water needs by recommending a diversified approach, consisting of multiple strategies and a range of short- and long-term actions. Given the many water challenges the State must actively respond to, the *California Water Plan* deems it imperative that planning take place on a regional scale and that planning constitute an inclusive process involving multiple players, particularly local agencies and governments and their citizens. The most current version of the California Water Plan was released in 2009.

Many of the water management strategies described in the California Water Plan are currently being utilized in the management of water resources in the Kern Region. Strategies already practiced include: drinking water treatment and distribution, groundwater/aquifer remediation, pollution prevention, conveyance, water transfers, conjunctive management/groundwater storage, floodplain management, urban runoff management, recharge areas protection, and agricultural lands stewardship, and land use planning and management.

The following water management strategies are being implemented in the Kern Region, but their application may not be widespread, and opportunities exist to expand and better integrate these strategies: agricultural water use efficiency, urban water use efficiency, economic incentives, ecosystem restoration, water-dependent recreation, watershed management, system re-operation, surface storage (regional/local), matching quality to use, recycled municipal water.

Some strategies are not used within the Kern Region at all such as desalination, precipitation enhancement, and surface storage (CALFED). This is because they are either infeasible, or underfunded. Desalination is generally not used because only relatively small amounts of brackish water exist locally. However, expanded utilization of some of these strategies could be implemented to enhance the implementation success of other currently used strategies.

FIGURE 11-1
CALIFORNIA WATER PLAN WATER MANAGEMENT STRATEGIES



11.2 Water Management Strategy Descriptions

11.2.1 Reduce Water Demand

11.2.1.1 Agricultural Water Use Efficiency

Agricultural water use efficiency involves improvements in technologies and management of agricultural water that result in water supply, water quality, and environmental benefits.

Efficiency improvements can include on-farm irrigation equipment, crop and farm water management, and water supplier distribution systems.

11.2.1.2 Urban Water Use Efficiency

Urban water use efficiency involves technological or behavioral improvements in indoor and outdoor residential, commercial, industrial, and institutional water use that lower demand, lower per capita water use, and result in benefits to water supply, water quality, and the environment.

11.2.2 Improve Operational Efficiency and Transfers

11.2.2.1 Conveyance (Delta and Regional/Local)

Conveyance provides for the movement of water. Specific objectives of natural and managed water conveyance activities include flood management, consumptive and non-consumptive environmental uses, water quality improvement, recreation, operational flexibility, and urban and agricultural water deliveries. Infrastructure includes natural watercourses as well as constructed facilities like canals, pipelines and related structures including pumping plants, diversion structures, distribution systems, and fish screens. Groundwater aquifers are also used to convey water.

11.2.2.2 System Re-operation

System re-operation means changing existing operation and management procedures for such water facilities as dams and canals to meet multiple beneficial uses. System re-operation may improve the efficiency of existing uses, or it may increase the emphasis of one use over another. In some cases, physical modifications to the facilities may be needed to expand the re-operation capability.

11.2.2.3 Water Transfers

A water transfer is defined in the CWC as a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer or exchange of water or water rights. A more general definition is that water transfers are a voluntary change in the way water is usually distributed among water users in response to water scarcity. Transfers can be from one party with extra water in one year to another who is water-short that year.

11.2.3 Increase Water Supply

11.2.3.1 Conjunctive Management and Groundwater Storage

Conjunctive use refers to the coordination of surface water and groundwater resources to maximize the utility of an area's collective water resources. Conjunctive use involves using surplus surface water when available (e.g., storm runoff, surplus surface water flows, or recycled water) to recharge the groundwater basin containing adequate storage capacity. Groundwater banking is a form of conjunctive use wherein surplus surface water or other available waters are injected or recharged for storage in the aquifer, and then extracted at a later time when surface water supplies are limited.

11.2.3.2 Desalination – Brackish/Seawater

Desalination is a water treatment process for the removal of dissolved salts from water for beneficial use. Desalination is used on brackish (high-salinity) water as well as seawater. Due to the fact that groundwater within the Kern Region is not high in TDS, and that the basin is geographically distant from the ocean, desalination as a water management strategy is of low priority in the Region. However, it could become a source of future imported water supply through inter jurisdictional agreements.

11.2.3.3 Precipitation Enhancement

Precipitation enhancement, commonly called "cloud seeding," artificially stimulates clouds, in principle, to produce more rainfall or snowfall than they would naturally. Cloud seeding injects special substances into the clouds that enable snowflakes and raindrops to form more easily.

11.2.3.4 Recycled Municipal Water

Recycled water is defined in the CWC to mean "water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur." Water recycling is a term which encompasses the process of treating wastewater, storing, distributing, and using the recycled water. The uses to which recycled water can be applied (e.g., landscape and agricultural irrigation, cooling, etc.) depend upon the quality of the treated water and the quality required for subsequent uses. Currently recycled water in the Kern Region that is treated to secondary quality levels is for irrigation of salt tolerant crops and for flood management within the KNWR. This IRWM Plan includes a number of current and planned management actions to increase recycled water use in the Kern Region.

11.2.3.5 Surface Storage – CALFED

The CALFED *Record of Decision* (2000) identified five potential surface storage reservoirs that are being investigated by DWR, the USBR, and local water interests. Building one or more of the reservoirs would be part of CALFED's long-term comprehensive plan to restore ecological health and improve water management of the Bay-Delta. The five (5) surface storage investigations are: Shasta Lake Water Resources Investigation, In-Delta Storage Project, Upper San Joaquin River Basin Storage Investigation, North-of-the-Delta Offstream Storage, and Los Vaqueros Reservoir Expansion.

11.2.3.6 Surface Storage – Regional/Local

Surface storage is the use of reservoirs to collect water for later release and use. Surface storage has played an important role in California where the pattern and timing of water use does not always match the natural runoff pattern. Most California water agencies rely on surface storage as a part of their water systems. Surface reservoirs can be formed by building dams across active streams or by building off-stream reservoirs where the majority of the water is diverted into storage from a nearby water source.

11.2.4 Improve Water Quality

11.2.4.1 Drinking Water Treatment and Distribution

Drinking water treatment includes physical, biological, and chemical processes to make water suitable for potable use. Distribution includes the storage, pumping, and pipe systems to protect and deliver the water to customers.

11.2.4.2 Groundwater/Aquifer Remediation

Groundwater remediation involves extracting contaminated groundwater from the aquifer, treating it, and discharging it to a water course or using it for some purpose. It is also possible to inject the treated water back into the aquifer. Contaminated groundwater can result from a multitude of sources, both naturally occurring and anthropogenic. Examples of naturally occurring contaminants include arsenic, high TDS, and high salinity from specific geologic formations or conditions. Groundwater can also be contaminated from anthropogenic sources with organic constituents, inorganic constituents, and radioactive constituents from many point and non-point sources. These anthropogenic sources include industrial sites, mining operations, leaking tanks and pipelines, landfills, impoundments, dairies, agricultural and storm runoff, and septic systems. Current groundwater concerns within the Region are dealt with via blending of supplies.

11.2.4.3 Matching Quality to Use

Matching water quality to water use is a management strategy that recognizes that not all water uses require the same quality water. One common measure of water quality is its suitability for an intended use, and a water quality constituent is often only considered a contaminant when that constituent adversely affects the intended use of the water. High quality water sources can be used for drinking and industrial purposes that benefit from higher quality water, and lesser quality water can be adequate for some uses, such as irrigation. Further, some new water supplies, such as recycled water, can be treated to a wide range of purities that can be matched to different uses.

11.2.4.4 Pollution Prevention

Pollution prevention can improve water quality for all beneficial uses by protecting water at its source, reducing the need and cost for other water management and treatment options. By preventing pollution throughout a watershed, water supplies can be used, and re-used, for a broader number and types of downstream water uses. Improving water quality by protecting source water is consistent with a watershed management approach to water resources problems.

11.2.4.5 Salt and Salinity Management

Salt and salinity management is a new strategy to the California Water Plan, however it has long been a problem needing to be addressed as salts have been perpetually managed and mismanaged where irrigation has been used. The CVRWQCB has stated, “The greatest long-term problem facing the entire Tulare Lake Basin is the increase of salinity in ground water” (2004). Salt in imported water supplies such as the SWP and CVP is the major source of salt which circulates throughout the groundwater in Kern County. An estimated 1,206 tons of salt is annually imported to the region and because the Tulare Lake Hydraulic Region does not have any natural outlets, the salt builds up and remains in the underlying aquifers. High salt concentrations (e.g., greater than the primary drinking water standard) are a particular problem in the western portion of the Region. DWR and other federal, state and local agencies continue to study alternative approaches for salt management.

11.2.4.6 Urban Runoff Management

Urban runoff management is a broad series of activities to manage both storm water and dry weather runoff. Dry weather runoff occurs when, for example, excess landscape irrigation water flows to the storm drain. Urban runoff management is linked to several other resource strategies including pollution prevention, land use management, watershed management, water use efficiency, recycled water, protecting recharge areas, and conjunctive management (combined use of surface and ground water systems to optimize resource use and minimize adverse effects of using a single source).

11.2.5 Practice Resource Stewardship

11.2.5.1 Agricultural Lands Stewardship

Agricultural lands stewardship broadly means conserving natural resources and protecting the environment by land managers whose stewardship practices conserve and improve land for food, fiber, watershed functions, soil, air, energy, plant and animal and other conservation purposes. It also protects open space and the traditional characteristics of rural communities. Further, it helps landowners maintain their farms and ranches rather than being forced to sell their land because of pressure from urban development.

11.2.5.2 Economic Incentives (Loans, Grants, Water Pricing)

Economic incentives are financial assistance and pricing policies intended to influence water management. For example, economic incentives can influence the amount of use, time of use, wastewater volume, and source of supply. Economic incentives include low-interest loans, grants, and water pricing rates. Free services, rebates, and the use of tax revenues to partially fund water services also have a direct effect on the prices paid by the water users. Governmental financial assistance can provide incentives for resource plans by regional and local agencies. Also, government financial assistance can help water agencies make subsidies available to their water users for a specific purpose.

11.2.5.3 Ecosystem Restoration

The California Water Plan defines ecosystem restoration as "improving the condition of modified natural landscapes and biotic communities to provide for the sustainability and for the use and enjoyment of those ecosystems by current and future generations." The benefits of ecosystem restoration in the Kern Region are numerous, and depending on the type of ecosystem restored, they can include: capturing and storing stormwater, groundwater recharge, flood protection, increasing water supply reliability, wildlife habitat creation, restoration and enhancement, water quality enhancement, flood management, and recreation.

11.2.5.4 Forest Management

Forests in California are used for sustainable production of resources such as water, timber, fish, wildlife, and livestock, as well as outdoor recreation, and almost all forest management activities can affect water quantity and quality. Forest management as a strategy focuses on those forest management activities that are designed to improve the availability and quality of water for downstream users, on both publicly and privately owned forest lands.

11.2.5.5 Land Use Planning and Management

Land use planning as a strategy generally refers to actions that can be taken by agencies with land use decision-making authority (i.e., cities, counties) to further the objectives set out in this IRWMP to better manage and protect local water and related environmental resources. Land use strategies can include long-range planning goals, objectives, general plan policies, ordinances, regulations, education and outreach programs, etc. Opportunities exist in the Kern Region for increased land use planning efforts such as the enhancement of natural resource protection and efficiency ordinances. Other mechanisms for increased land use planning efforts can include the cities and county providing incentives for private development that promotes features to improve water quality, enhance groundwater recharge, and reduce water demand.

11.2.5.6 Recharge Areas Protection

Recharge area protection includes keeping groundwater recharge areas from being paved over or otherwise developed and guarding the recharge areas so they do not become contaminated. Protection of recharge areas, whether natural or man-made, is necessary if the quantity and quality of groundwater in the aquifer are to be maintained. Existing and potential recharge areas must be protected so that they remain functional and they are not contaminated with chemical or microbial constituents.

11.2.5.7 Water-Dependent Recreation

Water-dependent recreation includes a wide variety of outdoor activities that can be divided into two (2) categories. The first category includes fishing, boating, swimming, and rafting, which occur on lakes, reservoirs, and rivers. The second category includes recreation that is enhanced by water features but does not require actual use of the water, such as wildlife viewing, picnicking, camping, and hiking.

11.2.5.8 Watershed Management

The California Water Plan defines watershed management as "the process of evaluating, planning, managing, restoring and organizing land and other resource use within an area of land that has a single common drainage point." The Kern Region is a good example of a geographical watershed. Managing the water and environmental resources within the Kern Region, as is being investigated through this IRWMP, is a means of watershed management.

11.2.6 Improve Flood Management

11.2.6.1 Flood Risk Management

Flood management includes minimizing impacts of floods on buildings and farmland, removing obstacles in the floodplain, voluntarily or with compensation, preventing interference with the safe operation of flood management systems, preserving or restoring natural floodplain processes, educating the public about avoiding flood risks and about planning for emergencies, and reducing flooding risks to humans. Opportunities exist in the Kern Region for minimizing flood risk and regional coordination of flood management activities.

11.2.7 Other Strategies

In addition to the 28 main water management strategies that this IRWMP evaluates, the California Water Plan highlights six (6) additional strategies that can potentially generate benefits to meet one or more water management objectives. However, these management strategies are currently limited in their capacity to strategically address long-term regional water planning needs. In some cases, such as Dewvaporation, the strategy involves emerging technologies that will require more research and development. In other cases, such as Crop Idling and Irrigated Land Retirement, they involve voluntary and often temporary tradeoffs from one sector of use to another (i.e., agricultural to urban) that will likely be unpredictable and limited in scope over the time horizon of this California Water Plan Update. Finally, implementation of strategies such as Rainfed Agriculture will have limited applicability in California due to the variability and uncertainty of precipitation patterns within the state from year to year. The California Water Plan provides guidance on these strategies, and stakeholders can go to the DWR website for further information on these topics.

Additional water management strategies:

- Crop idling for water transfers
- Dewvaporation or atmospheric pressure desalination
- Fog collection
- Irrigated land retirement
- Rainfed agriculture
- Waterbag transport/storage technology

11.2.8 Strategies Related to Climate Change

"No-Regrets" adaptation and mitigation strategies to address the general effects of climate change have been identified for the Kern IRWMP in Table 10-2, along with the corresponding IRWMP objectives. These strategies are those that fit into the current water management context for the region and also help in terms of effects of Climate Change. In subsequent grant solicitations, it is expected that DWR will increase the criteria levels for addressing climate change. These standards may include requiring:

- Quantitative tools for vulnerability analysis
- Specific actions identified for adaptation to effects of Climate Change with performance measures
- Disclosure and consideration of quantitative analysis of project GHG emissions

The RWMG shall update the Kern IRWMP to meet the standards after tools to properly assess the risk of climate change effects are available. The RWMG shall also consider the strategies adopted by CARB in its AB 32 Scoping Plan and consider joining the California Climate Action Registry CCAR (http://www.climateregistry.org/). The CCAR is a private non-profit organization that serves as a voluntary GHG registry to protect and promote early actions to reduce GHG emissions by organizations. Participation in these registries allows access to tools and consistent reporting formats which may aid RWMGs in understanding their GHG emissions and ways to reduce them.

In addition, the Kern RWMG shall utilize additional resources to help quantify vulnerability and GHG emissions, including but not limited to:

- Association of Environmental Professionals. 2007. *Alternative Approaches to Analyzing Greenhouse Gas Emissions and Global Climate Change in CEQA Documents*: http://www.counties.org/images/public/Advocacy/ag_natres/AEP_Global_Climate_Change_June_29_Final%5 B1%5 D.pdf
- The CARB *2008 Climate Change Scoping Plan*: http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm
- CARB website: http://www.arb.ca.gov/cc/cc.htm
- The California CAT website: http://climatechange.ca.gov/climate_action_team/index.html
- California Climate Action Registry. (2009). *General Reporting Protocol Version 3.1:* http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf
- State of California Climate Change Portal: http://www.climatechange.ca.gov
- CNRA's *2009 California Climate Adaptation Strategy*: http://www.climatechange.ca.gov/adaptation/index.html

- Center for Biological Diversity. 2007. *The California Environmental Quality Act On the Front Lines of California's Fight Against Global Warming*: http://www.biologicaldiversity.org/publications/papers/CBD-CEQA-white-paper.pdf

- DWR's Integrated Regional Water Management Climate Change Document Clearinghouse: http://www.water.ca.gov/climatechange/docs/IRWM-ClimateChangeClearinghouse.pdf

- DWR's white paper, *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water (2008)*: http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf

- DWR's Climate Change Website: http://www.water.ca.gov/climatechange

- U.S. EPA. 2009. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2007*. *http://epa.gov/climatechange/emissions/downloads09/InventoryUSGhG1990-2007.pdf*

- World Resources Institute and World Business Council For Sustainable Development. N.d. *The Greenhouse Gas Protocol for Project Accounting: http://www.ghgprotocol.org/files/ghg_project_protocol.pdf*

11.3 Adopted Water Management Strategies (by Subregion)

The Kern Region is geographically diverse, and the reason why it was appropriate to identify nine(9) subregions within the overall Kern Region, that could focus on their smaller region's issues, needs, characteristics, goals, and IRWMP efforts. Each of the eight subregions were presented with a matrix that included the 26 Water Management Strategies, and were asked to identify which strategies were applicable and appropriate for their subregion, as well as to identify those top five strategies that were the strongest for their region. A Water Strategy Discussion Guide was also distributed to each subregion to help stimulate discussion of the water management strategies and related projects. The results are summarized in Table 11-1. The subregion matrixes and a copy of the Discussion Guide are provided in Appendix E. Table 11-2 demonstrates the relationship of the Region's proposed projects with the *California Water Plan* strategies. Note that the table, due to its size, has been placed at the end of this section.

TABLE 11-1
WATER MANAGEMENT STRATEGIES BY SUBREGION

County of Kern	KCWA	Greater Bakersfield	Kern Fan	Mountains/ Foothills	North County	South County	West Side
Matrix not submitted	All strategies except for: • Desalination • Precipitation enhancement • Groundwater aquifer remediation	• Agricultural water use efficiency • Urban water use efficiency • Conveyance • Surface storage • Drinking water treatment & distribution • Recharge area protection	All strategies	All strategies except for desalination	• Water transfers • Conjunctive management & groundwater storage • Recycled municipal water • Matching water quality to use • Land use planning & management	Matrix not submitted	All strategies except for: • Precipitation enhancement • Matching water quality to use • Urban runoff management • Forest Management • Water-dependent recreation • Watershed management • Flood risk management

TABLE 11-2
CA WATER MANAGEMENT STRATEGIES VS. KERN IRWMP PROJECTS

	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
PROPOSED PROJECTS FORMAT: **(Project Name / Project Sponsor, If Joint Project; Other Partners)**	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
Nitrate / Perchlorate Contaminant Blending Project - New Source (SSCSD / Fairview Ranch Estates & other users in Cummings Valley)		✓	✓		✓	✓					✓	✓	✓													
Tehachapi Basin Nitrate Study (GHCSD / City of Tehachapi, TCCWD)						✓					✓	✓		✓			✓									
Tehachapi Regional Water Treatment Plant (GHCSD / Tehachapi - Cummings County Water District, City of Tehachapi, Bear Valley CSD, SSCSD)		✓	✓		✓	✓				✓	✓	✓	✓	✓				✓			✓				✓	
Tehachapi Basin Regional Water Treatment Facility (GHCSD / City of Tehachapi)			✓			✓					✓		✓					✓								
GHCSD Recycled Water Project (GHCSD / Wastewater Treatment Facility (private owner))		✓	✓						✓				✓											✓		
GHCSD/TCCWD Well Abandonment Program (GHCSD / TCCWD)														✓							✓				✓	
GHCSD Water Service Line Replacements (GHCSD)		✓	✓								✓															
GHCSD Urban Water Conservation Program (GHCSD / partner to be determined)		✓												✓		✓		✓								
GHCSD Wellhead Treatment Project (GHCSD)											✓		✓													

PROPOSED PROJECTS FORMAT: **(Project Name / Project Sponsor, If Joint Project; Other Partners)**	**Reduce Water Demand**		**Improve Operational Efficiency and Transfers**			**Increase Water Supply**					**Improve Water Quality**						**Practice Resource Stewardship**									**Improve Flood Mngmt**
	Agricultural Water Use Efficiency	**Urban Water Use Efficiency**	**Conveyance - Delta & Regional/Local**	**System Reoperation**	**Water Transfers**	**Conjunctive Management & Groundwater Storage**	**Desalination - Brackish/Seawater**	**Precipitation Enhancement**	**Recycled Municipal Water**	**Surface Storage - CALFED* & Regional/Local***	**Drinking Water Treatment and Distribution**	**Groundwater/Aquifer Remediation**	**Matching Quality to Use**	**Pollution Prevention**	**Salt & Salinity Management**	**Urban Runoff Management**	**Agricultural Lands Stewardship**	**Economic Incentives (loans, grants, water pricing)**	**Ecosystem Restoration**	**Forest Management**	**Land Use Planning & Management****	**Recharge Area Protection**	**Urban Land Use Management**	**Water-dependent Recreation**	**Watershed Management**	**Flood Risk Management**
Tehachapi Basin East Well Field Development Program (GHCSD / City of Tehachapi, TCCWD)	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓				✓				✓			✓	
Public Facility Distribution Line & Nitrate Removal Program (TCCWD / City of Tehachapi, Tehachapi Unified School District, Tehachapi Valley Rec and Parks District			✓								✓	✓	✓	✓										✓		
Tehachapi Regional Water Conservation Program (CUWCC BMP's) (Tehachapi - Cummings County Water District / City of Tehachapi, GHCSD, BVCSD, SSCSD)		✓				✓												✓								
Cummings Valley Salt/Nutrient Management Plan (TCCWD / BVCSD, SSCSD, CCI)	✓					✓			✓			✓	✓	✓	✓		✓							✓		
Cummings Valley Loop Line (TCCWD /BV CSD, SSCSD, CCI)			✓		✓	✓			✓				✓				✓	✓								
California Correctional Institution Reclamation Distribution Line (TCCWD / CCI)	✓		✓						✓			✓	✓	✓			✓							✓		
Brite Valley Recovery Well (TCCWD/ City of Tehachapi, GHCSD)			✓			✓						✓	✓				✓									
Reservoir 4 Solar Project, Olcese W.D. (OWD)														✓				✓								
Rock Meadow Riparian Vegetation Restoration, 32 Acres (OWD)																			✓	✓	✓	✓		✓	✓	✓

	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
PROPOSED PROJECTS FORMAT: **(Project Name / Project Sponsor, If Joint Project; Other Partners)**	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
Improved Quality Water Systems Infrastructure - Public Domain Allotments (Tubatulabals of Kern County)											✓	✓	✓				✓	✓	✓	✓	✓				✓	
Well Replacement No. 3 (Frazier Park Public Utility District)											✓			✓												
8" Main Line Replacement Lebec Road (Lebec County Water District)			✓	✓									✓													
South Fork Union School District Water Improvement Project (SFUSD)		✓	✓							✓	✓	✓	✓	✓				✓								
Invasive Weed Control on South Fork Kern River						✓								✓			✓		✓					✓	✓	✓
Conservation Acquisitions and Easements on South Fork Kern River														✓			✓		✓			✓		✓	✓	✓
Kern River Valley Water Management Plan		✓	✓	✓	✓	✓								✓		✓		✓			✓			✓	✓	✓
Kern County's Southern San Joaquin Valley Flood Mitigation Plan (Kern County)						✓							✓						✓						✓	✓
South Weedpatch Sewer Improvements (Kern County)			✓	✓					✓					✓					✓			✓				
South Taft Sewer Improvements - Full Project (Kern County)			✓	✓					✓					✓					✓			✓			✓	
South Shafter Waste Water System - Phase 1, Smiths Corner (Kern County)			✓	✓					✓					✓					✓			✓				

PROPOSED PROJECTS FORMAT: (Project Name / Project Sponsor, If Joint Project; Other Partners)	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
South Shafter Waste Water System - Full Project (Kern County)			✓	✓					✓					✓					✓			✓				
Sandy Creek Bank and Erosion Protection - Feasibility Study (Kern County)														✓					✓						✓	✓
South Taft Sewer Improvements - Phase 1 & 2 (Kern County)			✓	✓					✓					✓				✓	✓			✓				
Reeder Tract Waste Water Treatment Facility - Replacement of Sewer Aeration Tanks (Kern County)				✓										✓											✓	
Lake Shore Pines - Leach Field Replacement (Kern County)				✓										✓					✓			✓			✓	
Lake Isabella Regional WWTP and Sewer Collection System - Detailed Study (Kern County)			✓						✓					✓							✓					
Lake Isabella Regional WWTP and Sewer Collection System (Kern County)			✓						✓					✓											✓	
Kern Lake Hydrologic Analysis (Kern County)														✓											✓	✓
Reconstruct Adams/Jefferson Street, Ford City (Kern County)				✓										✓												✓
Cuddy Creek Restoration Project - Phase 1 (Kern County)														✓		✓			✓		✓				✓	✓
Caliente Creek Habitat Restoration - Feasibility Study (Kern County)														✓					✓		✓				✓	✓

PROPOSED PROJECTS FORMAT: (Project Name / Project Sponsor, If Joint Project; Other Partners)	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
South Shafter Wastewater Collection Project (Kern County)			✓											✓				✓							✓	
Solar Generating Project (City of Delano)														✓				✓			✓					
Arsenic Remediation Project (City of Delano)			✓	✓							✓	✓	✓					✓								
Alpaugh Pipeline (City of Delano)	✓					✓			✓	✓		✓	✓				✓	✓								
Water Meters (City of Delano)		✓				✓					✓	✓	✓					✓								
McFarland/Delano Trunk Sewer (City of McFarland/City of Delano)			✓	✓					✓					✓												
Delano/Alpaugh Treated Wastewater Outfall (City of McFarland/City of Delano)	✓		✓		✓	✓			✓				✓	✓			✓	✓								
McFarland Wastewater Treatment Plant Upgrade or Replacement (City of McFarland)			✓	✓					✓					✓			✓									
TCP Treatment of Six (6) City Wells (City of Shafter)		✓									✓	✓	✓	✓				✓								
East Shafter Water Storage Tank and Booster Station Facility (City of Shafter)			✓	✓						✓	✓															
Consolidation of City & Bishop Acres Community Water System (City of Shafter)			✓	✓	✓						✓							✓								

	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
PROPOSED PROJECTS FORMAT: **(Project Name / Project Sponsor, If Joint Project; Other Partners)**	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
Well 15 Arsenic Treatment System (City of Shafter)	✓	✓		✓							✓		✓					✓								
Three Million Gallon Water Tank and Well Project (City of Wasco)				✓						✓	✓															
Phase 1 of Storm Drain Reconstruction Project (City of Wasco)			✓													✓									✓	✓
Regional Groundwater Management and Solar Generation Program (Cities of Delano, McFarland, Shafter, and Wasco)	✓	✓	✓		✓	✓						✓	✓	✓				✓	✓			✓			✓	
Browning Road Water Well and Storage Tank (City of McFarland)		✓		✓						✓	✓							✓								
North Shafter Wastewater Collection Project (City of Shafter)			✓											✓				✓							✓	
West Kern Water District/Kern Water Bank Authority Well Interconnection (WKWD /KWBA)		✓	✓			✓					✓							✓								
Wellfield Mainline Installation (WKWD)		✓	✓			✓					✓							✓								
Replacement of WKWD Production Well 7-01 (WKWD)		✓				✓					✓							✓								
Replacement of WKWD Production Well 2-01 (WKWD)		✓				✓					✓							✓								
West Kern Water District Increased Storage Capacity at Pump Stations B and G (WKWD)		✓								✓	✓							✓								

PROPOSED PROJECTS FORMAT: (Project Name / Project Sponsor, If Joint Project; Other Partners)	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
West Kern Solar Project (WKWD)		✓									✓			✓				✓								
South Taft Water System Improvements (WKWD)		✓	✓								✓							✓								
Recharge/Extraction Feasibility Studies (WKWD)		✓			✓					✓	✓							✓			✓	✓				
Kern Water Bank Recharge and Recovery Enhancement Project (KWBA)		✓	✓		✓	✓					✓				✓				✓			✓				
Kern Water Bank Short Term Storage Program (KWBA)		✓	✓		✓	✓				✓	✓											✓				✓
Water Exchange Project (WEP) (Buena Vista Water Storage District)	✓		✓	✓	✓	✓	✓			✓		✓	✓					✓							✓	✓
Outlet Canal Reoperation Project (OCRP) (Buena Vista Water Storage District)	✓		✓	✓	✓	✓					✓	✓	✓					✓							✓	
Groundwater Recharge and Recovery Project (GRRR) (Buena Vista Water Storage District)	✓		✓	✓	✓	✓	✓				✓	✓	✓					✓							✓	
Conservation Easement Water Acquisition and Management Project (CEWAMP) (Buena Vista Water Storage Project)						✓				✓		✓	✓				✓	✓	✓		✓	✓			✓	
Brackish Groundwater Remediation Project (BGRP) (Buena Vista Water Storage District)						✓	✓				✓	✓	✓	✓	✓		✓	✓								
Federal Plant Farming Project (City of Taft)	✓	✓							✓				✓	✓			✓	✓			✓					

	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
PROPOSED PROJECTS FORMAT: **(Project Name / Project Sponsor, If Joint Project; Other Partners)**	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
City Reclaimed Water Project (City of Taft)	✓	✓							✓				✓	✓			✓	✓	✓		✓				✓	
Sandy Creek Retention Basin Project (City of Taft)		✓						✓		✓			✓	✓		✓		✓			✓					✓
Storm Water Filtration and Retention Project (City of Taft)		✓						✓		✓			✓	✓		✓		✓			✓					✓
Maricopa Wastewater Project (City of Maricopa/State: State Water Resources Control Board, CalTrans, Central Valley Regional Water Quality Control Board, State Fish & Game, San Joaquin Valley Air Resources Control Board, Division of Oil & Gas Federal: Bureau of Land Management, US Fish & Wildlife, United States Department of Agriculture/Rural Development, Housing & Urban Development, County: WKWD; Local: Santa Rosa Rancheria Tachi Tribe, Chumash Tribe & Tejon Tribe, Aera Oil, Kern Sunset Oil, Drilling & Production Company, Macpherson Oil Company))		✓	✓	✓	✓				✓	✓		✓		✓		✓			✓		✓	✓		✓	✓	
Goose Lake Slough Improvement Project (RRBWSD)			✓	✓	✓	✓																✓				✓
Groundwater Recovery Project (RRBWSD)			✓	✓	✓	✓							✓					✓				✓		✓		
Recharge Expansion Program (RRBWSD)			✓	✓	✓	✓							✓				✓	✓			✓	✓		✓		✓
Water Acquisition Project (RRBWSD)			✓	✓	✓	✓						✓	✓				✓					✓		✓		✓

PROPOSED PROJECTS FORMAT: (Project Name / Project Sponsor, If Joint Project; Other Partners)	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
North Kern Recycled Water Project (RRBWSD)		✓	✓		✓	✓			✓			✓	✓	✓				✓			✓	✓				
Buttonwillow Service Area System Improvements (BSASI)	✓		✓	✓	✓	✓					✓		✓	✓				✓							✓	
On-Farm Water Use Efficiency Project (OFWUEP)	✓		✓	✓	✓	✓					✓		✓	✓				✓							✓	
Kern Fan Direct Recharge and Recovery (KFDRR)	✓		✓	✓	✓	✓					✓	✓	✓	✓				✓				✓			✓	✓
Forrest Frick Pumping Plan Rehabilitation Project (AEWSD)			✓		✓									✓				✓				✓			✓	✓
Water Quality Improvement Project for Well 16 (LPUD)											✓	✓	✓					✓								
Well 19 Arsenic Reduction Blending Project (LPUD)											✓	✓	✓					✓								
Renovation of Belowground Storage Reservoir (LPUD)		✓		✓		✓					✓							✓								
Mettler Wastewater Project (MCWD)		✓	✓						✓	✓		✓		✓				✓				✓			✓	
Mettler Water Supply Project (MCWD)											✓			✓				✓			✓					

	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
PROPOSED PROJECTS FORMAT: **(Project Name / Project Sponsor, If Joint Project; Other Partners)**	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
AEWSD Intake Canal Check Structures and Kern Delta Intertie Improvements (AEWSDKDWD)	✓		✓	✓	✓	✓								✓				✓								✓
Sycamore Check Structure Improvement (AEWSD / United States Bureau of Reclamation (Possible))	✓		✓	✓	✓	✓								✓				✓								✓
AEWSD Wasteway Basin Improvements (AEWSD)	✓		✓	✓	✓	✓				✓							✓								✓	✓
AEWSD South Canal Balancing Reservoir Project (AEWSD)	✓		✓	✓						✓			✓					✓								✓
Lateral Capacity Improvement Projects (AEWSD)	✓		✓	✓		✓				✓								✓								
AEWSD In-Lieu Banking Program (AEWSD)	✓		✓	✓	✓	✓				✓		✓						✓								
Improved Stormwater Management and Flood Control in AEWSD (AEWSD, Kern County RMA, Lamont CSD, City of Arvin, Mettler CWD, Tejon Ranch (Possible)			✓	✓										✓		✓						✓				✓
Groundwater Storage and Recovery Project in White Wolf Basin (WRMWSD)	✓		✓		✓	✓											✓	✓			✓	✓				
WRMWSD Solar Power Generation Project (WRMWSD)						✓								✓				✓								
Oil field produced water treatment and water quality improvement project (BWSD)	✓	✓			✓	✓	✓				✓	✓	✓	✓	✓			✓				✓				

	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
PROPOSED PROJECTS FORMAT: **(Project Name / Project Sponsor, If Joint Project; Other Partners)**	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
LHWD Water Treatment Project (LHWD)	✓		✓	✓	✓	✓	✓					✓					✓	✓								
LHWD Groundwater Treatment Project (LHWD)	✓		✓	✓	✓	✓	✓					✓					✓	✓								
BMWD Afterbay Reservoir Expansion (BMWD/Other Kern County water agencies, Central Coast Water Authority, Santa Barbara County)	✓		✓	✓	✓					✓							✓	✓								✓
Coastal Branch of the California Aqueduct Expansion Project (BMWD/CA Dept. of Water Resources, Central Coast Water Authority, Santa Barbara County)	✓	✓	✓	✓	✓	✓												✓								
BMWD Forebay Reservoir (BMWD/Other Kern County water agencies, Central Coast Water Authority, Santa Barbara County)	✓		✓	✓	✓					✓							✓	✓								✓
BMWD Groundwater Treatment (BMWD)	✓			✓	✓		✓				✓	✓	✓		✓		✓									
BMWD Peaking Capacity Improvement Project (BMWD/LHWD)	✓		✓	✓	✓													✓								
BMWD Still Reservoir Expansion (BMWD)	✓			✓													✓	✓								✓
Lost Hills Surface Water Treatment Plant (BMWD/LHPUD, SWSD)		✓	✓	✓							✓		✓													
BMWD Tieline Modifications (BMWD)	✓		✓	✓													✓	✓								

PROPOSED PROJECTS FORMAT: (Project Name / Project Sponsor, If Joint Project; Other Partners)	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
Westside Districts' Groundwater Banking Project (BMWD /BWSD, LHWD, WRM WSD & DRWDWD)	✓		✓	✓	✓	✓						✓					✓	✓				✓			✓	✓
Improvement District No. 4 Groundwater Monitoring Wells (ID4)	✓	✓				✓						✓													✓	
Improvement of Recharge Capacity to the Kern River off of the Cross Valley Canal (ID4)	✓	✓	✓																✓					✓		
Cross Valley Canal Extension Lining Project (ID4)	✓	✓	✓		✓	✓																				
Cross Valley Canal Extension to Calloway Canal Intertie (ID4)	✓	✓	✓	✓	✓	✓					✓		✓													
Improvement District No. 4 Conjunctive Use Pipeline (ID4)			✓	✓	✓	✓					✓								✓					✓		
Henry C. Garnett Water Purification Plant Clearwell No. 4 (ID4)										✓	✓							✓								
Installation of Surface Water Quality Monitoring Stations (ID4)						✓					✓		✓	✓											✓	
Beardsley Canal and Henry C. Garnett Water Purification Plant Pipeline Connection (ID4)		✓	✓	✓	✓						✓															
3 Million Gallon Water Blending Tank & Booster Station (City of Bakersfield)		✓	✓	✓		✓				✓	✓	✓	✓	✓				✓								

PROPOSED PROJECTS FORMAT: (Project Name / Project Sponsor, If Joint Project; Other Partners)	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
Mt. Vernon Ave. Compost Facility Recycled Water Supply (City of Bakersfield/Kern County Waste Management Dept.)	✓	✓	✓	✓					✓		✓		✓					✓								
Wastewater Treatment Plant No. 2 City Farm Improvement Project (City of Bakersfield Public Works Wastewater Division)	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓			✓	✓				✓			✓	✓
San Miguel Memorial Tree Grove (Phase 2) (City of Bakersfield Recreation & Parks)	✓		✓														✓				✓					
Wastewater Treatment Plant No. 2 Tertiary Water Facility Installation (City of Bakersfield Public Works Wastewater Division)	✓	✓				✓			✓			✓	✓				✓	✓				✓			✓	
Well Head Arsenic Treatment (City of Bakersfield)		✓	✓	✓							✓	✓						✓								
Kern River Shoreline 48 Acres (City of Bakersfield/Kern River Levee District)																		✓	✓	✓	✓	✓		✓	✓	✓
River Supply Conduit to New South Bakersfield Ultra Filtration Plant			✓	✓							✓		✓					✓								
Weldon Regional Water Supply *(California Department of Public Health/Long Canyon, Mountain Mesa, Bella Vista, Hillview, Lakeview, KOA, Sierra Vista, Tradewinds, South Fork schools, Valley Estates, South Fork Women's Club, and Rainbird water systems, County of Kern, Self-Help Enterprises)*				✓		✓					✓	✓	✓	✓				✓			✓	✓			✓	
Backflow prevention for Agricultural Wells (KCWA)						✓						✓		✓				✓				✓				
Groundwater Banking Project (KCWA)			✓		✓	✓																			✓	✓

	Reduce Water Demand		Improve Operational Efficiency and Transfers			Increase Water Supply					Improve Water Quality						Practice Resource Stewardship									Improve Flood Mngmt
PROPOSED PROJECTS FORMAT: **(Project Name / Project Sponsor, If Joint Project; Other Partners)**	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta & Regional/Local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination - Brackish/Seawater	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED* & Regional/Local*	Drinking Water Treatment and Distribution	Groundwater/Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives (loans, grants, water pricing)	Ecosystem Restoration	Forest Management	Land Use Planning & Management**	Recharge Area Protection	Urban Land Use Management	Water-dependent Recreation	Watershed Management	Flood Risk Management
In-pipe hydropower utilizing Northwest Powerpipe (Kern County Water Agency)				✓										✓				✓								
Kern Fan Monitoring Well Project (Kern County Water Agency)				✓										✓								✓			✓	
Pilot Program Utilizing Biodenitrification of Groundwater (Kern County Water Agency)	✓	✓									✓	✓		✓												
Well-head arsenic treatment (Kern County Water Agency)	✓	✓									✓	✓														
Photovoltaic Array (Kern County Water Agency)			✓	✓																						
Northwest Feeder Extension (Kern County Water Agency)		✓	✓	✓	✓	✓					✓	✓	✓												✓	

11.4 Call for Projects

The manner in which strategies are implemented and objectives are met via the IRWMP process is by projects. To identify the many potential projects in the Kern Region and to assess the collection contribution of these projects towards meeting the IRWMP objectives, development of the IRWMP included a "Call for Projects" which gave stakeholders the opportunity to submit their projects and project concepts for consideration throughout the development of the plan. Projects could be submitted at any stage of development. Avenues available for submitting projects included the submission of projects via a project identification form, either submitted via electronic mail, by facsimile, or directly online via the Kern IRWMP website (www.kernirwmp.org). All projects submitted are listed by subregion in Table 11-3 and provided in Appendix F.

While many of the projects lack detailed supporting information, the Call for Projects provided a mechanism to engage stakeholders in the process of sharing project information and discussing the issues related to the integration of projects. Stakeholders were made aware that detailed information will be required for each project should a funding opportunity arise that their project would be well suited for. Additionally, the Call for Projects is not a closed process; stakeholders can continually submit projects through the project website; and there will be a process to continually update the list of projects that have already been submitted.

The information provided herein represents the outcome of the initial step in a process of bringing together individual projects into the collaborative process implied by this IRWMP. Assumptions were made with regard to which water management strategy a particular project would benefit most to begin the initial organization of the projects. For example, a groundwater recharge project was assumed to provide water supply benefits, with a possible secondary benefit addressing operational efficiency benefits.

TABLE 11-3
KERN IRWMP PROJECT LIST

IRWMP Subregion	Project Name and Proposed Sponsor (Joint Sponsor)
Mountains/Foothills	• Nitrate / Perchlorate Contaminant Blending Project - New Source (SSCSD / Fairview Ranch Estates & other users in Cummings Valley)
	• Tehachapi Basin Nitrate Study (GHCSD / City of Tehachapi, TCCWD)
	• Tehachapi Regional Water Treatment Plant (GHCSD / TCCWD, City of Tehachapi, BVCSD, SSCSD)
	• Tehachapi Basin Regional Water Treatment Facility (GHCSD / City of Tehachapi)
	• GHCSD Recycled Water Project (GHCSD / Wastewater Treatment Facility (private owner))
	• GHCSD/TCCWD Well Abandonment Program (GHCSD / TCCWD)
	• GHCSD Water Service Line Replacements (GHCSD)
	• GHCSD Urban Water Conservation Program (GHCSD/ partner to be determined)
	• GHCSD Wellhead Treatment Project (GHCSD)
	• Tehachapi Basin East Well Field Development Program (GHCSD / City of Tehachapi, TCCWD)

IRWMP Subregion	Project Name and Proposed Sponsor (Joint Sponsor)
	• Public Facility Distribution Line & Nitrate Removal Program (TCCWD / City of Tehachapi, Tehachapi Unified School District, Tehachapi Valley Rec and Parks District)
	• Tehachapi Regional Water Conservation Program (CUWCC BMP's) (TCCWD/ City of Tehachapi, GHCSD, BVCSD, SSCSD)
	• Cummings Valley Salt/Nutrient Management Plan (TCCWD/ BVCSD, SSCSD, CCI)
	• Cummings Valley Loop Line (TCCWD/ BVCSD, SSCSD, CCI)
	• California Correctional Institution Reclamation Distribution Line (TCCWD / CCI)
	• Brite Valley Recovery Well (TCCWD / City of Tehachapi, GHCSD)
	• Reservoir 4 Solar Project, Olcese W.D. (OWD)
	• Rock Meadow Riparian Vegetation Restoration, 32 Acres (OWD)
	• Well Replacement No. 3 (Frazier Park Public Utility District)
	• 8" Main Line Replacement Lebec Road (Lebec County Water District)
Kern River Valley	• Improved Quality Water Systems Infrastructure - Public Domain Allotments (Tubatulabals of Kern County)
	• South Fork Union School District Water Improvement Project (SFUSD)
	• Invasive Weed Control on South Fork Kern River
	• Conservation Acquisitions and Easements on South Fork Kern River
	• Kern River Valley Water Management Plan
	• Weldon Regional Water Supply (California Department of Public Health/Long Canyon, Mountain Mesa, Bella Vista, Hillview, Lakeview, KOA, Sierra Vista, Tradewinds, South Fork schools, Valley Estates, South Fork Women's Club, and Rainbird water systems, County of Kern, Self-Help Enterprises)
Kern County	• Kern County's Southern San Joaquin Valley Flood Mitigation Plan (Kern County)
	• South Weedpatch Sewer Improvements (Kern County)
	• South Taft Sewer Improvements - Full Project (Kern County)
	• South Shafter Waste Water System - Phase 1, Smiths Corner (Kern County)
	• South Shafter Waste Water System - Full Project (Kern County)
	• Sandy Creek Bank and Erosion Protection - Feasibility Study (Kern County)
	• South Shaft Sewer Improvements - Phase 1 & 2 (Kern County)
	• Reeder Tract Waste Water Treatment Facility - Replacement of Sewer Aeration Tanks (Kern County)
	• Lake Shore Pines - Leach Field Replacement (Kern County)
	• Lake Isabella Regional WWTP and Sewer Collection System - Detailed Study (Kern County)
	• Lake Isabella Regional WWTP and Sewer Collection System (Kern County)
	• Kern Lake Hydrologic Analysis (Kern County)
	• Reconstruct Adams/Jefferson Street, Ford City (Kern County)
	• Cuddy Creek Restoration Project - Phase 1 (Kern County)

IRWMP Subregion	Project Name and Proposed Sponsor (Joint Sponsor)
	• Caliente Creek Habitat Restoration - Feasibility Study (Kern County)
	• South Shafter Wastewater Collection Project (Kern County)
North County	• Solar Generating Project (City of Delano)
	• Arsenic Remediation Project (City of Delano)
	• Alpaugh Pipeline (City of Delano)
	• Water Meters (City of Delano)
	• McFarland/Delano Trunk Sewer (City of McFarland/City of Delano)
	• Delano/Alpaugh Treated Wastewater Outfall (City of McFarland/City of Delano)
	• McFarland Wastewater Treatment Plant Upgrade or Replacement (City of McFarland)
	• TCP Treatment of Six (6) City Wells (City of Shafter)
	• East Shafter Water Storage Tank and Booster Station Facility (City of Shafter)
	• Consolidation of City & Bishop Acres Community Water System (City of Shafter)
	• Well 15 Arsenic Treatment System (City of Shafter)
	• Three Million Gallon Water Tank and Well Project (City of Wasco)
	• Phase 1 of Storm Drain Reconstruction Project (City of Wasco)
	• Regional Groundwater Management and Solar Generation Program (Cities of Delano, McFarland, Shafter, and Wasco)
	• Browning Road Water Well and Storage Tank (City of McFarland)
	• North Shafter Wastewater Collection Project (City of Shafter)
Kern Fan	• West Kern Water District/Kern Water Bank Authority Well Interconnection (WKWD /KWBA)
	• Wellfield Mainline Installation (WKWD)
	• Replacement of WKWD Production Well 7-01 (WKWD)
	• Replacement of WKWD Production Well 2-01 (WKWD)
	• West Kern Water District Increased Storage Capacity at Pump Stations B and G (WKWD)
	• West Kern Solar Project (WKWD)
	• South Taft Water System Improvements (WKWD)
	• Recharge/Extraction Feasibility Studies (WKWD)
	• Kern Water Bank Recharge and Recovery Enhancement Project (KWBA)
	• Kern Water Bank Short Term Storage Program (KWBA)
	• Water Exchange Project (WEP) (Buena Vista Water Storage District)
	• Outlet Canal Reoperation Project (OCRP) (Buena Vista Water Storage District)
	• Groundwater Recharge and Recovery Project (GRRR) (Buena Vista Water Storage District)
	• Conservation Easement Water Acquisition and Management Project (CEWAMP) (Buena Vista Water Storage Project)
	• Brackish Groundwater Remediation Project (BGRP) (Buena Vista Water Storage District)
	• Federal Plant Farming Project (City of Taft)
	• City Reclaimed Water Project (City of Taft)
	• Sandy Creek Retention Basin Project (City of Taft)
	• Storm Water Filtration and Retention Project (City of Taft)

IRWMP Subregion	Project Name and Proposed Sponsor (Joint Sponsor)
	• Maricopa Wastewater Project (City of Maricopa/State: State Water Resources Control Board, CalTrans, Central Valley Regional Water Quality Control Board, State Fish & Game, San Joaquin Valley Air Resources Control Board, Division of Oil & Gas Federal: Bureau of Land Management, US Fish & Wildlife, United States Department of Agriculture/Rural Development, Housing & Urban Development, County: WKWD; Local: Santa Rosa Rancheria Tachi Tribe, Chumash Tribe & Tejon Tribe, Aera Oil, Kern Sunset Oil, Drilling & Production Company, Macpherson Oil Company))
	• Goose Lake Slough Improvement Project (RRBWSD)
	• Groundwater Recovery Project (RRBWSD)
	• Recharge Expansion Program (RRBWSD)
	• Water Acquisition Project (RRBWSD)
	• North Kern Recycled Water Project (RRBWSD)
	• Buttonwillow Service Area System Improvements (BSASI)
	• On-Farm Water Use Efficiency Project (OFWUEP)
	• Kern Fan Direct Recharge and Recovery (KFDRR)
South County	• Forrest Frick Pumping Plan Rehabilitation Project (AEWSD)
	• Water Quality Improvement Project for Well 16 (LPUD)
	• Well 19 Arsenic Reduction Blending Project (LPUD)
	• Renovation of Belowground Storage Reservoir (LPUD)
	• Mettler Wastewater Project (MCWD)
	• Mettler Water Supply Project (MCWD)
	• AEWSD Intake Canal Check Structures and Kern Delta Intertie Improvements (AEWSDKDWD)
	• Sycamore Check Structure Improvement (AEWSD / United States Bureau of Reclamation (Possible))
	• AEWSD Wasteway Basin Improvements (AEWSD)
	• AEWSD South Canal Balancing Reservoir Project (AEWSD)
	• Lateral Capacity Improvement Projects (AEWSD)
	• AEWSD In-Lieu Banking Program (AEWSD)
	• Improved Stormwater Management and Flood Control in AEWSD (AEWSD, Kern County RMA, Lamont CSD, City of Arvin, Mettler CWD, Tejon Ranch (Possible)
	• Groundwater Storage and Recovery Project in White Wolf Basin (WRMWSD)
	• WRMWSD Solar Power Generation Project (WRMWSD)
Westside	• Oil field produced water treatment and water quality improvement project (BWSD)
	• Lost Hills Water District Water Treatment Project (LHWD)
	• Lost Hills Water District Groundwater Treatment Project (LHWD)
	• BMWD Afterbay Reservoir Expansion (BMWD/Other Kern County water agencies, Central Coast Water Authority, Santa Barbara County)
	• Coastal Branch of the California Aqueduct Expansion Project (BMWD/CA Dept. of Water Resources, Central Coast Water Authority, Santa Barbara County)

IRWMP Subregion	Project Name and Proposed Sponsor (Joint Sponsor)
	• BMWD Forebay Reservoir (BMWD/Other Kern County water agencies, Central Coast Water Authority, Santa Barbara County)
	• BMWD Groundwater Treatment (BMWD)
	• BMWD Peaking Capacity Improvement Project (BMWD/ LHWD)
	• BMWD Still Reservoir Expansion (BMWD)
	• Lost Hills Surface Water Treatment Plant (BMWD/Lost Hills Public Utility District (LHPUD), SWSD)
	• BMWD Tieline Modifications (BMWD)
	• Westside Districts' Groundwater Banking Project (BMWSD /BWSD, LHWD, WRMWSD & DRWD)
Greater Bakersfield	• Improvement District No. 4 Groundwater Monitoring Wells (ID4)
	• Improvement of Recharge Capacity to the Kern River off of the Cross Valley Canal (ID4)
	• Cross Valley Canal Extension Lining Project (ID4)
	• Cross Valley Canal Extension to Calloway Canal Intertie (ID4)
	• Improvement District No. 4 Conjunctive Use Pipeline (ID4)
	• Henry C. Garnett Water Purification Plant Clearwell No. 4 (ID4)
	• Installation of Surface Water Quality Monitoring Stations (ID4)
	• Beardsley Canal and Henry C. Garnett Water Purification Plant Pipeline Connection (ID4)
	• 3 Million Gallon Water Blending Tank & Booster Station (City of Bakersfield)
	• Mt. Vernon Ave. Compost Facility Recycled Water Supply (City of Bakersfield/Kern County Waste Management Dept.)
	• Wastewater Treatment Plant No. 2 City Farm Improvement Project (City of Bakersfield Public Works Wastewater Division)
	• San Miguel Memorial Tree Grove (Phase 2) (City of Bakersfield Recreation & Parks)
	• Wastewater Treatment Plant No. 2 Tertiary Water Facility Installation (City of Bakersfield Public Works Wastewater Division)
	• Well Head Arsenic Treatment (City of Bakersfield)
	• Kern River Shoreline 48 Acres (City of Bakersfield/Kern River Levee District)
	• River Supply Conduit to New South Bakersfield Ultra Filtration Plant
KCWA	• Backflow prevention for Agricultural Wells (Kern County Water Agency)
	• Groundwater Banking Project (Kern County Water Agency)
	• In-pipe hydropower utilizing Northwest Powerpipe (Kern County Water Agency)
	• Kern Fan Monitoring Well Project (Kern County Water Agency)
	• Pilot Program Utilizing Biodenitrification of Groundwater (Kern County Water Agency)
	• Well-head arsenic treatment (Kern County Water Agency)
	• Photovoltaic Array (Kern County Water Agency)
	• Northwest Feeder Extension (Kern County Water Agency)

Section 12: Project Priorities and Implementation

12.1 Project Prioritization Process

The Kern IRWMP will be implemented through the specific studies and actions, projects, and programs proposed by the Regions stakeholders and Participants. In order to identify potential projects that facilitate IRWMP implementation, and during the development of the IRWMP, the RWMG held an open "call for projects." Participants and others were encouraged to submit projects during multiple Stakeholder meetings and in email correspondence solicitations, throughout IRWMP development. To implement water management strategies identified in the IRWMP, stakeholders identified close to 140 separate projects. The resulting initial "call for projects" list is contained in Appendix F.

The RWMG and Executive Committee developed a process to prioritize projects, in order to allow the subregions to identify their top ranked projects on a subregional level, with the intent that these projects would then be brought forth to represent the entire Kern Region as the best projects to be put forth in applications for funding. The formal project prioritization process and prioritization criteria are documented in Appendix G. Any future changes to the project prioritization process will be reflected in Appendix G. The project prioritization process is described below.

Currently, the prioritization of projects is based upon a detailed screening process. The process is two-fold: Phase 1 - Subregion Level and Phase 2 - Kern Region Level (please see Figure 12-1 for a graphical overview of the process). All projects submitted will remain on the Project list, and the list will be updated on a regular basis as new projects are submitted and as projects are developed through time and re-prioritized.

12.1.1 Introduction of Prioritization Concept

At the sixth stakeholder meeting (20 April 2009), the prioritization process was introduced to the RWMG and the larger Stakeholder group. The process was designed to meet two separate but related objectives: (1) to enhance and develop projects in order to meet regional objectives; and (2) to select the best suite of projects in order to maximize funding opportunities for the Region.

Examples of prioritization processes from other IRWMP Planning Regions were presented to the group for discussion in order to determine the important criteria by which the stakeholders wanted to have their projects evaluated. Due to the complexity of the issue, the discussion carried over to a second stakeholder meeting held on June 3, 2009.

Some of the questions that were asked during these meetings included:

- Will it be possible to modify the ranking of projects, if those projects are later modified?

Yes, as new elements are included in projects as a result of new partnerships or other factors, then re-evaluation of projects will definitely occur at the next round of the prioritization process.

- Are there any constraints from DWR on how frequently the IRWMP can be modified?

  Not yet, but legislation (Senate Bill 834) has been proposed to provide more structure for the IRWMP process.

- What does it mean, "How well does the project use sound scientific basis for data acquisition and project management?"

  Do you have data to document the proposed benefits of your project, such as quantifiable baseline or historical data?

- Would it be possible to rank projects more in accordance with the regional objectives developed by the stakeholders, as those objectives are focused on the most critical problems in our region, rather than rely so heavily on the State objectives?

  The State objectives come from other planning documents and legislation, and so they must be taken into account in addition to the regional objectives. The idea is that regional objectives should help to address statewide problems.

- Do we know how similar projects from different IRWMPS will compete against each other, especially if one is ranked higher in one IRWMP than they are in another?

  DWR will be assessing the overall quality of each IRWMP, and not compare just the individual projects contained in each IRWMP.

In response to these and other questions and comments, an all-day project prioritization process workshop was proposed to handle all remaining questions and to finalize the prioritization criteria.

12.1.2 Project Scoring Criteria

The project prioritization criteria were initially developed at a focused workshop held on 29 June 2009 and subsequent working sessions. They were finalized and adopted on 19 September 2011. The proposed criteria are presented in the form of a two-tier, four part matrix (provided in Appendix G):

- Tier 1 – Tier 1 criteria evaluate the projects' applicability to specific objectives as well as benefits. By evaluating projects based on these criteria, proposed projects will be consistent with the IRWMP Program Preferences and Statewide Priorities, as discussed in Section 1.6.

  - Part 1 – Kern IRWMP Objectives – these are the primary objectives developed by participants during the 24 November 2008, 28 January 2009, 17 February 2009, and 30 March 2009 Stakeholder meetings and subsequently finalized by Executive

Committee. These are the first and most important criteria that the proposed projects should address.

- Part 2 - State IRWMP Program Preferences – these are criteria that DWR identified in the following resources to be used to evaluate projects in previous IRWMP Rounds:

  - IRWMP PROPOSITION 50 Chapter 8 Program Guidelines: http://www.grantsloans.water.ca.gov/docs/prop50/round2/guidelinepsp/Round_2_Guidelines_060107_Final.pdf
  - Water Code Division 26.5: 79500. Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002, actual text: http://www.water.ca.gov/irwm/docs/prop50/leginfo/prop50_legislative_amend2.pdf
  - PROPOSITION 84 (Anticipated Preferences/Priorities)**: http://www.grantsloans.water.ca.gov/grants/irwm/integregio_general.cfm
  - IRWMP PROP 84 Workshops by Department of Water Resources: http://www.water.ca.gov/irwm/integregio_general.cfm

- These criteria also consider whether or not the projects address the legislative requirements of EO S-3-05 and AB 32 concerning GHG emissions, and SBX7-7 concerning water use efficiency.

- Part 3 – Statewide Priorities – these are criteria that DWR identified in previous IRWMP Rounds and which may be used to evaluate funding applications.

* Tier 2 – Tier 2 criteria evaluate the projects' readiness for grant funding.

  - Part 4 – Criteria for Grant Applications – these are criteria that are derived from previous grant applications for IRWMP funding-related programs.

A project would be scored depending on how well it contributed, or benefited, each criterion. The following simple system of points was used:

* 0 Points – Criteria does not apply
* 1 Point – Criteria may apply/need more information
* 2 Points – Criteria partially applies
* 3 Points – Criteria fully apply

The projects will be grouped into the following four (4) project lists, based on the project scores.

1. Master Project List:
   a. The Master Project List includes all projects submitted to the Kern IRWMP.

   b. The Master Project List is a non-scored list of projects.
   c. Any member of the Kern IRWMP Stakeholder Group, as defined in the Kern IRWMP Governance Structure, may submit a project for inclusion on the Master Project List by completing a Project Submittal Form (presented in Appendix G).
   d. Projects may be added to or removed from the Master Project List at any time.

2. High Priority List:
   a. The High Priority List consists of the top 5 projects from each subregion, as determined by the Project Prioritization Process.
   b. The High Priority List is an unranked list.
   c. The High Priority List will be updated on an annual basis.
3. Moderate Priority List:
   a. The Moderate Priority List consists of all projects not included on the High Priority List, that receive more than 50 percent of the points available on the Tier 1 Scoring Matrix (presented in Appendix G), as determined by the Project Prioritization Process.
   b. The Moderate Priority List is an unranked list.
   c. The Moderate Priority List will be updated on an annual basis.
4. Low Priority List:
   a. The Low Priority List consists of all projects not included on the High Priority List, that receive less than 50 percent of the points available on the Tier 1 Scoring Matrix, as determined by the Project Prioritization Process.
   b. The Low Priority List is an unranked list.
   c. The Low Priority List will be updated on an annual basis.

12.1.3 Project Prioritization Steps and Timeline

The current list of projects presented in this IRWMP Update was prioritized based on a draft process in 2009. The project prioritization process was subsequently modified to meet updated IRWMP requirements, and was finalized and adopted during a Stakeholders meeting on 19 September 2011. Subsequent project prioritization will occur annually and will follow a two-tiered process, based on the above scoring criteria.

1. Project Prioritization Process:
   a. The Project Prioritization Process will be completed on an annual basis.
   b. All projects on the Master Project List at the time of the Project Prioritization Process will be prioritized.
      i. Projects submitted after the Project Prioritization Process will be eligible for prioritization during the subsequent year's Project Prioritization Process.
   c. Only prioritized projects, subject to the terms described in this section, will be eligible for IRWM program grant funding.

d. Project prioritization will follow a two-tiered process.

e. Tier 1 Prioritization:

   i. Each subregion, as defined in the Kern IRWMP Governance Structure, will score all projects physically located within the subregion.

      1) Projects may only be scored in one subregion. Projects physically located in more than one subregion will be scored in the subregion in which a majority of the project lies.

   ii. All projects will be scored using the Tier 1 Scoring Matrix (presented in Appendix G).

      1) One Project Scoring Matrix will be completed for each project and submitted to the Executive Committee, or its designee, for record keeping purposes.

   iii. The top five (5) projects from each subregion will be placed on a High Priority List.

      1) The High Priority List is an unranked list and will not include the project scores.

   iv. Of the remaining projects, projects receiving more than 50 percent of the points available on the Tier 1 Scoring Matrix will be placed on the Moderate Priority List. Projects receiving less than 50 percent of the points available on the Tier 1 Scoring Matrix will be placed on the Low Priority List.

f. Tier 2 Prioritization:

   i. Tier 2 Prioritization will be used to select project(s) for IRWM program grant funding.

   ii. Tier 2 Prioritization will be completed prior to the submission of each IRWM program grant application.

   iii. Only projects on the High Priority List that meet the grant requirements, as defined in the grant proposal solicitation package, will be eligible for Tier 2 Prioritization, unless the grant funds available exceed the funding requirements of the eligible projects on the High Priority List.

      1) If the grant funds available exceed the funding requirements of eligible projects on the High Priority List, eligible projects on the Moderate Priority List will be eligible for Tier 2 Prioritization.

      2) If the grant funds available exceed the funding requirements of eligible projects on the High and Moderate Priority Lists, eligible projects on the Low Priority List will be eligible for Tier 2 Prioritization.

   iv. Tier 2 Prioritization will be completed by the Executive Committee using the following steps:

1) The project proponent of an eligible project must submit in writing to the Executive Committee, or its designee, documentation authorizing the project proponent to proceed with a grant application.
    (a) The authorization must:
        i. Designate a point of contact; and
        ii. Document the availability of or ability to acquire matching funds, as defined by the grant proposal solicitation package.
    (b) If completion of the project requires the contribution of goods, services and/or funding from a partnering entity, authorization to proceed from the partnering entity must also be submitted in writing to the Executive Committee or its designee.
2) Projects that are authorized to proceed will be scored by the Executive Committee using the Tier 2 Scoring Matrix (presented in Appendix G).
3) The top ranking project(s) will be selected to proceed with an IRWM program grant application.
    (a) The number of projects selected to proceed with an IRWM program grant application will be based on the grant proposal solicitation package and the total amount of grant funding available.
4) If two or more projects receive the same score and either the grant proposal solicitation package or the amount of funding available does not allow all of the projects to apply for grant funding, the Executive Committee will break the tie by rescoring each project using the Tier 1 Scoring Matrix. The project(s) receiving the highest score(s) will be selected to proceed with an IRWM program grant application.

2. Removal of a Project:
    a. Projects may be removed from any of the four project lists at any time by request of the project proponent.
    b. Projects may be removed from Tier 2 Prioritization at any time by request of the project proponent.
    c. To remove a project, the project proponent must submit a written request for removal to the Executive Committee or its designee. The request for removal must include: the project title, consent to remove the project from all project lists and/or the Tier 2 Prioritization and the reason for removal of the project.

d. It is the project proponent’s sole responsibility to notify any and all partnering entities of the removal of the project from either the four project lists or the Tier 2 Prioritization.

The following steps and timeline were followed for the initial project prioritization:

- All projects were to have been submitted by 17 July 2009 for placement on the first list of projects to be prioritized. Projects submitted after that date would be considered for the second round of prioritization. The first list of prioritized projects had approximately 140 projects for prioritization (provided in Appendix F).
- The goal of the prioritization process is to identify the top projects from each of the eight subregions; as well as to identify the top 40 projects for the overall region.
- Each subregion had about one month to meet and prioritize their projects. The timeframe for these subregional meetings was July 27 to August 21 2009.
- Each subregion identified their top five projects and submitted them the Executive Committee by August 21 2009. Subregions were permitted to substitute a project from the top five with a different project from the list, if the project was close in score to the number five ranked project and justification for the substitution was provided.
- Members of the Executive Committee individually reviewed the top 40 projects submitted by the subregions, and then met on August 28 and August 31 2009 to reprioritize the top 40 projects.
- The final top 40 list was reviewed and voted on by all the participants during a regularly scheduled IRWMP meeting on August 31, 2009.

This process was developed by the stakeholders and worked well to develop a prioritized listing of the top 40 projects for the Kern Region. Subsequent project prioritization will occur annually, and will follow the final adopted project prioritization process.

12.1.4 Selected Plan Projects

The result of the prioritization process Phase 2, shown on Figure 12-1 and as described above, is the list of the top 40 prioritized projects for the Kern IRWMP. These projects are provided in Table 12-1. It is the intent of the RWMG to adopt this IRWMP with the list of projects described in Table 12-1 and detailed in Appendix H. The list of top 40 prioritized projects will be updated to reflect the final adopted project prioritization process at a later date. An update is currently scheduled for early 2012.

FIGURE 12-1
PRIORITIZATION PROCESS

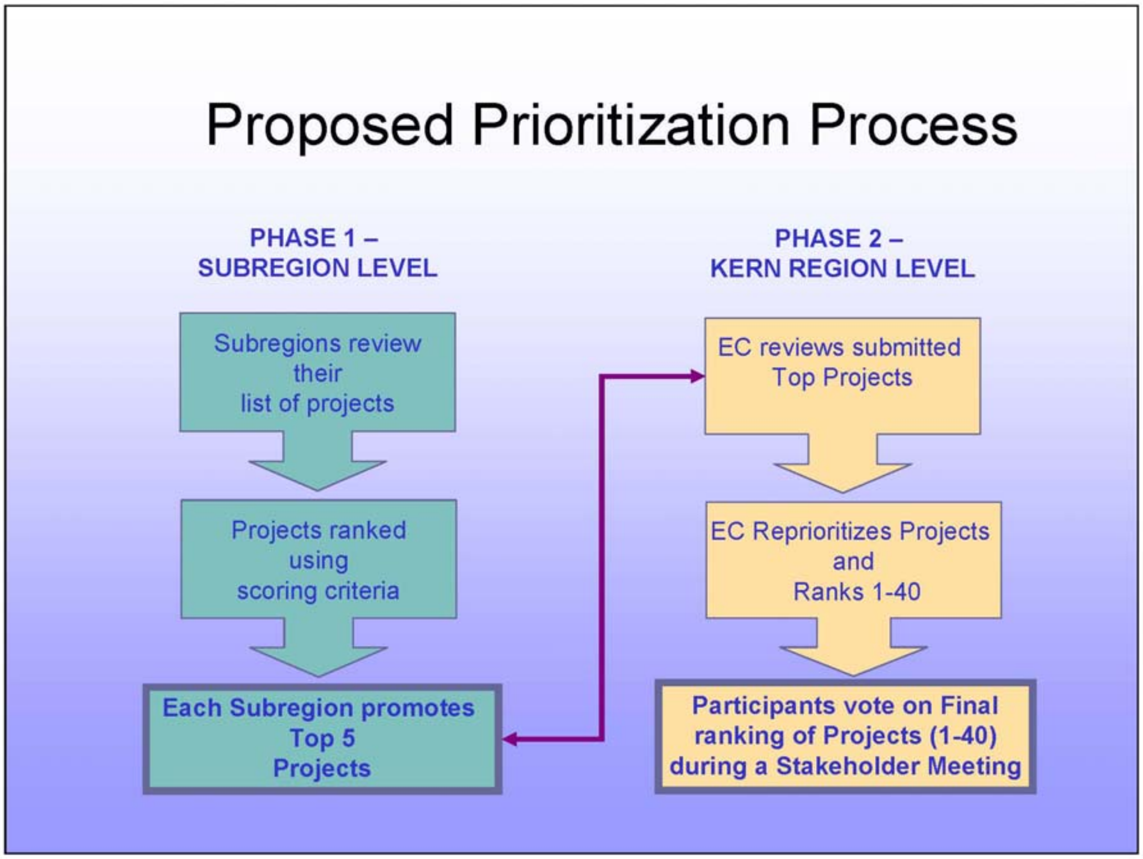


TABLE 12-1
KERN IRWMP TOP 40 PROJECT LIST

Rank	Project No.	Project Name	Subregion
1	55	Regional Groundwater Management and Solar Generation	North County
2	58-63	Improvements to and Expansion of groundwater distribution systems in the Kern Fan Area	Kern Fan
3	19	Improved Quality Water Systems Infrastructure Public Domain Allotments	Mountains/Foothills
4	35	Lake Isabella Regional WWTP and Sewer Collection System Detailed Study	County of Kern
5	130	Groundwater Banking Project	KCWA
6	65-67, 70,78,79,80,85	Kern Fan Area Groundwater Recharge and Recovery Project	Kern Fan
7	99	Groundwater Storage and Recovery White Wolf Basin	South County
8	112	Westside Districts' Groundwater Banking Project	Westside
9	39	Cuddy Creek Restoration Project Phase 1	County of Kern
10	23	Invasive Weed Control on South Fork Kern River	Mountains/Foothills
11	64,74	Taft Urban Water Supply Project	Kern Fan
12	128	Weldon Regional Water Supply	Mountains/Foothills
13	92	AEWSD Intake Canal Check Structures and KDWD Intertie Improvements	South County
14	128	River Supply Conduit to New South Bakersfield Ultra Filtration Plant	Greater Bakersfield
15	116	Cross Valley Canal Extension to Calloway Canal Intertie	Greater Bakersfield
16	97	AEWSD In-lieu Banking Program	South County
17	110	LH Surface Water Treatment	Westside
18	106	BMWD Forebay Reservoir	Westside
19	72,75,76	Retention and Remediation Project	Kern Fan
20	133	Biodenitrification Pilot Program	KCWA
21	134	Wellhead Arsenic Treatment	KCWA
22	52	Well 15 Arsenic Treatment System	North County
23	87	Water Quality Improvement Project for Well 16 Lamont PUD	South County
24	12,8	Tehachapi and Golden Hills Water Conservation Program	Mountains/Foothills
25	90	Mettler Wastewater Project	South County
26	119	Installation of Surface Water Quality Monitoring Stations	Greater Bakersfield
27	73,82	Recycled Water Project City of Taft and RRBWSD	Kern Fan
28	121	3 Million Gallon Water Blending Tank and Booster Station	Greater Bakersfield
29	125	Wastewater Treatment Plant No.2 Tertiary Water Facility Installation	Greater Bakersfield
30	51	Consolidation of City and Bishop Acres Water Systems	North County
31	29	South Shafter Waste Water System Phase 1, Smiths Corner	County of Kern
32	27	South Weedpatch Sewer Improvements	County of Kern
33	28	South Taft Sewer Improvements Full Project	County of Kern
34	101,103,107	Groundwater Quality Projects	Westside
35	102	LHWD Treatment (perched water)	Westside
36	129	Backflow Prevention for Ag Wells	KCWA
37	47	Delano/McFarland/Alpaugh Treated Wastewater Outfall	North County
38	14	Cummins Valley Loop Line	Mountains/Foothills
39	132	Kern Fan Monitoring Well Project	KCWA
40	44	Alpaugh Pipeline	North County

12.2 Integration of Water Management Strategies

CWC § 79501 states the following:

> *The people of California find and declare that it is necessary and in the public interest to do all of the following…*
>
> *Establish and facilitate integrated regional water management systems and procedures to meet increasing water demands due to significant population growth that is straining local infrastructure and water supplies.*
>
> *Improve practices within watersheds to improve water quality, reduce pollution, capture additional storm water runoff, protect and manage groundwater better, and increase water use efficiency.*
>
> *Protect urban communities from drought, increase supplies of clean drinking water, reduce dependence on imported water, reduce pollution of rivers, lakes, streams, and coastal waters, and provide habitat for fish and wildlife.*

Integrated regional water management planning meets this intent by encouraging broad evaluation of watershed related issues as well as identification of projects to address these needs. Integrated regional water management planning solicits the input and expertise of various groups, including water agencies, flood control agencies, local planning entities, conservancies, sanitation districts, business organizations, tribes, open space and recreation interests, and habitat preservation interests. One of the benefits of this planning process is that it brings together this broad array of groups into a forum to discuss and better understand shared needs and opportunities. This format assures that a full range of issues and needs are considered. It also ensures that an extensive range of expertise is used to evaluate projects and identify means to improve and integrate projects.

Examples of integration took place in the Kern IRWMP process at the subregion level. The Phase I project prioritization process allowed for the opportunity to present support for projects, to discuss the merits of the projects with the subregion participants, and to discuss how projects could potentially be combined to create more regional, comprehensive, and logistically beneficial and efficient projects. Additionally, at the Phase I level, some subregions found that their projects could be combined to provide greater benefit to the Region. They collectively modified versions of their projects that they felt better integrated with the goals and objectives of the Kern Region as well as other projects. The best example of this comes from the Kern Fan subregion where eight (8) individual projects were combined into one collective project, the Kern Fan Area Groundwater Recharge and Recovery Project; which as combined ranked 6th out of 40.

12.3 Advantages and Benefits of Plan Implementation

There are many advantages to preparing a regional plan as opposed to implementing isolated local efforts. Regional planning provides a means to maintain, protect, and restore natural resources within the Kern Region while also enhancing the quality of life for residents in the Region. The Kern IRWMP provides a means to support environmental protection, quality of life issues, and economic development using the watershed boundary as the planning framework. This IRWMP allows for stakeholders in the community to join together in creating a vision for water resources in the Kern Region.

In creating the opportunity for collaboration, this IRWMP process facilitates the establishment of partnerships between local and state governments, community organizations and any other groups with the common goal of protecting water resources within the Kern Region. It is through the IRWMP process that community efforts can be coordinated to create a regionally focused plan to more efficiently reach the identified objectives and goals. Moreover, preparation of a regional plan allows for the communities to address water supply, water quality, flood management, and environmental and land use issues within the physical boundaries of local watersheds rather than political boundaries.

The environmental benefits of preparing this IRWMP are clear: enhanced water supply reliability, improvements in water quality, protecting natural habitats and open space areas for their water resource function, controlling flooding and maintaining community culture and land uses. The community benefits are, however, even more important in the Kern Region. This is exemplified by the coordination and collaboration of the subregions, which was formed for the purposes of carrying out this IRWMP. The fact that the subregions, the Executive Committee, and all the stakeholders who participated in the planning of this IRWMP, have come together to develop an action plan to address their concerns over water resources in the Kern Region, is an exemplary contribution to water management for the future.

12.3.1 Benefits of Plan Implementation

The primary benefit of the Kern IRWMP is development of a process and framework supportive of collaborative regional planning. This IRWMP allows Stakeholders in the community to create a vision for watershed planning in the Region, and identify appropriate means to achieve this vision. Creation of the IRWMP has facilitated partnerships between local, State, and Federal entities. For example, several of the projects proposed in this IRWMP are being jointly sponsored by multiple local entities.

The IRWMP process fosters coordination, collaboration and communication among entities in the Region and has resulted in greater efficiencies (e.g., efforts are not duplicated, information is shared), will enhance public services, and will facilitate public support for watershed projects. As part of preparing this IRWMP, the regional agencies have provided input as to their ongoing research and data collection projects. Knowledge of these research and data collection projects assists other agencies from duplicating efforts. Efficiencies have also been achieved by cooperating on regional efforts rather than separate localized efforts.

A regional planning effort ensures that all potential components of watershed planning are considered rather than one particular area or project type dominating. Regional planning improves the likelihood that benefits and impacts are shared instead of one group or area reaping the benefits while another bears the impacts. Regional planning efforts also increase the likelihood that projects that implement one particular objective (e.g., water supply) are considerate of other objectives (e.g., flood control or habitat preservation). As part of project integration, projects can be refined so that they achieve multiple objectives and benefits.

The IRWMP will allow otherwise separate agencies to speak as a region and to improve policies, regulations and laws related to water demand, water supply, water quality, operational efficiency, and resource stewardship. The range of projects identified by this IRWMP meets all objectives identified by the Stakeholders:

- Increase water supply
- Improve operational efficiency
- Improve water quality
- Promote land use planning and resource stewardship
- Improve regional flood management

Full implementation of this IRWMP will result in multiple benefits associated with these objectives. In addition, the IRWMP will provide for the following specific benefits through implementation of these projects:

- Water Supply Projects. The majority of projects submitted by Stakeholders relate to water supply, particularly storm water capture, groundwater recharge, and development of recycled water supplies. Storm water capture and subsequent groundwater recharge provides for increased use of local supplies rather than imported water. These projects assist in maintaining the long-term sustainability of the groundwater supply. Depending on project specifics, these projects can also serve to decrease peak flood flows and provide opportunities for habitat improvement and restoration. Recycled water supplies, likewise, offset demand for imported water. Recycled water can be used to offset potable water demand, recharge groundwater basins, and create and restore wetland areas.

- Operational Efficiency Projects. Several projects are proposed to improve water infrastructure, including projects for intertie improvements, groundwater distribution system expansions, consolidation of mutual water companies, and projects to replace outdated and poorly functioning infrastructure. These projects have benefits related to reduced maintenance costs and decreased system water loss. For example, in the case of the sewer relocation project (project #46), a primary water quality benefit would be the reduced risk of damage to the sewer and potential for a sewage spill. As another example, consolidation of mutual water companies (project # 51), would result in economies of scale and would ensure each connection is metered (thus encouraging water conservation). In addition, projects which improve operational efficiency can reduce GHG emissions by reducing energy use and system losses, thereby providing climate change mitigation benefits.

- Water Quality Improvement Projects. Projects that affect water quality include installation of surface water quality monitoring stations, treatment of naturally occurring arsenic, and enhancement of secondary treatment of water treatment plants to tertiary treatment. The primary benefit from implementing these water quality projects would be the reduced potential for human exposure to potentially harmful substances. These projects would also improve the efficiency of both water and wastewater treatment processes. Besides improving drinking water, these projects could potentially benefit other types of water users, such as agricultural water users and water dependent wildlife habitat.

- Land use planning and resource stewardship Projects. Representative projects that address land use planning and resource stewardship include the Cuddy Creek restoration project (project #39), the Kern River Valley Water Management Plan (project #25), and invasive weed control project on the South Fork Kern River (Project #23). These projects can also reduce flooding impacts by removing obstructions in streams that could result in significant erosion and damage to public facilities.

- Flood Management Projects. Projects that would benefit the IRWMP's flood management objectives include sewer improvement projects (project #30), stormwater control projects (project #98), weed control on the Kern River (project #23), retention and detention studies (project #75) and capital improvement projects (project #54). These types of projects help to reduce flooding and plan for runoff events within the watershed context rather than on an isolated basis.

12.3.2 Plan Beneficiaries

The potential beneficiaries of the Kern IRWMP are the residents of the Region and Stakeholders represented by the Executive Committee, and include: water agencies, local, State and Federal agencies, businesses, water purveyors, wildlife and associated habitats, the agricultural/farm industry, and others within the jurisdictions served by IRWMP projects. These beneficiaries are represented by members of the Executive Committee, and the larger RWMG.

12.3.3 Interregional Benefits

Coordination with and recognition of potential nexus with adjacent IRWMPs prepared by other Regions, if appropriate, is important to the Kern IRWMP, and the most direct way to maximize interregional benefits. The Kern Region is adjacent to eight other existing or developing IRWMP planning regions: Poso Creek, Southern Sierra, Inyo-Mono, Antelope Valley, Upper Santa Clara River, the Watersheds Coalition of Ventura County, Santa Barbara, and San Luis Obispo (see Figure 1-3). Overlapping areas exist with three of the other Regions: 1) San Luis Obispo, 2) Antelope Valley, and 3) Poso Creek.

For example, it may be that issues of importance to the entire Tulare Lake Hydrologic region, or to the San Joaquin Valley as a whole, could be addressed by linking multiple IRWMPs to solve common problems. Linkage of these IRWMPs will provide mutual benefits and potential joint funding partnership opportunities for entities within the Tulare Lake Hydrologic Region. It is anticipated that there will be opportunities to link the Kern IRWMP to plans from other adjacent areas. To enable such linkage to other IRWMPs, the geographic area and stakeholders for this IRWMP are broadly defined.

12.4 Impacts of Plan Implementation

The IRWMP Guidelines require an evaluation of potential negative or adverse impacts within the Kern Region and in adjacent areas from implementation of the IRWM Plan projects. Negative impacts that may be associated with implementing the submitted projects include (1) short-term, site specific impacts related to site grading and construction, and (2) long-term impacts associated with project operation. For the purposes of this IRWMP, impacts are discussed at a screening level below.

Project-specific and/or programmatic environmental compliance processes (consistent with CEQA and, if applicable, the National Environmental Policy Act) will evaluate the significance of the impacts. Under CEQA, impacts determined to be significant must be mitigated to a level of non-significance (unless the lead agency makes findings of overriding consideration). The IRWMP itself does not lead to the implementation of any specific project. It has been determined that the IRWMP itself is exempt from CEQA. The following provisions of the State:

CEQA Guidelines apply:

- Statutory Exemption (15262 for Feasibility and Planning Studies)
- Categorical Exemption (15306-Information Collection)

CEQA review of specific projects will provide an evaluation of impacts in much greater detail than discussed below:

- Aesthetics. Projects that include construction activities and new infrastructure have the potential to affect aesthetics. However, it is likely that projects would be constructed in areas that are already disturbed, or would include mitigation measures that would return disturbed areas to their pre-construction conditions.

- Air Quality. Short-term air quality impacts could result from construction of the projects. However, through the CEQA process potential air emissions would be minimized through application of BMPs identified by the air quality management district or mitigation measures.

- Biological Resources. Short-term biological impacts could result from construction activities as well as non-native plant removal. Most of these negative effects would be avoided or minimized through mitigation efforts related to CEQA. Additionally, the IRWMP includes preservation of ecosystem health as one of its objectives. Thus, if implemented, projects could result in overall benefits to biological resources.

- Cultural Resources. Impacts to cultural resources (historical, archeological, and paleontological resources) could result from construction activities from the projects. As part of the CEQA process it will be necessary to develop mitigation measures to avoid or minimize these potential impacts.

- Geology and Soils. Projects with the potential to impact geologic resources would be required to undergo geological feasibility studies which would specify the appropriate engineering standards the contractor would have to comply with during construction. Compliance with these standards would mitigate project site geological and soil impacts.

- Hydrology and Water Quality. It is anticipated that impacts to hydrology and water quality would be generally beneficial because in the long-term projects are intended to improve water supply reliability and water quality. For short-term erosion or sedimentation, project-specific BMPs would be identified as part of the National Pollutant Discharge Elimination System (NPDES) permitting process. A number of projects proposed in this IRWMP are groundwater recharge projects using either storm water or recycled water. Because recycled water generally contains more salts than other water sources in the Kern Region, recharge with recycled water could increase the salinity of the local groundwater. This issues merits particular analysis in project specific CEQA documentation.

- Land Use and Planning. Projects were evaluated as to their compatibility with other planning documents for the Kern Region, including local and regional General Plans. Therefore, no significant land use changes or inconsistencies with policies are anticipated.

- Noise. Noise impacts could result from construction activities from some of the proposed projects. However, through the CEQA process most of these activities would be minimized through mitigation efforts and no long-term noise impacts are expected.

- Population and Housing. No adverse impacts to population and housing are anticipated. IRWMP implementation would help to meet the water demands of the existing and anticipated future population.

- Public Services and Utilities. Many of the projects are intended to enhance water supply, water quality, and improve storm water management and flood control. These types of projects would benefit the utilities and service systems in the Kern Region.

- Recreation. One of the objectives of the IRWMP is to preserve and enhance water dependent recreation. Therefore, impacts to recreation from IRWMP implementation are likely to be beneficial.

- Transportation and Circulation. Transportation and circulation could be temporarily impacted during construction of some of the projects. Construction can temporarily increase traffic congestion due to transportation of equipment and trips by workers. Construction of projects located near roadways can result in temporary lane closures and detours. However, through the CEQA process most of these activities would be avoided or minimized and no long-term transportation and circulation impacts are expected.

12.4.1 Impacts to Energy

The Kern Region has a variety of efforts planned to reduce water consumption and energy use, and to develop local energy supply sources. These efforts include water conservation, recycled water use, and utilization of renewable resources, such as WWTP digester gas recovery, hydropower, and solar power. As described in the IRWMP, the OWD, the cities of Delano, McFarland, Shafter, and Wasco, and the WRMWSD are proposing solar energy projects, and a number of agencies are proposing recycled water projects.

The reduction of water use will also reduce energy usage, as the treatment and distribution of water supply is an energy intensive activity. In addition, the development of local recycled water supplies will reduce the need for imported water and the associated uses of energy to transport that supply. These projects, in conjunction with the development of local renewable energy sources, will provide environmental benefits through reduction of GHG emissions as well as the reduced need for utility transmission and distribution facilities. Through implementation of these projects and the Kern IRWMP, there is the potential for an overall benefit to energy resources within the Kern Region.

12.4.2 Other Impacts

The IRWMP Guidelines require an evaluation of potential negative or adverse impacts from implementation of the IRWMP projects, specifically including those directly affecting DAC, and Environmental Justice related concerns, and Native American tribal communities, and including the benefits of environmental stewardship. The net result of the IRWMP projects is to improve water reliability, water quality, and enhance resources stewardship. These actions have broad benefits to all groups participating in the IRWMP. Implementation of the high priority strategies identified by this plan is unlikely to unduly burden a specific minority group or DAC.

12.5 Institutional Structure for Plan Implementation

The RWMG and Stakeholder Group discussed in a number of stakeholder meetings the type of governance structure that will be needed to sustain the Kern IRWMP in the years following the completion and approval of the IRWMP. The following summary shows the existing governance structure provided for in the Participation Agreement signed in 2008. The Participants and Executive Committee will use this dialogue to continue discussions about regional planning and changes to the IRWMP over the long term.

12.5.1 Governance Structure

The Governance Structure based on the Participation Agreement established the Kern RWMG and prescribed the preliminary roles and responsibilities for the RWMG. The members of the RWMG that signed the Agreement in October 2008 are referred to as “Participants”. RWMG Participants are involved in the decision-making process during development of the Kern IRWMP by each having one vote, and a vote of approval is required by a majority of Participants. The formal Governance Structure is documented in Appendix I. Any future changes to the Governance Structure will be reflected in Appendix I. The structure is described below.

Currently, this type of governance (MOU-based) is voluntary on the part of the signatories to the MOU, and relies on the members of the RWMG to choose to collaborate. Efforts continue to be made for outreach and to dispense information about the planning activities associated within this region. As part of the governance, a stakeholder group has been incorporated thus allowing any entity to participate in the IRWMP process. In addition to stakeholders and the RWMG, an Executive Committee has been formed. This group is a composite of 10 stakeholders representing the various regions and represents the working group of the RWMG. The current Executive Committee and participants as part of the 2008 agreement are shown in Tables 12-2 and 12-3.

TABLE 12-2
IRWMP EXECUTIVE COMMITTEE

Subregion	Member
Greater Bakersfield	Oildale Mutual Water Company
Kern Fan	Rosedale-Rio Bravo Water District
Mountains/Foothills	Bear Valley CSD
Kern River Valley	Long Canyon Water Company
North County	City of Shafter
South County	Wheeler Ridge-Maricopa Water Storage District
Westside	Belridge Water Storage District
County of Kern	Kern County Development Services Agency
Kern County Water Agency	Kern County Water Agency
Member-at-Large	To Be Elected in 2012

TABLE 12-3
IRWMP PARTICIPANT LIST

Participant	Region	Statutory Water Authority
County of Kern	County of Kern	
Casa Loma Water Company	Greater Bakersfield	X
City of Bakersfield	Greater Bakersfield	
East Niles Community Services District	Greater Bakersfield	X
Greenfield County Water District	Greater Bakersfield	X
Improvement District No. 4	Greater Bakersfield	X
Oildale Mutual Water Company	Greater Bakersfield	X
California Water Service	Greater Bakersfield and Kern River Valley	X
Kern County Water Agency	Kern County Water Agency	X
City of Taft	Kern Fan	
Buena Vista Water Storage District	Kern Fan	X
Buttonwillow County Water District	Kern Fan	X
City of Maricopa	Kern Fan	
Henry Miller Water District	Kern Fan	X
Kern Water Bank Authority	Kern Fan	X
Rosedale Rio Bravo Water Storage District	Kern Fan	X
Vaughn Water Company	Kern Fan	X
West Kern Water District	Kern Fan	X
City of Tehachapi	Mountains/Foothills	X
Golden Hills Community Service District	Mountains/Foothills	X
Lebec County Water District	Mountains/Foothills	X
Long Canyon Water Company	Kern River Valley	X
Mt. Mesa Water Company	Kern River Valley	X
North of the River Municipal Water District	Mountains/Foothills	X
Olcese Water District	Mountains/Foothills	X
Rainbird Valley Mutual Utility Company	Kern River Valley	X
Stallion Springs Community Service District	Mountains/Foothills	X
Tehachapi RCD	Mountains/Foothills	

Participant	Region	Statutory Water Authority
Tehachapi-Cummings County Water District	Mountains/Foothills	X
Tejon-Castac Water District	Mountains/Foothills	X
City of Delano	North County	
City of McFarland,	North County	
City of Shafter	North County	
City of Wasco	North County	
North West Kern RCD	North County	
S. San Joaquin Municipal Utility District	North County	X
Arvin Community Services District	South County	X
Arvin-Edison Water Storage District	South County	X
Bear Valley Community Services District	South County	X
City of Arvin	South County	
Frazier Park Public Utility District	South County	X
Kern Delta Water District	South County	X
Lamont Public Utility District	South County	X
Lamont Stormwater District	South County	X
Mettler County Water District	South County	X
Wheeler Ridge-Maricopa Water Storage District	South County	X
Belridge Water Storage District	Westside	X
Berrenda Mesa Water District	Westside	X
Dudley Ridge Water District	Westside	X
Lost Hills Water District	Westside	X

The same level of effort required to develop the IRWMP will not be required to administer the IRWMP. Consultant support will be available as an option, however, at a minimum, 10 to 12 hours monthly will be required to manage the administrative activities required to sustain the IRWMP. A higher level of activity may require a half-time position to be housed by one of the Executive Committee member agencies. Administrative activities include a wide variety of activities, including administrative services, website management, document production, meeting preparation, etc. KCWA staff has been relied upon during development of the IRWMP to perform these tasks. Although approximately 1 percent of each grant is usually available to manage the grant, one cannot rely fully on grant funds to manage the IRWMP process through time. This governance structure proposes that the Executive Committee assumes the responsibility for administration of the IRWMP, which will require consideration of staffing either in-house, through in-kind services, or through hiring of an outside consultant.

Using the Participation Agreement as a guide, the following draft terms outline the responsibilities of the Participants, the Executive Committee, and Stakeholders, for implementation of the IRWMP.

12.5.2 Terms of Participation Agreement (or MOU)

The Participation Agreement addresses the following topics:

- Organization
- Roles
- Representation and Decision Making

12.5.3 Organization

The Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan (Kern IRWMP) will include three groups:

1. **Regional Water Management Group Members** – signatories to the Participation Agreement and First Amendment.
2. **Stakeholder Group** – an open group of interested people that participate in public meetings related to the update and implementation of the Kern IRWMP. Anyone may participate as part of the Stakeholder Group if they are willing to abide by the Code of Conduct.
3. **Executive Committee** – a ten (10) member subgroup of the Stakeholder Group, and *working group* comprised of one representative from each of the seven (7) subregions and two (2) overarching subregions (hereafter referred to singularly as “subregion” or collectively as “subregions”) that comprise the Kern IRWMP: 1) Greater Bakersfield, 2) Kern Fan, 3) Mountains/Foothills, 4) Kern River Valley, 5) North County, 6) South County, 7) West Side, 8) KCWA, 9) the County of Kern and 10) one non-governmental organization (NGO) or community member (hereafter referred to as “Member-At-Large”).

12.5.4 Roles

1. **The Regional Water Management Group (RWMG) Members will:**
    a. Offer their facilities for stakeholder meetings on an as-available basis
    b. Appoint one (1) representative and one (1) alternate to the Executive Committee for each respective subregion
        i. RWMG members may cast one (1) vote for the representative position and one (1) vote for the alternate position within their subregion
        ii. If a RWMG member is a participant in more than one subregion, the member may only vote in their primary subregion, as defined in current Participation Agreement
    c. Participate in RWMG meetings of the Kern IRWMP
    d. Participate in subregion meetings for their primary subregion
    e. Promote subregional cooperation among their respective agencies or organizations focused on implementing the IRWM Plan

f. Provide funding to support cooperative efforts focused on implementing the IRWM Plan

g. Provide financial oversight for efforts using shared funds

h. Approve (or deny) recommendations for use of shared funds made by the Executive Committee on behalf of the Stakeholder Group

i. Provide a decision mechanism (by majority vote where each representative has a single vote) in instances where facilitated broad agreement within the Stakeholder Group cannot be reached

j. Empower the Executive Committee to fulfill the roles outlined below

2. The **Stakeholder Group** participants may:

   a. Offer their facilities for stakeholder meetings on an as-available basis

   b. Participate in Stakeholder and RWMG meetings

   c. Provide information and/or comments

3. The **Executive Committee** will:

   a. Collaborate with the RWMG, Stakeholder Group and other entities

   b. Call and conduct RWMG, Executive Committee and Stakeholder meetings as necessary

   c. The Executive Committee will elect two (2) of its members as co-chairs, one (1) from the agricultural sector and one (1) from the urban sector

   d. The co-chairs will conduct and direct meetings of the RWMG

   e. The co-chairs, acting as signatories for the RWMG, may execute third-party agreements for integration with other RWMGs with the approval of a simple majority of the Participants

   f. Provide quarterly progress reports and updates to the IRWMP

   g. Initiate actions with the Stakeholder Group to identify, select and apply for appropriate funding opportunities

   h. Recommend to the Stakeholder Group, hire, and manage consultants as needed

   i. Gather, compile and manage data as defined in IRWMP and any grant related contracts received to implement the IRWMP

   j. Identify and obtain needed expertise when appropriate

   k. Prepare an annual budget each fiscal year (July to June) and present to the RWMG for approval

   l. Manage operating funds as provided by the approved budget

   m. Serve as central point of contact for RWMG and IRWMP Implementation. The Executive Committee will select one person to serve as the designated point of contact on behalf of the Implementation Governance Structure. This person may or may not be a member of the Executive Committee.

   n. Provide facilitation for implementation process

o. Identify and coordinate with staff dedicated to supporting the roles of the Executive Committee

p. Coordinate with a legal entity willing to act on behalf of the Stakeholder Group to:

    i. Execute and manage contracts as approved by the RWMG

    ii. Oversee receipt and processing of financial transactions

    iii. Provide an annual report of financial transactions according to accepted accounting practices

q. Designate a fiscal agent to collect and manage funds

r. Initiate discussions related to long-term governance preferences

s. Provide a spokesperson or advocate to represent the Stakeholder Group and RWMG related to implementation of the IRWMP

12.5.5 Representation and Decision Making

1. Regional Water Management Group Members:

    a. Each signatory of the original RWMG Participation Agreement will continue as a member of the RWMG.

    b. New entities may join the RWMG by becoming a signatory to the current Participation Agreement if approved by a simple majority vote of the existing RWMG members.

    c. RWMG members may withdraw from the IRWMP by providing a written request to the Executive Committee. Withdrawal from the RWMG shall not reduce the member's responsibility to make payments of the full amount of their financial obligation under the approved budget for the year in which the request to withdraw is made.

    d. Each member of the RWMG will contribute their proportionate share of the adopted budget for the current fiscal year.

    e. Entities that are not members of the RWMG may contribute funding or in-kind services to support the activities of the Executive Committee and/or RWMG without becoming signatories to the Participation Agreement.

    f. Each organization that is a signatory to the Participation Agreement will appoint one representative to serve on the RWMG.

    g. Each member of the RWMG will have one (1) vote.

    h. If broad agreement cannot be reached, actions may be taken by the RWMG based on a simple majority vote.

2. Executive Committee:

   a. Shall consist of ten (10) members selected by the RWMG to represent the Kern Subregion for staggered three year terms[4]:

      i. Kern County (2012)
      ii. Kern County Water Agency (2013)
      iii. West Side (2012)
      iv. Kern Fan (2013)
      v. North County (2014)
      vi. South County (2012)
      vii. Mountains/Foothills (2013)
      viii. Greater Bakersfield (2014)
      ix. Kern River Valley (2012)
      x. Member-At-Large (2013)

   b. Representatives and alternates to the Executive Committee will be elected as follows:

      i. Nominations for each category can be made by any member of the RWMG and will be made during a Stakeholder Meeting

      ii. If the person nominated is willing to serve on the Executive Committee as described, that person will be considered as a candidate by the RWMG members

      iii. RWMG members may cast one (1) vote for a representative and one (1) vote for an alternate within their subregion. RWMG members that belong to more than one subregion may only vote in their primary subregion

      iv. As the County of Kern is the sole RWMG member for the County of Kern subregion, a representative and alternate to the Executive committee shall be nominated and appointed either directly by or following a procedure set forth by the Kern County Board of Supervisors.

      v. As the Kern County Water Agency is the sole RWMG member for the Kern County Water Agency subregion, a representative and alternate to the Executive committee shall be nominated and appointed either directly by or following a procedure set forth by the Kern County Water Agency Board of Directors.

[4] Members for each category will be reselected in the year shown and every three years following.

vi. A representative and alternate for the Member-At-Large position shall be elected by a simple majority vote of the NGOs and community members belonging to the Stakeholder Group.

1) As the Member-At-Large position is representative of the entire Kern IRWMP, and not any one subregion, the election will be conducted by the Executive Committee.

2) Each NGO and community member may cast one (1) vote for a representative and one (1) voted for an alternate.

vii. If an Executive Committee position becomes vacant before the regularly scheduled reselection year, the same selection process described in this section will be used to select a replacement.

viii. Representatives or alternates to the Executive Committee cannot designate an alternate.

1) If the representative and alternate of a subregion are unable to participate in a meeting or vote, the subregion may elect a temporary alternate following the procedure described in this section.

ix. If the participants of a subregion are not satisfied with the performance of their Executive Committee representative or alternate, one or more RWMG members from that subregion can request that the RWMG members from that subregion conduct a new nomination and selection cycle, as described in this section, for the position (or positions) not being served satisfactorily. This request must be approved by a simple majority vote of the RWMG members from the subregion, as defined in Section 3(a).

1) The newly appointed representative or alternate will be subject to the same nomination and selection cycle, as described in this section.

2) The Executive Committee Co-chairs, or their appointed designee, shall be notified within forty-eight (48) hours of the selection of a new representative or alternate.

c. Members of the Executive Committee will strive to make decisions based on broad agreement. If broad agreement cannot be reached on a particular matter, actions may be taken by a simple majority vote of the Executive Committee members as defined in Section 3(b).

d. Participation at Executive Committee meetings will be limited to one (1) representative per subregion.

3. Voting:

    a. Voting of the RWMG:

        i. If broad agreement cannot be reached, actions may be taken by the RWMG by a simple majority vote.

        ii. A simple majority vote is defined as a majority of the total number of RWMG members.

        iii. Unless otherwise specified, any RWMG member who is unable to cast a vote in person, may submit their vote in writing to the Executive Committee Co-chairs, or their appointed designee, prior to the time of the vote.

        iv. A vote may be taken on any item if motioned and seconded by members of the RWMG.

    b. Voting of the Executive Committee:

        i. A simple majority vote of the Executive Committee is required for all decisions and/or actions requiring approval of the Executive Committee.

        ii. A simple majority vote is defined as a majority of the total number of Executive Committee representatives.

        iii. A vote may be taken on any item if motioned and seconded by members of the Executive Committee.

4. Notification of Meetings and Document Availability:

    a. RWMG Members shall receive notice of all meetings at least seventy-two (72) hours prior to each meeting. Meeting notices will be published to the IRWMP website, sent via electronic mail (e-mail) to the RWMG member email list and posted at the location of the meeting.

    b. All documents requiring review by or approval of the RWMG, shall be published to the Kern IRWMP website and sent via electronic mail (e-mail) to the RWMG member email list at least forty-eight (48) hours prior to the meeting or vote.

12.5.6 Funding

1. Preparation of a Budget:

    a. The Executive Committee shall prepare a budget each fiscal year (July to June).

2. Allocation of Costs:

    a. Costs will be allocated to the RWMG Participants proportionally based on each participant's budget, defined as:

i. Water districts, agencies, purveyors or other RWMG Members that exclusively manage water: The budget will be the total annual budget for the current fiscal year.

ii. For cities, agencies or other RWMG Members that manage or provide goods and/or services other than water management: The budget will be the total operating revenues related to all water management activities, including, but not limited to water supply, wastewater treatment and/or flood management.

iii. For RWMG Members that do not provide goods and/or services related to water management: The budget will be defined on a case-by-case basis and approved by a vote of the RWMG.

b. RWMG Members with a cost allocation of less than two hundred dollars ($200) will not be required to contribute funds. Their cost allocation will be paid by the remaining RWMG Members in proportion to their cost allocation.

c. If a RWMG Members is unable to contribute funds due to financial hardship, said Member may request a fee waiver from the Executive Committee.

i. All fee waivers will be considered on a case-by-case basis.

ii. The Executive Committee may require in-kind services to be provided in-lieu of a financial contribution.

iii. All fee waivers, including any terms or conditions assigned to the waiver, granted by the Executive Committee must be approved by a simple majority vote of the RWMG.

3. Accounting and Reporting:

a. The Executive Committee, or its designated fiscal agent, will provide an annual report of financial transactions according to accepted accounting practices.

b. An informal audit of the finances may be requested by a simple majority vote of the Executive Committee or RWMG.

c. A formal audit of the finances may be requested by a simple majority vote of the Executive Committee or RWMG.

i. A request for a formal audit must define a funding mechanism for the audit, if the funds for a formal audit were not included in the approved budget for the fiscal year in which the audit request is made.

12.6 Plan Adoption and Amendments

1. Adoption of the Kern IRWMP:

a. To adopt the Kern IRWMP, the Executive Committee or RWMG shall hold a public hearing to notify the public of their intent to adopt an IRWMP. A list of entities or individuals that provided comments to the draft IRWMP can be found in Appendix J.

b. The Kern IRWMP shall be in full effect when at least three (3) public agencies, two (2) of which having statutory authority over water supply and management, sign and return to the Executive Committee, or their designee, the signature page of the plan.

    i. Adoption of the plan by each entity seeking to do so shall be subject to the internal policies and practices of said entity.

2. Amendments to the Kern IRWMP:

    a. Amendments to the plan may be proposed by any member of the Stakeholder Group.

    b. Amendments to the plan shall require:

        i. Approval of the RWMG by a simple majority vote, as defined in Section 3(a).

        ii. Once approved by the RWMG, the Executive Committee or RWMG shall hold a public hearing to notify the public of the RWMG's intention to adopt an amended plan.

        iii. The amended plan shall be in full effect when at least three (3) public agencies, two (2) of which having statutory authority over water supply and management, sign and return to the Executive Committee, or their designee, the signature page of the plan.

    c. Changes to the plan's appendices may be proposed by any member of the Stakeholder Group.

    d. At a minimum, the following elements of the Kern IRWMP shall be contained in appendices to the plan:

        i. Kern IRWMP Governance Structure

        ii. Project Prioritization Process

        iii. Project List

    e. The plan's appendices may be amended by a simple majority vote of the RWMG, as defined in Section 3(a).

    f. Amendment of one or more of the appendices, in part or in whole, shall not require re-adoption of the plan by the RWMG.

12.7 IRWMP Term

The term of the Kern IRWMP will be 20 years from initial adoption, with updates and subsequent re-adoption by the parties described below, occurring a minimum of every five years within that 20 year timeframe, unless one or more of the following events triggers re-adoption prior to the scheduled five-year interval:

- Significant change in conditions as defined by the RWMG with input from the Stakeholders.
- Achievement of an objective which necessitates setting a revised or replacement regional objective.
- The need, as determined by the RWMG with Stakeholder input, to set new regional objectives.

Section 13: Finance Plan

13.1 Funding the Development of the IRWM Plan

Initial funding for the Kern IRWMP effort was provided by the Kern RWMG Participants through the MOU. Future funding will be needed to implement all of the projects proposed in this IRWMP, as well to sustain the Kern IRWMP into the future. There are opportunities for grant funding that are available to the stakeholders in the Region and that are well suited to many of the projects that are in this IRWMP. Sources of implementation funds may include: grants, loans, appropriations, water and wastewater general funds, capital improvement funds, general funds from local cities, county departments, private organizations, member dues, etc. Local taxpayers may also fund these projects through rate increases, bond measures, and tax increases.

This section identifies the various funding sources and their associated requirements and guidelines to assist with implementation of the Kern IRWMP projects.

13.2 Appropriations

Funding for large projects can be obtained through federal or state earmark appropriation. Appropriations require extensive political support and effort and can take many years, even in the most favorable political and economic climates. Local agencies have been successful with obtaining appropriations through the U.S. EPA, State and Tribal Assistance Grants (STAG), as well as Title 16 Grants through the Bureau of Reclamation. Recent budget challenges at both the state and federal level have made obtaining future appropriations more difficult. However, given the length of time necessary, it may be prudent for the County of Kern to initiate efforts to seek a federal and/or state funding appropriation.

EPA's STAG account provides grant funds for programs operated primarily by State, local, Tribal and other governmental partners. The account includes two broad types of funds: (1) Infrastructure Assistance, which is used primarily by local governments for projects supporting environmental protection; and, (2) Categorical Grants, which assist State and Tribal governments and other environmental partners with the operation of environmental programs. A portion of the funding from this account goes to State Revolving Fund loans (described below), but some of the funds can be directed to specific drinking water, wastewater, storm water infrastructure, and other water quality protection projects. In 2009, $2.9 billion was appropriated to the State and Tribal Assistance Account.

The USCOE receives appropriations for water projects primarily through its Environmental Infrastructure program. Projects are authorized through the Water Resources Development Act which is generally enacted every two years. Under this program, the local sponsor provides matching funds to the USCOE appropriation and USCOE executes the program. For investigations, the local sponsor's matching share is 50 percent and for design and construction the local sponsor matching share is 25 percent.

Title XVI of the Wastewater and Groundwater Study and Facilities Act allows the Secretary of the Interior (through the Bureau of Reclamation) to “investigate and identify” opportunities for the reclamation and reuse of impaired surface water, groundwater, or wastewater. The Title XVI program gives partial funding, with construction costs shared between the federal government and a local project sponsor. The federal share is generally limited to 25 percent total project costs or $20M, except in the case of “financial hardship.” Formally, funding is only supposed to go to projects where: (1) an appraisal investigation and feasibility study have been approved by Reclamation, (2) Reclamation (on behalf of the Secretary) has determined the local project sponsor is capable of funding the non-federal share of costs, and (3) the local sponsor has entered into a cost share agreement with Reclamation. In practice, many project authorizations and pending legislative proposals are for projects that have not gone through these three steps. Title XVI funding requires two actions, first authorization by Congress and then a subsequent appropriation. Authorization can occur anytime, as a standalone bill or through the Water Resources Development Act. Authorized projects are then funded (or not funded) through the annual Energy and Water Development appropriations bill. Because of the limitation on the ability of Reclamation to request funding for this program, delay can be anticipated in requesting funds for construction. Depending on the number of requests for funding, this delay could be several years. It is estimated that Reclamation will enter into agreements for funding through Title XVI, totaling $115M in fiscal year 2010. However annual appropriations are generally less than $25M.

13.3 Grants and Loans

13.3.1 Grants

Grant and loan funding sources have been identified based on currently available information. However, due to the continuing economic downturn and the State of California’s budget shortfall, the status of many grant and loan programs is uncertain. Grant and loan programs dependent on the sale of California General Obligation bonds have been, and very like will continue to be, limited in the amount of funding offered.

This section includes a discussion of funds available through various grant programs and specifies eligibility requirements. A summary of potential grant funding sources is provided in Table 13-1.

13.3.1.1 Water Recycling Funding Grant and Loan Program (SWRCB)

This is a long-term program operated by the SWRCB that offers grants and low-interest loans for the planning, design and construction of water recycling facilities. This program can also be used to fund groundwater recharge facilities and groundwater reclamation. Grants are provided for facilities planning studies to determine the feasibility of using recycled water to offset the use of fresh/potable water from state and/or local supplies. Pollution control studies, in which water recycling is an alternative, are not eligible. Planning grants are limited to 50 percent of eligible costs, up to $75,000. Construction grants are limited to 25 percent of project costs or $5,000,000, whichever is less. Public agencies and privately-owned utilities regulated by the PUC are eligible. The Water Recycling Funding Program receives funding from various sources, including Proposition 50 and the State Revolving Fund. Due to the varying funding sources, preferences for funding can vary. For example, funding from Proposition 50 gives preference to those recycling projects that result in benefits to the Delta. Currently this program is not being funded.

13.3.1.2 Stormwater Grant Program (SWRCB)

The SWRCB provides grant funds for projects designed to reduce and prevent storm water contamination of rivers, lakes, and streams. Projects must either implement LID strategies or assist in compliance of established storm water TMDLs. Preference is given to projects consistent with an IRWMP and projects that promote long-term water quality. Eighty two (82) million dollars in funding from Proposition 84, up to $3M per project, could be made available to projects that suit this purpose. Solicitations for the Proposition 84 Storm Water Grant Program are on hold until further notice due to the continued budget crisis and Bond Fund Suspension ordered per the December 18, 2008, Budget Letter issued by the Department of Finance. State Water Board staff plans to distribute SWGP funding through at least two rounds of funding, with up to $45M available in Round 1, and the remaining funding available in Round 2.

13.3.1.3 Local Groundwater Assistance Program (DWR)

The Local Groundwater Management Assistance Act of 2000 (CWC § 10795 et seq., Assembly Bill 303) was enacted to provide grants to local public agencies to conduct groundwater studies or to carry out groundwater monitoring and management activities. Priority for grant funding is given to local public agencies that have adopted a groundwater management plan and demonstrate collaboration with other agencies in the management of the affected groundwater basin. Eligible applicants are public agencies with groundwater management authority. Grants up to $250,000 are available. This program is funded through various sources; currently, $4.68M funding is available through Proposition 50.

13.3.1.4 WaterSMART (USBR)

The USBR Sustain and Manage America's Resources for Tomorrow Program (WaterSMART) was established for USBR to work with states, tribes, local governments, and NGOs to secure and stretch water supplies for use by existing and future generations. In addition to sustainable water resources goals, the program also addresses adaptive measures needed to address climate change and future demands. A number of the programs described below are part of the WaterSMART program.

13.3.1.5 Water and Energy Efficiency Grants (USBR)

The Water and Energy Efficiency Grants program offered through USBR is an annual grant program which the applicant will need to provide a minimum of a 50 percent match. Two funding categories are available: funding requests up to $300,000 and funding requests up to $300,000 to $1,000,000. The grants program is approximately $27M and the FOA is released at the beginning of each year. The projects need to demonstrate both water and energy savings.

13.3.1.6 System Optimization Review (USBR)

System Optimization Review grants also offered through the WaterSmart program provides up to $300,000 per grant with total funding available around $1,000,000. A 50 percent matching requirement is needed for the project. The SOR grant projects must demonstrate an increase in system wide efficiency for both water and energy. The projects should not focus on a single structure but apply a broad approach to evaluate the entire system.

13.3.1.7 Grant Grants to Develop Climate Analysis Tools (USBR)

These grants offered annually provide funding to universities, non-profits, or entities with water or energy delivery authority in the Western United States for the development of tools to better manage water resources with the caveat the tool must consider climate change. Up to $200,000 per award is available with $1M of total funding available in the 2010 funding cycle. Seven areas of research are listed as eligible under this program which the ultimate goal of better water resource management.

13.3.1.8 Advanced Water Treatment Grants (USBR)

The Advanced Water Treatment Grant Program offered by USBR funds demonstration and pilot projects which utilize advanced water treatment systems. ADWT grants fall under WaterSMART funding and up to $600,000 is available annually with a total of $2M available. The purpose of this program is to create a new economically feasible water supply from brackish groundwater, seawater, or impaired waters. The ADWT grant encourages water agencies intends to accelerate the adoption of advanced water technologies including reverse osmosis, filtration, electrodialysis, pretreatment methods, advanced oxidation, concentrate disposal or any other process that removes dissolved and suspended matter such as salts, viruses, bacteria or any other difficult to remove matter. The projects should not be the full scale plant but a pilot to demonstrate the viability of the project. O&M costs are not included in the funding, cost sharing is required and the projects must be completed within the specified timeframe of the grant.

13.3.1.9 FEMA/California Emergency Management Agency Infrastructure Improvement Grants

FEMA through the California Emergency Management Agency funds grants to improve existing infrastructure to increase protection from hazards (like wildfires, earthquakes, etc.). In FY 2011 grants up to $3M were available. The intent is to improve infrastructure, particularly lifeline infrastructure (water systems, hospitals, fire) to reduce injuries, loss of life, and damage and destruction of property. <u>Grants are also available for the creation of Local Hazard Mitigation Plans.</u>

13.3.1.10 Small Community Wastewater Grants (SWRCB)

The SCWG Program, most recently funded by Propositions 40 and 50, provides grant assistance for the planning, design, and construction of publicly-owned wastewater treatment and collection facilities. Grants up to $2M are available for small communities (i.e., with a population of 20,000 persons, or less) with financial hardship (i.e., annual MHI is 80 percent of the Statewide MHI, or less).

The Small Community Wastewater Strategy (Strategy) is referenced in State Water Resources Control Board Resolution No. 2008-0048, which promotes strategies to assist small and/or disadvantaged communities with wastewater needs.

13.3.1.11 North American Wetlands Conservation Act Grant (USFWS)

This grant provides funds for projects that provide long-term protection of wetlands, and the fish and wildlife that depend upon wetlands. Applicants must provide local match equal to that requested. Entities that are eligible include organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the US, Canada, and Mexico. Applications are continuously accepted by the US FWS for this grant.

13.3.1.12 Challenge Grant Program (USBR)

This grant program is intended to fund collaborative local projects that improve water conservation and management through advanced technology and conservation markets. Through this program, federal funding is provided to irrigation and water districts for up to 50 percent of the cost of projects involving conservation, efficiency and water marketing. Eligible applicants include irrigation and water districts and state governmental entities with water management authority. Applicants must be located in the western US (California is an eligible area). Applicants do not have to be part of a Reclamation project but proposals with a connection to Reclamation will receive more weight in the evaluation process. Challenge grants are offered periodically, however, more consistent funding can be found under the USBR WaterSMART program.

13.3.1.13 Safe, Clean, and Reliable Drinking Water Act of 2010 (Various)

The Safe, Clean, and Reliable Drinking Water Supply Act of 2010 is a $11.14 billion general obligation bond proposal, that if passed by California voters, would provide funding for projects and programs to address ecosystem and water supply issues. The bond is comprised of seven categories including: drought relief, water supply reliability, groundwater protection and water quality, water recycling, water conservation, Delta sustainability, and statewide water system operational improvement.

The bond would also provide $70M to projects in the Kern Region for the implementation of projects selected through participation in IRWM Plans. To receive funding, a proposed project must be selected by the local IRWMP group as part of a suite of projects that are put into an application to the Department of Water Resources, such as those identified through the process and as identified on the priority list provided in Section 11.

13.3.1.14 Environmental Protection Agency, Pollution Prevention (EPA)

EPA created the Pollution Prevention (P2) Grant Program (formerly Pollution Prevention Incentives for States) under the authority of the Pollution Prevention Act of 1990. The grant program provides matching funds to State and Tribal programs to support P2 activities across all environmental media and to develop State-based programs.

The purpose of the P2 Grant Program is to give States and Tribes the capability to assist businesses and industries in identifying better environmental strategies and solutions for complying with Federal and State environmental regulations. It also aims to improve business competitiveness without increasing environmental impacts. The majority of P2 Grants fund State-based projects for technical assistance, training, outreach, education, regulatory integration, data collection, research, demonstration projects, and recognition programs.

13.3.1.15 Environmental Protection Agency, Source Reduction Assistance (EPA)

EPA annually awards grants and cooperative agreements under the Source Reduction Assistance (SRA) Grant Program. The purpose of this program is to prevent the generation of pollutants at the source and ultimately provide an overall benefit to the environment. This program seeks projects that support source reduction, pollution prevention, and/or source conservation practices. Source reduction activities include: modifying equipment or technology; modifying processes or procedures; reformulating or redesigning products; substituting raw materials; and generating improvements in housekeeping, maintenance, training, or inventory control. Pollution prevention activities reduce or eliminate the creation of pollutants via such procedures as: using raw materials, energy, water or other resources more efficiently; protecting natural resources through conservation; preventing pollution; and promoting the re-use of materials and/or conservation of energy and materials. Eligible organizations include units of State, local, and tribal government; independent school district governments; private or public colleges and universities; nonprofit organizations; and community-based grassroots organizations.

13.3.1.16 Environmental Protection Agency, Wetlands Program Development Grants (EPA)

This program seeks projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. The US EPA has identified three priority areas: (1) the development of a comprehensive monitoring and assessment program; (2) the improvement of the effectiveness of compensatory mitigation; and (3) the refinement of the protection of vulnerable wetlands and aquatic resources. Typically, grant amounts range from $25,000 to $250,000, but there is no set amount. A 25 percent match is required. Eligible entities include States, tribes, local governments, interstate associations, intertribal consortia, and national non-profit, NGOs.

13.3.1.17 Natural Resources Conservation Service, Watershed Protection and Flood Prevention Grant (NRCS)

The purpose of the program is to support activities that promote soil conservation and that promote the preservation of the watersheds of rivers and streams throughout the US. This program seeks to preserve and improve land and water resources via the prevention of erosion, floodwater, and sediment damages. The program supports improvement of; (1) flood prevention including structural and land treatment measures; (2) conservation, development, utilization, and disposal of water; or (3) conservation and proper utilization of land. Successful applicants under this program receive support for watershed surveys and planning, as well as watershed protection and flood prevention operations. Funding for watershed surveys and planning is intended to assist in the development of watershed plans to identify solutions that use conservation practices, including nonstructural measures, to ultimately solve problems.

Matching funds are not required; however, applicants must generally provide matches ranging from 0 to 50 percent in cash or in-kind resources depending on such factors as project type and the kinds of structural measures which a project proposes.

Eligible entities include: states, local governments, and other political subdivisions; soil or water conservation districts; flood prevention or control districts; and tribes. Potential applicants must be able to obtain all appropriate land and water rights and permits to successfully implement proposed projects.

13.3.1.18 US Department of Agriculture, Water and Waste Disposal Program (USDA)

The Water and Waste Disposal Program provides financial assistance in the form of grants and loans for the development and rehabilitation of water, wastewater, and storm drain systems within rural communities. Funds may be used for costs associated with planning, design, and construction of new or existing water, wastewater, and storm drain systems. Eligible projects include storage, distribution systems, and water source development. There are no funding limits, but the average project is granted $1,800,000. Projects must benefit cities, towns, public bodies, and census-designated places with a population less than 10,000 persons. The intent of the program is to improve rural economic development and improve public health and safety.

13.3.1.19 Federal 319 Program (SWRCB)

This program, administered by the SWRCB, is a NPS pollution control program that is focused on controlling activities that impair beneficial uses and on limiting pollutant effects caused by those activities. The program is federally funded on an annual basis. Project proposals that address TMDL implementation and those that address problems in impaired waters are favored in the selection process. There is also a focus on implementing management activities that reduce and/or prevent release of pollutants that impair surface and ground waters. Nonprofit organizations, local government agencies including special districts, tribes, and educational institutions qualify. State or federal agencies may qualify if they are collaborating with local entities and are involved in watershed management or proposing a statewide project. Between $250,000 and $1M of grant money are available for program implantation and between $125,000 and $750,000 for planning. Approximately between $4.5 and $5M are available in funds each year.

13.3.1.20 USDA Rural Development Program

The US Department of Agriculture, through its Rural Development Program, offers grants and financing for utilities in communities of less than 10,000 persons. Public agencies and Native American Tribes are eligible grantees. Eligible utilities include electric, telecommunications, water, and environmental (wastewater, solid waste, storm drainage). USDA can pay up to 75% of project costs also offers low interest financing.

13.3.1.21 USBR Rural Water Supply Program

Through this program, Reclamation assists rural communities in the western United States with planning and design of projects to develop and deliver potable water supplies. Public agencies, and Indian tribes serving communities of less than 50,000 persons are eligible to receive funding for appraisal investigations and feasibility studies related to water supply.

TABLE 13-1
POTENTIAL FUNDING SOURCES - GRANTS

Grant Program	Grant Agency/ Grant Process	Eligible Entities	Eligible Uses	Funding Details
Water Recycling Construction Funding Program	State Water Resources Control Board Applications accepted on continuous basis.	Private entities and public agencies.	Municipal wastewater recycling and reclamation of groundwater unusable due to human activities. Planning costs, land easements and O&M not eligible.	Grants for up to 25 percent of construction costs, up to $5M. Loan funding also - see table below. This program has ~$47M in unallocated funding available.
Stormwater Grant Program	State Water Resources Control Board	Public agencies	Assist in the compliance with Stormwater TMDL	Up to $3,000,000 when this program is available
Local Groundwater Assistance Program	Department of Water Resources Grant guidelines anticipated January 2010.	Public agencies	Groundwater studies or projects that facilitate groundwater management.	Up to $250,000 per project. Approximately $4.7M allocated to this grant program in 2010.
Advanced Water Treatment Grants	US Bureau of Reclamation No specific application process or timeline specified at this time.	Public agencies	Projects that promote advanced water treatment	This is a new grant program proposed for year 2010. No specific information is available on funding amounts or match requirements at this time.
Water Use Efficiency Grant	USBR	Public agencies	Promotes both water use efficiency and energy efficiency	Funding level I: up to $300,000; Funding level II $300,000-$1,000,000
SOR	USBR	Public agencies	System optimization for water and energy	Up to $300,000 with a 50% match
Challenge Grant Program	US Bureau of Reclamation	Public agencies	As defined by the grant	Periodically offered for special topics
Safe, Clean, and Reliable Drinking Water Act of 2010 (more details provided below)	Various These funds are dependent on passage of General Obligation Bond on the ballot November 2010	Currently unknown	Currently unknown	The Kern Region is eligible for a share of $70M in funding, grants and loans for water recycling, desalination, groundwater recharge, water use efficiency and conservation projects These funds are dependent on passage of General Obligation Bond on the ballot November 2010

Grant Program	Grant Agency/ Grant Process	Eligible Entities	Eligible Uses	Funding Details
Pollution Prevention (P2)	Environmental Protection Agency			$5M to support pollution prevention grants in FY 2010
Source Reduction Assistance	Environmental Protection Agency	Public agencies; Colleges	To prevent the generation of pollutants	Per FOA
Wetlands Program Development Grants	Environmental Protection Agency	Public agencies	Studies related to the reduction, prevention and elimination of water pollution	Between $25,000 to $250,000 with 25% matching
Watershed Protection and Flood Prevention Grant	Natural Resources Conservation Service	Public agencies	Promote soil conservation and preserve watersheds	Per FOA
Water and Waste Disposal Program	US Department of Agriculture	Public bodies with <10,000 in population	Development and rehabilitation of water, wastewater and storm drain systems	Averages $1,800,000
Reclamation Rural Water Supply Program	US Department of the Interior – Bureau of Reclamation	States and subdivisions of states with water management or delivery authority	To assess potable water supply needs and identify solutions through appraisal investigations and feasibility studies.	For appraisal investigations: up to $200,000 with 50% cost-share above that amount. Funding for feasibility studies is cost-shared at a minimum of 50% paid by Reclamation. Separate project specific Congressional authorization for construction would be necessary.

13.3.2 Loans

This section includes a discussion of funds available through various loan programs and specifies eligibility requirements. A summary of potential loan funding sources is provided in Table 13-2.

TABLE 13-2
POTENTIAL FUNDING SOURCES - LOANS

Loan Program	Grant Agency/ Grant Process	Eligible Entities	Eligible Uses	Funding Details
Clean Water State Revolving Fund	State Water Resources Control Board	Public agencies	Water and wastewater treatment facilities.	Up to $25M. Loan rate set at ½ State's General Bond Obligation rate.
Safe Drinking Water State Revolving Fund	California Department of Public Health	Public water systems	Water treatment facilities needed to comply with Safe Drinking Water Act.	Up to $20M. Loan rate set at ½ State's General Bond Obligation rate.
Federal 319 Program	State Water Resources Control Board	Public agencies	TMDL implementation, nonpoint source pollution	
New Local Water Supply (Proposition 82)	Department of Water Resources No specific application process or timeline specified at this time.	Local public agencies	Water supply development projects including canals, dams, reservoirs, desalination facilities, groundwater extraction facilities, and related improvements.	Loan for up to $5M. Loan rate set at ½ State's General Bond Obligation rate.
California Energy Commission Energy Financing Program	California Energy Commission	Public agencies	Proven energy saving devices	$3M maximum loan with 3% interest rate; Ends March 2012
Agricultural Drainage Loan Program	State Water Resources Control Board	Public agencies	Storage, conveyance and disposal of agricultural drainage waters	$11.3M available with funding cap of $20M for implementation projects and $100,000 for feasibility studies. Loan for up to 20 years.

Loan Program	Grant Agency/ Grant Process	Eligible Entities	Eligible Uses	Funding Details
Agricultural Drainage Management Loan Program	State Water Resources Control Board	Public agencies	Storage, conveyance and disposal of agricultural drainage waters	$6.67M available with funding cap of $5M for implementation and $100,000 for feasibility studies. Loan for up to 20 years.
Small Community Wastewater Grants and Loans	SWRCB	Small disadvantaged communities	Correct water quality problem	Based on equation
Infrastructure State Revolving Fund- California Infrastructure and Economic Development Bank	Infrastructure and Economic Development Bank	Public agencies	Public infrastructure	$250,000 to $10,000,000 loan for up to 30 years.
Agricultural Water Conservation Program	DWR	Local public agencies and incorporated mutual water companies	Capital construction projects	$5M per project

13.3.2.1 Clean Water State Revolving Fund (SWRCB)

The Federal Water Pollution Control Act (Clean Water Act or CWA), as amended in 1987, provides for establishment of a Clean Water State Revolving Fund (CWSRF) program. The program is funded by federal grants, State funds (including Propositions 50 and 84), and Revenue Bonds. The purpose of the CWSRF program is to implement the CWA and various State laws by providing financial assistance for the construction of facilities or implementation of measures necessary to address water quality problems and to prevent pollution of the waters of the State.

The CWSRF Loan Program provides low-interest loan funding for construction of publicly-owned wastewater treatment facilities, local sewers, sewer interceptors, water recycling facilities, as well as, expanded use projects such as implementation of NPS projects or programs, development and implementation of estuary Comprehensive Conservation and Management Plans, and storm water treatment. Publicly owned treatment works, local public agencies, non-profit organizations, and private parties are eligible for funding. Matching funds are not required. Applications are continuously accepted and $200 to $300M is available annually.

The California CWSRF will receive funds from the American Recovery and Reinvestment Act of 2009 (ARRA) in an amount in excess of $280M. Priorities will be focused on "shovel-ready" projects that will create jobs immediately.

13.3.2.2 Safe Drinking Water State Revolving Fund (DPH)

The Federal SDWA Amendments of 1996 authorized the creation of a revolving fund program for public water system infrastructure needs specific to drinking water. There is similar State legislation and the Safe Drinking Water State Revolving Fund (SDWSRF) reflects the intent of Federal and State laws to provide grant funding or low-interest loans to correct deficiencies in public water systems based on a prioritized system. Highest priority is given to projects that address public health risk, projects that will assist a public water system with compliance with the SDWA, and projects that assist those public water systems most in need. Funding is available for construction/enhancement of public water systems. The program is funded by Federal grants, State funds (including Propositions 50 and 84), and revenue bonds. The program is administered by DPH. The entity must be a public water system to be eligible and preference is given to DACs.

The SDWSRF is receiving funds from the federal ARRA, which was was signed into law in February 2009. The ARRA/SDWSRF funding is for infrastructure development for California's drinking water systems.

13.3.2.3 Agricultural Drainage Loan Program (SWRCB)

The Agricultural Drainage Loan Program was created by the Water Conservation and Water Quality Bond Law of 1986 to address treatment, storage, conveyance, or disposal of agricultural drainage water that threaten waters of the State. There is $11.3M available with a funding cap of $20M for implementation projects and $100,000 for feasibility studies. Loan repayments are for a period of up to 20 years.

13.3.2.4 Agricultural Drainage Management Loan Program (DPH)

This program was created by Proposition 204, passed by the voters in 1996, to address treatment, storage, conveyance, or disposal of agricultural drainage water that threaten waters of the State. There is $6.67M available with a funding cap of $5M for implementation and $100,000 for feasibility studies and a loan repayment period of up to 20 years.

13.3.2.5 Small Community Wastewater Grants

This grant and loan program offered by SWRCB provides funding for projects that will correct a public health or water quality problem present in a small financially DAC. Communities that meet the criteria may receive funds for planning, design, and construction of publicly owned wastewater treatment facilities. Amount of the grant is calculated using the equation in the guidelines and the MHI of the community.

13.3.2.6 Infrastructure State Revolving Fund- California Infrastructure and Economic Development Bank

Through I-Bank, this program funds public infrastructure projects deemed important to California communities. The financing is available to cities, counties, special districts, assessment districts, joint powers authorities, and redevelopment agencies. Eligible projects may include streets and highways, sewage collection and treatment, water treatment and distribution, drainage, flood control, solid waste collection and disposal. The financing can be paired with other grant and loans programs to complete the funding of a project although no matching is required and the funds may serve as the sole source for the project. Funding amount range from $250,000 to $10,000,000 at a fixed interest rate and applications are accepted continuously.

13.3.2.7 California Energy Commission Energy Financing Program

The program provides funding to cities, counties, public care institutions, public hospitals, public schools and colleges, and special districts. The projects must have proven energy savings and some of the projects are but not limited to pumps and motors, lighting systems, building insulation, energy generation, waste water treatment equipment, and HVAC modifications. The maximum funding for each loan is $3M with an interest rate of 3 percent. As this program is tied to ARRA funds, the loans must be dispersed by March 2012.

13.3.2.8 Agricultural Water Conservation Program (Proposition 13) (DWR)

Local public agencies or incorporated mutual water companies with adopted UWMPs are eligible for funding under this program. Funds include a total of $28M with each project loan limited to $5M. The funds can be utilized for constructions projects that improves agricultural water use efficiency. Rehabilitation projects are not considered eligible under this program. Applications are accepted on a continuous basis.

13.4 Other Financing Mechanisms

Several new programs/financial instruments have come out of the ARRA. Anyone interested in these funding mechanisms should seek advice from an investment banker/bond counsel and/or the California Debt and Investment Advisory Council.

New ARRA financial instruments include:

- Direct Subsidy Build America Bonds (Direct Subsidy BABs)
- Tax Credit Build America Bonds (Tax Credit BABs)

Generally these are all new financial instruments made possible with ARRA that include some provision where a portion of the loan cost is subsidized by the federal government. These bond programs are all tied to ARRA and hence will expire December 31, 2010. The intent of these bond programs is to allow public agencies to finance public projects with little or no interest cost. All of these bonds are issued as taxable bonds (whereas most government bonds are issued as tax-exempt bonds). Because these are taxable bonds they attract a new and larger set of investors than is typical for a government bond.

- Direct Subsidy BABs - under this program a public entity can issue bonds for a capital project to the taxable bond market. In turn the US Treasury gives the public entity/bond issuer 35 percent of the interest they will owe to the bond holders (e.g., if a City issues a bond with 6 percent interest, the Treasury reimburses the City for 2.1 percent of that interest, making the interest paid by the City 3.9 percent).

- Tax Credit BABs - under this program a public entity can issue bonds for a capital project to the taxable bond market. In turn, the bond holder is given federal tax credits.

Metropolitan Water District recently sold $78M in BABs and after the direct subsidies and tax credits, Metropolitan was able to have an effective interest rate of less the 4 percent.

13.5 Selected Plan Project Cost Estimates

Current project cost data was gathered in 2009. Since that time, the IRWMP project data forms have been updated to reflect changes to the IRWMP standards as well as the current project prioritization process, which include the need to collect data on project operations and maintenance costs and funding. It is understood that operations and maintenance costs for projects that implement the IRWMP plan are the responsibility of the sponsoring agency and are typically ineligible for grant or loan funding. Sponsoring entities will be expected to operate and maintain IRWMP projects through user fees and other non-grant revenues. Project cost data will be updated in the future through the project prioritization process.

13.6 Grant Funding Package Strategy

Securing funding for the projects proposed in the Kern IRWMP can be best accomplished with a focused, deliberate, packaging strategy. As seen from the descriptions above, there are many funding programs within and outside of the Kern Region that could provide financial opportunities for the stakeholders' projects. As these funding opportunities become available, Plan Projects will be integrated to fit the future funding criteria. In this manner, a process would be established for integrating packages of projects for future funding programs.

Section 14: Technical Feasibility, Monitoring, Data Management, and Plan Performance

This section is organized into three parts to summarize the information used to support the technical feasibility of the IRWMP, the means and methodologies for data management and monitoring within the Region, and plans for data collection, reporting and performance of the Kern Region IRWMP.

14.1 Technical Feasibility

The Kern IRWMP objectives, discussed in Section 9, were developed to allow progress of the overall IRWMP to be measured. Examples of projects that would benefit these objectives, either current projects, or concepts, are provided in Section 11.3.1. Projects proposed for implementation in the Kern IRWMP must be supported by technical studies and reports that document not just their feasibility, but also their ability to meet these objectives.

The Kern IRWMP was prepared using information and guidance provided by an extensive mix of water suppliers, municipalities, town councils, regulatory, environmental, agricultural, and land use planning entities that represent all areas of the Kern Region. Extensive information and data on the Kern Region have been prepared by these various agencies and groups. Early in the development process of these stakeholders were asked to submit their plans, reports, and studies to the region's IRWMP resource library to ensure that the Kern IRWMP accurately reflects each stakeholder's individual perspectives, while fostering recognition of opportunities for partnering to resolve common issues. That information was reviewed and evaluated as part of this IRWMP and served as the technical foundation for the development of this plan, as described below.

The following documents contain the baseline information used in the development of the Kern IRWMP. A brief summary of some of the main reports, how often they are updated, who prepares them and the type of information generated by the document is provided for each report listed. .

14.1.1 Water Resource Management Reports and Plans

These reports document the reliability and availability of the Region's water supplies to meet current and projected demands. These reports typically include UWMPs and AB 3030 Groundwater Management Plans. Since 2009, with the passage of the Comprehensive Water Package (SBX7) by the Legislature, some additional planning processes have been proscribed; these include AWMPs and Groundwater Monitoring protocols.

The California Urban Water Management Planning Act (a part of the CWC) applies to public and private municipal water suppliers with more than 3,000 connections or supplying more than 3,000 AFY. The act requires suppliers to describe and evaluate sources of water supply, impacts of hydrology on water supplies, efficient uses of water (DMMs), implementation strategy and schedule, and other relevant information and programs. This information is used by the urban water supplier to develop a UWMP, which is submitted to DWR in years ending in five and zero (e.g., 2000, 2005, 2010). An additional requirement since 2009 is SBX7-7, Part 2.55, which requires all urban retail water suppliers subject to the UWMP Act to contribute to the achievement of a 20 percent reduction in statewide urban water use in gpcd by 2020. Specific terms were required to be included in 2010 UWMPs, which were due by July 1, 2011.

Assembly Bill 3030 (AB 3030), the Groundwater Management Act (also a part of the CWC), authorized local agencies to prepare groundwater management plans for groundwater basins not subject to adjudication or other form of regulation. AB 3030 lays out a procedure for development of a groundwater management plan. The act also specifies twelve technical components which can be included in a groundwater management plan, including replenishment strategy, mitigation of overdraft, mitigation of contaminated groundwater, and avoidance of saline intrusion.

The Agricultural Water Management Planning Act (SBX7-7, Part 2.8), now a part of the CWC, applies to agricultural water suppliers providing water to more than 10,000 irrigated acres. It requires applicable agricultural water suppliers to adopt AWMPs, on a schedule parallel to UWMPs. The purpose for the plans is to facilitate management and conservation of water by suppliers, and also to guide and document the implementation of EWMPs used to meet the conservation goals. To promote the use of demand-based practices and help meet water conservation goals, SBX7-7 requires agricultural water suppliers to implement a number of EWMPs. Some of the EWMPs are critical (mandatory) for all affected agricultural water suppliers. Other additional EWMPs are to be implemented by suppliers if the measures are locally cost effective and technically feasible.

Another new water resource data collection venue is the Groundwater Monitoring reporting under SBX7-6. SBX7-6 established a voluntary program that allows local agencies to establish a groundwater elevation monitoring program designed to best meet local circumstances.

Table 14-1 presents a listing of the water resource management reports and plans reviewed for the Kern IRWMP, and that were collected as part of the Kern Region document library.

Note that a number of 2010 UWMPs are still in development, or have not yet been provided for the Kern IRWMP.

TABLE 14-1
WATER RESOURCE MANAGEMENT REPORTS AND PLANS

Subregion	Agency	Document	Relevant Data
County of Kern	--	--	--
Greater Bakersfield	City of Bakersfield	2000 Water Report	• Provides historical balance of water supply and demand within the City. • Basis to determine how much additional water demand can occur without taxing the available water resources.
	Improvement District No. 4	2010 UWMP	• Special district, water supplier wholesaler, SWP Contractor. • Water Sources include SWP entitlement, Kern River water, CVP and groundwater banking projects. • Serves population of approximately 336,000. • ID4 wholesales water to CWS, City of Bakersfield, ENCSD and NORMWD. • In 2005 a new agreement for water supply was executed increasing water supply from the original 25,000 AFY to a maximum of 53,000 AFY to meet purveyors' projected water demands.
	Oildale Mutual Water Company	2010 UWMP	• Provides description and evaluation of sufficiency of current and future water supplies.
	City of Bakersfield	2005 UWMP Update	• Reviews the activities of the City water system as a retail water supplier. • Describes the management of the groundwater basin to achieve the maximum practicable conservation and efficient use of water resources. • Describes water management tools and options used to maximize local resources and minimize need to import water from other regions. • City of Bakersfield provides water to its customers from groundwater pumping. • Groundwater basin is recharged with Kern River water. • DMMs, future water supplies, potential recycled water use and potential plans to serve new customers within the City water system service area are discussed.
	North of the River Municipal Water District	2005 UWMP	• Provides wholesale water to OMWC (78% of NORMWD supply) and retail water to ~2000 service connections. • Water sources include contract with KCWA ID4 for 15,000 AFY of SWP and 1,500 AFY from groundwater. • Practices in-lieu of groundwater recharge • Excellent Water Quality
Kern County Water Agency	Kern County Water Agency	2001 Water Supply Report	• Describes water supplies and demands up to water year 2001 for the Agency and the member purveyors.
		2007 Water Supply Report (unpublished data)	• Describes water supplies and demands up to water year 2007 for the Agency and the member purveyors.
Kern Fan	Rosedale-Rio Bravo Water Storage District	AB3030 Groundwater Management Plan	• Groundwater management practices based on conjunctive use of surface and groundwater resources. Surface water is used for irrigation in-lieu of groundwater extraction. • Water sources are from Kern River water by contract with the City of Bakersfield (10,000 AFY) and by contract with KCWA for SWP water (29,000 AFY). • Groundwater recharge is achieved through direct recharge to underground and by delivery of surface water to lands otherwise dependent on groundwater. 80-90% of surface water delivered percolates to groundwater. • Water transfers and exchanges also part of conjunctive use program. RRBWSD is participant of Pioneer Project.
	West Kern Water District	2010 UWMP, AB3030 Groundwater Management Plan	• Provides description and evaluation of sufficiency of current and future water supplies, including groundwater. Also provides management plan for groundwater.
	Vaughn Water Company	2005 UWMP	• Serves population of ~ 27,000 in the Rosedale area in Bakersfield. • Underlies KCWA ID4 and RRBWSD and supports efforts of both agencies to achieve groundwater balance. • Produces approximately 10,740 AFY of groundwater. • Groundwater levels dropped ~145' in five years. • Entered into MOU with RRBWSD to allow development of certain lands within District.

Subregion	Agency	Document	Relevant Data
Mountains/Foothills	Tejon-Castac Water District	2005 UWMP	• Provides description and evaluation of sufficiency of current and future water supplies.
	Tehachapi Regional	2010 UWMP	• Provides description and evaluation of sufficiency of current and future water supplies.
Kern River Valley	--	--	--
North County	City of Shafter	2005 UWMP	• Delivers water supply of approximately 5,000 AFY through 3,700 connections. • Water supply source is the groundwater body of the Kern County sub-basin. • Water system includes 7 active wells, 4 above ground storage stand with booster pumps and 70 miles of distribution lines. • Wells depths range between 700 and 800 feet. Standing water level approximately 250 feet • North Kern Water District as underlying wholesaler replenishes the groundwater through collection of tolls has recharges approximately 2,426,579 AF in 14 years. • TCP, arsenic, and nitrates have been detected in groundwater supply. • Water to City meets all drinking water standards.
	City of Wasco	2010 UWMP	• Only potable water source is from 8 City owned and operated wells from groundwater body of Kern County sub-basin. • Groundwater quality in general is suitable for most urban and agricultural uses with some impediments. Constituents of concern are has high TDS, nitrate, arsenic, and organic compounds. • Overall quality from active wells exceeds State Department of Health Services water quality criteria. However there are 3 contaminants of concern, nitrate, DBCP and EDB. • Wastewater Treatment Facility treats approximately 1.7 MGD. Effluent is discharged to 605 acres of City owned land for agricultural use only.
South County	Kern Delta Water District	AB3030 Groundwater Management Plan	• Groundwater management plan based on conjunctive use of surface and groundwater resources. • Surface water sources include SWP water by contract with KCWA (25,000 AFY) and Kern River water through exchange agreement with BVWSD for SWP water. Certain land receive effluent from the City of Bakersfield Wastewater Treatment Plants No. 2 and No. 3. • Groundwater levels are measured routinely on 150 wells in the spring and fall.
	Wheeler Ridge Maricopa Water Storage District	AB3030 Groundwater Management Plan	• Goal to increase reliability and sustainability of water supply by securing several sources of imported water and managing conjunctively with groundwater. • Water sources include groundwater, imported water from SWP and local banking programs including Kern Water Bank, Pioneer Project and Berrenda Mesa. Approximately 436,962 AF of storage available from these banking programs as of December 2006. • Hydrographs indicate water level decline of 100'-300' between 1950 and 1970, average of 8'-12' per year. Since 1970, an overall recovery on average of 2'-6' has been observed in response to surface water importation. On average 170,052 AFY of imported SWP. • Average groundwater extraction between 1971 and 2002 is approximately 61,461 AFY. • Groundwater recharge is received primarily through percolation from irrigation. • Groundwater meets Class I or Class II irrigation water quality standards.
	Arvin-Edison	AB3030 Groundwater Management Plan, USBR Water Management Plan	• Coordinated groundwater management plan based on conjunctive use of surface and groundwater resources to increase reliability and sustainability of water supplies. A plan for efficient water management and agricultural water conservation.
Westside	Dudley Ridge Water District	AWMP	• Prepared in compliance with AB3616 Agricultural Water Suppliers Efficient Water Management Practices Act of 1990. • Provides description of district, inventory of water resources, review of previous water management practices.
	Belridge Water Storage District	AWMP	• Prepared in Accordance with "Memorandum of Understanding by Water Suppliers in California January 1, 1999 Regarding Agricultural Water Management Practice Act of 1990 AB3616".
	Berrenda Mesa Water District	AWMP	• District formed under Division 13 of California Water Code on September 3, 1963. • Serves 55,440 acres of agricultural land. • Member of KCWA.
	Lost Hills Water District	AWMP	• Provides description of district, inventory of water resources, review of previous water management practices.

14.1.2 Facilities Plans and Master Plans

A facilities plan and/or master plan is a physical development plan that provides the framework by which future planning decisions are made. It is an action plan for a particular resource or service such as recycled water, flood control, and wastewater, and can include planned facilities.

Table 14-2 presents a listing of the facilities plans and master plans reviewed for the Kern IRWMP, and that were collected as part of the Kern Region document library.

TABLE 14-2
FACILITIES PLANS AND MASTER PLANS

Subregion	Agency	Document	Relevant Data
County of Kern	--	--	--
Greater Bakersfield	California Water Service	2008 Master Plan Update	• Groundwater provides 60% of water demands, treated Kern River water from North East Bakersfield Water Treatment Plant (NEBTP) and North West Bakersfield Water Treatment Plant (NWBTP) provide 23% of water demands, and ID4 provides 17% of water demands. • NEBTP will expand from 20 MGD to 40 MGD and ultimately to 60 MGD. • NWBTP treats 10.4 MGD half of which is contractually obligated to the City of Bakersfield.
Kern County Water Agency	--	--	--
Kern Fan	--	--	--
Mountains/Foothills	--	--	--
Kern River Valley	--	--	--
North County	City of Wasco	2007 Final Water Master Plan	• Service area expected to increase from 5,400 acres to 10,600 acres and population to increase from 18,000 to 41,000, both by 2026. • Demands will increase from 4.1MGD to 15 MGD in 2026. • Future water system will need 18 wells, expanded distribution system, 3 MG tank, and two 1 MG tanks.
South County	--	--	--
Westside	--	--	--

14.1.3 Resource Conservation Plans

Resource conservation plans in this context are those watershed, river, and conservation plans that study the natural, biological, recreational, and historical resources of a particular watershed, or Region.

Table 14-3 presents a listing of the resource conservation plans reviewed for the Kern IRWMP, and that were collected as part of the Kern Region document library.

TABLE 14-3
RESOURCE CONSERVATION PLANS

Subregion	Agency	Document	Relevant Data
County of Kern	County of Kern	Draft Kern County Valley Floor Habitat Conservation Plan	Protects federally listed species, State-protected species, and/or other species of concern on an area ~ 3,110 sq. miles that includes most of the San Joaquin Valley floor portion of Kern County up to an elevation of 2,000 feet.
	County of Kern	Kern Flood Control and Mitigation for Kern Lake Basin	Develops an implementation plan inclusive of project operation, cost, benefits, justification, environmental effects, and floodplain effects that will provide for mitigation of flood waters for all watersheds covered by the Kern Lake Basin.
	County of Kern	2008 Strategic Plan	
Greater Bakersfield	City of Bakersfield	Metropolitan Bakersfield Habitat Conservation Plan	
	City of Bakersfield	2007 Recreation and Parks Master Plan	
Kern County Water Agency	--	--	--
Kern Fan	--	--	--
Mountains/Foothills	--	--	--
Kern River Valley	CDFG, Sequoia National Forest, Sequoia National Park	Upper Kern Basin Fishery Management Plan	• Describes the environment of the upper Kern basin. • Provides direction for management of the fish resources of the upper Kern basin. • Identifies environmental concerns that could directly or indirectly affect fishery management in the upper Kern basin
	Desert Mountain Resource Conservation and Development Council (RC&DC)	Desert Mountain RC&D 5-Year Plan, 2009-2013	• Provides updated socio-economic, demographic, and agricultural data for Inyo, San Bernardino, Los Angeles, Kern, Mono, and California. • Identifies quantifiable goals and objectives for the RC&D service area: includes water supply, water quality, land management.
North County	--	--	--
South County	--	--	--
Westside	--	--	--

14.1.4 Water Quality Plans

Water quality plans are generally designed to preserve and enhance water quality and protect beneficial uses of water.

Specifically, the CVRWQCB Basin Plan, which protects the beneficial uses of water within the Central Valley hydrologic region, designates beneficial uses for surface and ground waters, sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's anti-degradation policy, and describes implementation programs to protect all waters in the Region. In addition, the Basin Plan incorporates (by reference) all applicable State and Regional Board plans and policies and other pertinent water quality policies and regulations. As conditions change, such as the identification of new TMDLs or water quality standards, the Basin Plan is amended. Following adoption by the CVRWQCB, the Basin Plan and subsequent amendments are subject to approval by the SWRCB, the State Office of Administrative Law, and the US EPA.

DWR provide ongoing monitoring of the SWP through the Municipal Water Quality Investigations Committee; it prepares the SWP Sanitary Survey every five years in accordance with state law. USBR provides a Baseline Water quality Report for the CVP.

Table 14-4 presents a listing of the local water quality plans reviewed for the Kern IRWMP, and that were collected as part of the Kern Region document library.

TABLE 14-4
WATER QUALITY PLANS

Subregion	Agency	Document	Relevant Data
County of Kern	Central Valley RWQCB	Central Valley Basin Plan & Amendments	
Greater Bakersfield	City of Bakersfield	2000 Water Balance Report	
	California Water Service	2007 Water Quality Report	• Water supply meets all primary and secondary drinking water standards.
	North of the River Municipal Water District	2007 Water Quality Report	--
	Improvement District No. 4	2006 Water Quality Report	• KCWA participates in wide scope of water management activities including water quality, flood control and groundwater. • ID4 created in 1971 to act as wholesaler provider of drinking water. • ID4 operates the Henry C. Garnett Water Purification Plant. Produces on average 25 MGD during peak (summer months) produces 45 MGD. • Water is wholesaled to retail “purveyors” CWS, NORMWD and ENCSD. • Water sources include SWP (77,000 AFY) which is exchanged when possible with Kern River water. • In 2006 Henry Garnett Plant treated 18,412 AF of Kern River water and 71,600 AF of SWP water. • ID4 has met all USEPA and DHS drinking water standards. • ID4 participated in SWP Sanitary Survey in 1996 and updated 2001 and in the sanitary survey for the Friant-Kern Canal and Upper San Joaquin River watershed in 1998 and update in 2000. • ID4 began its own sanitary survey in 1992 of the Kern River Watershed.
	North of the River Municipal Water District	2007 Annual Water Quality and Consumer Confidence Report	
	East Niles Community Services District	2007 Water Quality Report for Groundwater and Surface Water	
Kern County Water Agency	--	--	--
Kern Fan	Vaughn Water Company	2007, 2008 Water Quality Reports	
Mountains/Foothills	Stallion Springs Community Services District	2007 Water Quality Report	--
Kern River Valley	--	--	--
North County	City of Shafter	2007, 2008 Consumer Confidence Reports	
South County	--	--	--
Westside	--	--	--

14.1.5 City, County, and Federal Land Use Plans

Land use plans provide for the scientific, aesthetic, and orderly disposition of land, resources, facilities and services of urban and rural communities. General plans are a compendium of city or county policies regarding long-term development, in the form of maps and accompanying text. In California, general plans have seven mandatory elements (circulation, conservation, housing, land use, noise, open space, safety and seismic safety) and may include any number of optional elements (such as water, air quality, economic development, hazardous waste, and parks and recreation). Most local general planning documents generally have identified water management resource strategies that integrate with land use planning efforts. By law, each city and county is required to update the Housing Element of its general plan every five years and the Governor's Office of Planning and Research recommends that the remaining elements be reviewed every eight to ten years.

14.1.5.1 Kern Regional Blueprint Program

The Kern Regional Blueprint Program, led by the Kern Council of Governments (KernCOG), is part of a larger eight-county, San Joaquin Valley-wide process. At both the County and Valley levels, the Blueprint process will result in a preferred regional transportation, land use, and environmental vision responding to the many challenges associated with anticipated population growth over the next 40 years. Part of Kern's portion of a valley-wide blueprint will include growth principles and scenario planning tools for both local and regional level planning activities. It is also another means for collecting economic, transportation/planning, environmental, and GIS data for the Region.

The final product, to be known as the San Joaquin Valley Regional Blueprint, will include a visual representation of the goals expressed in general plans and individual regional transportation plans.

The following is a list of the city, county, and specific land use planning documents reviewed for the Kern IRWMP, and that were collected as part of the Kern Region document library.

County of Kern subregion

- Kern County General Plan
- Kern Regional Blueprint Report Phase 1 and Phase 2 Reports

Greater Bakersfield subregion

- Metropolitan Bakersfield General Plan

Kern Fan subregion

- City of Taft General Plan
- California Centre Specific Plan
- I-5 and I-58 Rural Community Plan
- South Kern Industrial Center Specific Plan

Mountains and Foothills subregion

- City of Tehachapi General Plan
- Tejon Industrial Complex East Specific Plan
- Tejon Industrial Complex West Specific Plan

Kern River Valley

- NA

North County subregion

- City of Delano General Plan
- City of Wasco General Plan
- City of Shafter General Plan
- City of McFarland General Plan
- Pong Rural Community Specific Plan
- Smith's Corner Rural Community Specific Plan
- Mexican Colony-Cherokee Strip Community Specific Plan

South County subregion

- San Emigdio New Town Specific Plan IER Technical Appendices
- Bear Valley Springs Specific Plan

Westside subregion

- Lost Hills General Plan
- Blackwells's Corner Specific Plan
- Cameron Pointe Specific Plan

14.2 Data Management

Collection of data can be used to help quickly identify data gaps, assess project and program performance, support statewide data needs, and integrate with other regional and statewide programs. Within the Region, there are a several entities that collect and maintain data on the Region's water and environmental resources. The Kern Fan Monitoring Committee (KFMC) was established by various MOUs among the Kern Fan area entities. The members of the Committee include both banking project participants and adjoining entities (those entities whose lands and/or banking projects are adjacent to the banking projects). The KFMC is responsible for collecting data from participants/adjoining entities and reporting that data in the KMFC's "Kern Fan Area Operations and Monitoring Report." Other discretionary activities/authorities of the committee include: hiring technical consultants, determining the need for/placement of additional monitoring sites and dispute resolution. Data that is collected and published in the Operations and Monitoring Report includes the following: groundwater levels, groundwater elevation and water quality sampling results. Regional banking programs such as the Kern Water Bank collect annual statistical data in accordance with AB3030, the Groundwater Management Planning Act, and providing groundwater monitoring data for the Region.

The Kern River Interests are those valley floor entities with Kern River rights; they include: Buena Vista WSD, Kern Delta WD, North Kern WSD, City of Bakersfield and KCWA. More specifically, North Kern and City of Bakersfield has rights below the "first point of measurement," Kern Delta and Buena Vista have "second point of measurement" rights and the Agency has lower river (a.k.a. high flow) rights. The Kern River Interests collectively have hired a Watermaster to maintain records at the first point of measurement. Buena Vista WSD also is responsible for the collection and maintenance of second point records.

KCWA is the primary means for collecting data on groundwater and surface water supplies and water quality. Since its formation in 1961, the Agency or through other water districts has collected information on the water supply and demand characteristics of the San Joaquin Valley portion of Kern County. Since 1977, the Agency has published it annual Water Supply Report to present these statistics in one document and to assist water leaders and users in making water management decisions.

Each of these committee's and/or agencies are collecting data that is important to the Region, have methods for data collection that are similar, and thus have opportunities for streamlining or maximization of efficiencies for creating region-wide datasets and databanks.

Data is vitally important to agencies trying to maximize operating efficiency and design projects with limited budgets. The types of data available, current relevance and trends, and knowledgeable people that can interpret the data are all important. Equally important is the opportunity for Federal and State agencies to view local data for their own monitoring needs and to better understand local conditions.

Creation of data management tools that recognize these similarities in methodology, the repetitiveness in data harnessing, and inefficiencies in data reporting are additional strategies that can be implemented in order to streamline efforts on not just a local, but a region-wide scale as well. The ongoing data collection and management efforts for the IRWMP will be directed by the Executive Committee, which will establish a means to collect and maintain the data as well as to update and maintain the IRWMP website via an outside consultant.

14.3 Monitoring

The Kern River Watermaster is the main local entity for monitoring Kern River surface water, and is responsible for the operation of Isabella Reservoir and dam, representing all downstream water rights entities. Unless the integrity of the dam is jeopardized, the Kern River Watermaster is responsible for giving the daily instructions on the amount of water to be released from the Isabella Reservoir by the Army Corps of Engineers. The Watermaster is also responsible for preparing and keeping complete daily records on Kern River flows, which dates back to 1977 according to records from the City of Bakersfield Water Resources Department since 1977 (Kern River Valley Specific Plan, County of Kern, October 2006). KCWA monitors SWP supply availability to the Region, and Arvin-Edison, as the largest Friant entity in the Region, monitors the CVP surface supply.

14.3.1 Urban Water Management Plan (UWMP) and AB3030 Compliance Monitoring and Reporting

Sources of data for water supply quantities include the individual agency UWMPs and AB3030 plans that are updated every 5 years (ending in 0). These include the evaluation of single-dry and multi-dry year demands under different hydrologic scenarios and an assessment of supply vs. demand. Monitoring of surface and groundwater supplies as appropriate are conducted to support these analyses.

14.3.2 Safe Drinking Water Act (SDWA) Compliance Monitoring and Reporting

All public water systems are required to produce water that complies with the SDWA. To this end, specific monitoring information is required and conducted routinely. Results of the monitoring are reported to DPH. In addition, monitoring information is required to be published in an annual Consumer Confidence Report (described below).

14.3.3 Watershed Sanitary Survey Reporting

Watershed Sanitary Surveys are required by DPH every 5 years or when there are major changes to the watershed. Municipalities that use surface water for drinking water, such as KCWA and the City of Bakersfield, are also required to prepare these.

14.3.4 Unregulated Contaminant Monitoring Rule Results

The 1996 SDWA Amendments mandate that the US EPA publish a list of unregulated contaminants that may pose a potential public health risk in drinking water. This list is called the Contaminant Candidate List. The initial 1998 accounting listed 60 contaminants. US EPA uses this list to prioritize research and data collection efforts for future rulemaking purposes. The 1996 SDWA Amendments incorporated a tiered monitoring approach. The rule required all large public water systems and a nationally representative sample of small public water systems serving less than 10,000 people to monitor the contaminants. The information from the monitoring program for the Region are compiled and submitted to the State.

14.3.5 Monitoring Done as Part of TMDL Implementation

As conditions change in the Region, such as the identification of new TMDLs or water quality standards, the CVRWQCB Basin Plan is amended. Compliance monitoring is required by the RWQCB, and performed on an ongoing basis in order to determine if a watershed is in compliance with an identified TMDL. A compliance monitoring program for implementing a TMDL would generally include the anticipated compliance points for the monitoring program, parameters to be measured, analytical methods and their sensitivity for reliably detecting the regulated chemicals, frequency of measurements, etc. With such information it will be possible to evaluate whether the proposed compliance monitoring could be expected to be adequate for detecting significant violations of the requirements set forth in the TMDL.

14.4 Data Reporting

Reporting requirements in California are used to obtain data and information on a variety of water resources issues, such as demand, supply, and quality. Much of this information is now collected in a format that can be rolled up from the local to region scale level, to the larger California Water Plan. The Kern IRWMP will serve as a vein of information to the California Water Plan.

14.4.1 Municipal National Pollutant Discharge Elimination System Permits

Municipal NPDES Permits require developers of certain developments/redevelopments to prepare engineering documents to prevent potential pollutants from entering storm drain systems. Examples are Urban Storm Water Mitigation Plans (USMP) and/or Storm Water Pollution Prevention Plans (SWPPP). The municipal NPDES requires the owner/operator to submit an Annual Storm Water Permit Report and Assessment to the local RWQCB (in the case of the Kern IRMWP, the Central Valley RWQCB). The Annual Reports include the information necessary to assess compliance relative to the permit, and the effectiveness of implementation of permit requirements on storm water quality.

14.4.2 Annual Consumer Confidence Reports

The preparation of Consumer Confidence Reports (CCRs) is required by the California Health and Safety Code §116470 and the CDPH, as well as the SDWA and US EPA. This code requires every public water system, as a condition of its operating permit, to annually prepare a report and provide a copy of that report to each customer. It also requires public water systems with more than 10,000 service connections that detect contaminants above their public health goals (PHGs) to provide PHG exceedence reports every three years and to hold public hearings regarding their reports. The CCR includes information on a system's source water, the levels of any detected contaminants, and compliance with drinking water regulations, plus some educational material. Contaminants typically reported include turbidity, coliform, lead/copper, unregulated contaminants, and those contaminants of concern specific to a particular location.

14.4.3 Memorandum of Understanding Regarding Urban Water Conservation in California

The *Memorandum of Understanding Regarding Urban Water Conservation in California* was originally executed in 1991. The Urban MOU includes several water conservation Best Management Practices (BMPs) intended to reduce California's long-term urban water demands, and signatory agencies report progress on their implementation to the CUWCC. The BMPs are currently implemented by MOU signatories on a voluntary basis, but recent legislation institutes new requirements for demonstration of water conservation measure implementation in order to qualify for State grant funding. CWS signed in 1991 on behalf of all its districts statewide, KCWA signed in 1993 on behalf of ID4, BVCSD signed in 1993, and NORMWD signed in 2001. Each of these agencies now files BMP implementation reports with the CUWCC.

14.4.4 Memorandum of Understanding Regarding Agricultural Water Management Council in California

The *Memorandum of Understanding Regarding Agricultural Water use in California* (Ag MOU) was established in 1996 between the agricultural and environmental and public interest communities to address voluntary efficient use of agricultural water in California. It established the AWMC and provides guidance for a reporting process by which signatories evaluate and endorse water management plans. Signatories to the AWMC, or Council Members, are divided into three groups: Group 1 are agricultural water suppliers of which there are approximately 67; about 11 of which are Kern Region stakeholders; Group 2 are environmental groups; and Group 3 are other interested parties that do not have voting powers. Group 1 members commit to preparing a Water Management Plan based on the criteria established in the MOU within two years of becoming a signatory. After the plan receives the Council's endorsement water suppliers submit plan updates every two years on the implementation of their efficient water management practices. As noted in Section 14.1.1, AWMPs are now required for agricultural water suppliers providing water to more than 10,000 irrigated acres.

14.5 Identified Data Gaps

Numerous data sets and reports were reviewed for their applicability to the Kern Region and in conjunction with statewide data needs. In addition to reviewing these documents and reports, stakeholder meetings allowed for public participation in voicing known technical gaps and/or avenues for further data collection. Together, this knowledge provided the information necessary to identify data gaps and deficiencies to illuminate in the IRWMP. Data gaps represent information crucial to a greater understanding of the Region and help develop context for future projects and water management actions.

Some of the data gaps and deficiencies identified that are of most importance to the Region include the following:

- Agricultural pumping
- Outdoor verses indoor water urban use (many homes without meters)
- Groundwater return flows
- Total urban water demand, and water demand by urban water use sector for the Kern Region, (i.e., residential, commercial, industrial)
- Subsurface flow
- Consumptive use losses in the basin
- The amount of water available for recovery through stormwater capture
- Natural groundwater recharge
- Historical and current groundwater pumping records
- Population data for specific subregions
- Socioeconomic data for specific subregions
- Well closures due to poor water quality
- DAC impacts due to poor water quality

A major issue in the Region is collection of various types of data by a wide variety of public and private entities, at both the state and local levels. This data is not compiled into a central database, although the KCWA Water Supply Report has attempted to serve at least part of that function in the past. A potential function of the Kern IRWMP would be to serve as a comprehensive data collection point (see Plan Performance Section 13.2.1.).

It is recommended that additional monitoring and studies be conducted to fill in these data gaps. One such study is the on-going Tulare Lake Basin DAC study. Results of from this and other studies will be incorporated into future plan updates.

14.6 Monitoring Plan Performance

In general, the success of the Kern IRWMP depends on how well the IRWMP objectives are accomplished. Achievement of all of the objectives will, in large part, determine the success of local integrated regional water management planning processes.

As described in Section 12.7, IRWMP updates will occur at a minimum every five years and the project prioritization process will occur annually. This IRWMP is a dynamic document and is part of an ongoing local effort to achieve integrated local water management. The process, through Stakeholder participation and plan revisions, will continue for many years and will be an effective mechanism for addressing the water management issues facing the Region. As a consequence, IRWMP objectives, regional priorities, and statewide priorities will continue to be reviewed for relevance and modified as needed to ensure the overall IRWMP reflects regional changing needs and continues to be effective. Additionally, proposed projects will be reviewed and evaluated on a regular basis to ensure that current plan objectives will be met and that the resulting Plan Projects offer the greatest benefit possible. Periodically, a new set of Plan Projects will be selected to address revised IRWMP objectives and State and regional priorities. This ongoing review and update allows the plan to undergo “adaptive management”, e.g., allow the IRWMP to evolve in response to changing conditions and as better data is developed. IRWMP revisions will result in:

1) An updated evaluation of information and data related to watershed conditions
2) An evaluation of projects/actions and their contribution to meeting IRWMP measurable objectives
3) Revised objectives, strategies, and projects based on new conditions and past project successes

As discussed in Section 9, in developing the IRWMP objectives, the Participants and Executive Committee members determined that it was important that they not only be measurable, but also that the existing conditions of the resources at issue be quantified so that change/progress could be reasonably ascertained at a later date. These performance measures were developed to allow progress of the individual projects to be measured and to gauge the impact of the overall IRWMP.

As projects are implemented in the Region as part of this IRWMP, project performance will be assessed and outcomes will be monitored, and the results from this monitoring will be used to guide future project implementation. If monitoring reveals, for example, that a project is progressing as planned and regional changes do not necessitate revisiting project implementation, then changes to project prioritization would not be anticipated. However, if monitoring reveals that a project, or suite of projects, are not producing the anticipated result, corrective actions (whether it be improving a specific project, changing the project prioritization, strengthening the measures by which those projects are being monitored, etc.) can be implemented. This information will feed into future updates of the plan, and keeps it a living document.

14.6.1 Data Collection and Integration into State Programs

As described in Section 13.1.2, groundwater, surface water, and water quality monitoring already takes place within the Region. Many of the mechanisms by which KCWA, the subregions and the cities collect data are described by the monitoring programs and procedures described therein.

Data collected as part of this IRWMP can be used to support existing state programs such as the Surface Water Ambient Monitoring Program (SWAMP), the Groundwater Ambient Monitoring and Assessment (GAMA), and the California Environmental Resources Evaluation System (CERES), as well as water use efficiency and demand reduction data collected by the SWRCB through the CUWCC and AWMC.

- Surface Water Ambient Monitoring Program (SWAMP). All the surface water data collected as part of the IRWMP will be consistent with SWAMP database compatibility guidelines, and will be exported annually to the state database using the required data submission formats. Where appropriate, IRWMP sampling activities will be performed according to SWAMP quality assurance requirements.

- Groundwater Ambient Monitoring and Assessment (GAMA). Groundwater data collection efforts as part of the IRWMP will be coordinated with the needs of the GAMA program and will be consistent with database specifications so that the data can be easily submitted, shared, and integrated into the GAMA database. Field sampling efforts will be coordinated with the GAMA program to eliminate duplicative data collection efforts and fill data gaps.

- California Environmental Resources Evaluation System (CERES). All data and reports will be sent to CERES so that information will be available and useful to a wide variety of users.

- California Statewide Groundwater Elevation Monitoring (CASGEM). On November 4, 2009 the State legislature enacted SBX7-6, which mandates a permanent statewide, locally-managed groundwater elevation monitoring program for California's groundwater basins and sub-basins identified in DWR Bulletin 118. To achieve that goal, the new law directs that groundwater elevations be regularly and systematically monitored, and groundwater elevation data collected under collaboration between local monitoring entities and DWR.

  The primary objective of the CASGEM monitoring program is to define the seasonal and long-term trends in groundwater elevations in California's groundwater basins. The scale for this evaluation should be the static regional groundwater table or potentiometric surface. A secondary objective is to provide sufficient data to draw representative contour maps of the elevations. These maps could be used to estimate changes in groundwater storage and to evaluate potential areas of overdraft and subsidence.

14.6.2 Dissemination of Data

Dissemination of data to Stakeholders, agencies, and the general public is integrated into the IRWMP process to ensure overall success. A requirement of the Proposition 84 Guidelines is the routine reporting on project performance. The routine collection of data that occurs as part of other processes (as described in Section 13.1.3) will support the data reporting that is required as part of the IRWMP process. A database for maintaining project information is available to each Stakeholder for proposing new, or updating current or old, projects for inclusion in the IRWMP. Although updating the data is not stipulated in the Governance structure, it is in the best interest of the Participants group to keep the database current, so the most updated information is used to evaluate projects using the project prioritization framework as outside funding sources become available. Data collected or produced as part of the IRWMP will then be presented and disseminated during future meetings.

A public website, www.kernirwmp.com, has been created to store data and information about the IRWMP process so that the public can find information about public meeting dates, agendas, and notes. The website provides information on the IRWMP process and posts annual reports and relevant documents that can be downloaded. Data collected during the process will be available on the website, as well as links to other existing monitoring programs to promote data between these programs and the IRWMP. This will provide a means to identify data gaps (e.g., information needed to provide a more complete assessment of the status of a specific issue or program) and to ensure that monitoring efforts are not duplicated between programs. The website provides a mechanism for Participants to upload project information regarding water supply, water quality, and other benefits of the project, which will be collected in a database to manage, store, and disseminate information to the public.

The Executive Committee will direct the management of the website, via an outside consultant, who will be responsible for maintaining the website by updating and tracking IRWMP documents. The website will serve as a means to track, store, and disseminate data related to the IRWMP including monitoring data and data within State databases. The website will also serve as a means to share data within the watershed and with adjacent planning regions, as well as to facilitate the use of project-specific monitoring efforts to improve the RWMG's ability to implement future projects in the IRWMP.

Section 15: Coordination and Outreach

This section provides information on the coordination and outreach efforts with local and state agencies, DACs, and the broader public, undertaken as part of the Kern IRWMP development.

15.1 Coordination with Local Land Use Planning

The Kern IRWMP establishes broad objectives and planning targets for the entire Kern Region. Projects and programs implemented by the IRWMP participants will likely remain the primary means by which the IRWMP's objectives are contributed. As noted in a number of the stakeholder meetings, many of the local agencies increasingly acknowledge the value of collaboration in the planning, design, implementation, funding, monitoring and maintenance of integrated projects. Implementation of the Kern IRWMP supports the development of integrated projects, provides a comprehensive framework that can support planning by individual agencies and jurisdictions, and encourages integrated planning for those issues that could benefit from a regional approach.

Municipal and county governments and special districts include local jurisdictions and land use planning agencies that are involved in the identification of issues, formation of objectives, and development of projects contained in this IRWMP. Their participation provides a link between local planning agencies and this IRWMP by offering discussion in meetings, providing accurate, consistent land use planning information, and incorporating a wide variety of local planning documents and goals into the project objectives. The cities of Bakersfield, Delano and Wasco, the County of Kern, KCRMA, and Kern Council of Governments are examples of land use agencies and entities participating in the meetings.

15.1.1 Linkages Between the IRWMP and Local Planning Documents

Numerous plans and studies related to water resources and land use management in the Kern Region has contributed to the development of the IRWMP. Thus, the Kern IRWMP has been developed from and is consistent with local planning efforts in the Kern Region, as discussed below.

- <u>Regional Description:</u> The Kern IRWMP has utilized information from the Kern County General Plan, the General Plans from the cities of Bakersfield, Wasco, Taft, Delano, Tehachapi, and Shafter, the Kern River Valley Specific Plan, the on-going Kern Regional Blueprint Program, as well as discussions with city and County planning staff to describe the Region and subregions. The IRWMP relies on these planning documents to describe the existing setting of the Region and subregions, including existing and planned land uses (see Section 2). In addition to providing information on the social and cultural makeup of the regional community, these plans also provided information on population projections, economic conditions and trends and special environmental resources and environmental water demands.

- Regional Issues, Needs, and Objectives: Stakeholders were asked to identify major water issues and problems. Specific consideration of regional water supplies and issues was informed with data from multiple local planning documents, but primarily from UWMPs prepared by the local water agencies. Water quality issues were examined using information contained in the CVRWQCB's Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) and its amendments. Habitat, species, and resource stewardship issues were examined based on general plans, the Valley Floor and MBHCPs and other environmental stewardship plans. Based on the issues identified, Stakeholders were then asked to develop IRWMP objectives.

- Involvement of Land Use Decision Makers: Land use decisions have the potential to affect the way water is managed in the Kern Region, and the way the water management strategies are utilized in the Kern IRWMP, as land use can affect population growth, water demand, and surface water quality. The implementation of stormwater capture projects may require acquisition of land which could displace existing uses and may warrant consideration of modifications to land use policies and practices. In addition, the passage and implementation of water conservation or floodplain management ordinances can further address IRWMP objectives. In developed areas, the land use decision makers are primarily cities and counties. In open space areas, the USFS, Bureau of the Land Management, National Park Service, and California State Parks have regulatory responsibility for the conservation and preservation of those spaces. Additionally, many 'open spaces' in the Kern Region are undeveloped rural lands under jurisdiction of the County of Kern. All of these agencies and jurisdictions have been involved in the development of the IRWMP as part of the stakeholder process.

15.1.2 Participation by Local Planning Entities

As mentioned above, local planning entities, such as the municipalities, the County of Kern Development Services Agency, and Kern COG participated in development of the IRWMP and will participate in continuing IRWMP implementation. These local planning entities participated in Stakeholder meetings, provided updated data (as described above), reviewed and commented on IRWMP sections, sponsored projects, and participated in the prioritization of projects. As described in Section 11, these planning agencies, along with the general Stakeholder group, will be asked to participate in all updates of the IRWMP, by participating in meetings, providing information and data necessary to revise objectives, by making recommendations regarding project ranking, and by sponsoring projects.

15.2 Coordination with State and Federal Agencies

15.2.1 Participation in IRWMP Development

Several State and Federal regulatory and resource agencies were involved in the identification of issues, formation of objectives, and development of projects for this IRWMP. Coordination with these agencies is essential to the development and implementation of all recommended projects due to the need for regulatory and environmental approval prior to implementation. Furthermore, these agencies have had the chance to address items of concern on these projects at the stakeholder meetings. Their role and responsibility is to ensure that this IRWMP consider resource management, resource enhancement, and regulatory compliance standards. The agencies include: California Department of Public Health Drinking Water, DWR, CDFG, CVRWQCB, the USBR, USFWS, and USFS. The recent inclusion of the USFS in Tulare Regional Water Planning is seen as an important step towards their continued involvement in these regional planning efforts.

15.2.2 Participation in IRWMP Implementation

As described in Section 11, the RWMG intends to continue coordination with State and Federal agencies as the IRWMP is updated through time. It is anticipated that State and Federal agencies will continue to participate in the IRWMP as participants and project proponents. Ongoing participation by these entities will enhance the technical data and knowledge in the IRWMP. These agencies will also be able to identify and recommend funding sources for IRWMP implementation. In addition, implementation of Plan Projects will require coordination with multiple Federal and State agencies, such as:

- <u>DWR</u>. DWR as the state agency with oversight of IRWM Planning, DWR will review the Plan for comportment with the Proposition 84 and Proposition 1E IRWM Guidelines. This will include review of all components of the Plan, including Governance, Projects and Data Management. DWR also has oversight of the grant funding application process and grant award program. Depending on the lists of IRWM Projects submitted for specific funding rounds by the RWMG, DWR will have some level of approval authority.

- <u>CDFG and USFWS.</u> CDFG and USFWS oversee implementation of the California and Federal ESA and regulate activities that may impact endangered species and their habitats (Fish and Game Code, Sections 2050 et seq.). Any Plan Projects with potential impacts to sensitive species will require consultation with these agencies. CDFG also oversees any activity that will substantially modify a river, stream, or lake (Fish and Game Code Sections 1600 et seq.). Before undertaking any activity that would result in modification of a river, stream, or lake, it will be necessary to obtain a Lake or Streambed Alteration Agreement from CDFG.

- <u>DPH.</u> DPH regulates public water systems, including allowable treatment technologies for drinking water and the treatment and distribution of recycled water. Any Plan Projects that involve treatment of drinking water or recycled water will require coordination with DPH.

- <u>Central Valley RWQCB.</u> The CVRWQCB sets goals for groundwater and surface water quality in Kern County. Based on these goals, the CVRWQCB regulates discharges to groundwater and surface water, including storm water runoff. Any Projects that could result in storm water runoff or which could result in a change in discharges to surface or groundwater may have to coordinate with the CVRWQCB. Under the CWA Section 401, every applicant for a federal permit or license for any activity which may result in a discharge to a water body must obtain State Water Quality Certification (called a 401 Certification) to ensure that the proposed project will not violate state water quality standards. Most 401 Certifications are issued in connection with US ACE permits for dredge and fill discharges. The CVRWQCB reviews projects for 401 Certification.

- USACE. USACE has regulatory authority over all discharges of dredge and fill materials within navigable waters and waters (such as intermittent streams and wetlands) with significant connection to navigable waters. The USACE regulates such projects through the issuance of permits. Any IRWM Plan Projects that could result in discharge of dredge and fill material to a water body may have to coordinate with the USACE.

15.3 Public Outreach/Disadvantaged Community Outreach

Public participation is a critical component of the IRWMP process. The water resources in Kern County are utilized for such varied purposes that development of the Kern IRWMP requires participation from all water users. Working collaboratively, staff from KCWA and MIG (the Kern IRWMP facilitation consultants), along with members of the Executive Committee and RWMG conducted extensive outreach across the Kern IRWMP Region. To reach members of the public at large, the Kern IRWMP established a public website that includes meeting information and handouts, points of contact and links to relevant documents and internet webpages, including DWR's IRWM webpage. Additionally, meeting information was periodically posted on news websites (both English and Spanish) and online public message/information boards. Agency staff also worked diligently to identify possible representatives of specific public interest groups, such as DACs and water recreationists. Once identified, staff from MIG and KCWA sent emails and made phone calls to directly contact these individuals and organizations. Additionally, mailers were sent to public mailing lists provided by the County of Kern and several other participants. The goal of the outreach effort was to inform individuals and organizations of the IRWM program, Kern IRWMP efforts to date and methods of participation. Recognizing that attendance at and participation in meetings, even evening meetings, might not be possible, members of the public were encourage to submit comments via phone or email so that their concerns and issues could be listed and addressed even in their absence.

Recognizing the importance of community participation, particularly from DACs, while understanding that personal and professional obligations may inhibit participation in the Kern IRWMP, the Kern IRWMP RWMG also relied on participation from community organizations, including Self-Help Enterprises (http://www.selfhelpenterprises.org/) and Community Water Center (http://www.communitywatercenter.org/). Self-Help Enterprises and Community Water Center both work with DACs in the San Joaquin Valley, and both groups are actively involved in water-related issues. Self-Help Enterprises has experience working with Kern County communities on a variety of topics, including water supply and quality related concerns. Through their work, Self-Help Enterprises has created list of community water projects, which was provided to the Kern IRWMP Executive Committee in order to highlight some of the concerns in the region. Community Water Center has experience and knowledge similar to that of Self-Help Enterprises. Despite not having direct ties to Kern County communities, Community Water Center has actively participated in the Kern IRWMP and continues to share their knowledge with the Kern RWMG. Through the participation of these community organizations, the Kern IRWMP has been able to expand our outreach and gain valuable knowledge regarding community water needs that otherwise may not have been possible.

To further encourage public participation, the Kern IRWMP held evening meetings on multiple occasions. These meetings were advertised on local news websites and public message boards. At one of these meetings, dinner was provided to attendees free of cost. In addition to locally held subregion meetings, the Kern IRWMP RWMG also maintains an open invitation to participants to request local participant meetings be held. To date, one such request has been received, made by participants from the Kern River Valley area, located in the northern portion of the Mountains and Foothills subregion, who wanted to increase public participation in their area by hosting a meeting. On June 15, 2009, an evening meeting was held at the Kern River Valley Veterans/Senior Center in Lake Isabella, CA. The meeting was open to all members of the public. Similar to other Kern IRWMP outreach efforts, the meeting was spent providing the public with information on the IRWM program, the Kern IRWMP and methods of participation. Additional time was spent discussing the Kern IRWMP's relationship with the Southern Sierra IRWMP and possible project partnerships that could be established in the region. As a result of this meeting we were able to nearly double our participant contact list for the area.

15.3.1 Environmental Justice

Concerns for environmental justice will need to be addressed as part of IRWMP implementation. As the Kern Region continues to develop, care will need to be taken to prevent creating environmental justice issues that unfairly affect certain communities, in particular, DACs. The Kern IRWMP objectives of increasing water supplies, improving operational efficiencies, improving water quality, promoting land use planning and environmental stewardship, and improving regional flood management, must be consistently applied to future projects so as to ensure greatest regional benefits without placing an undue burden on a specific community.

References

Bakersfield, City of. 2007. 2005 Urban Water Management Plan.

Bakersfield, City of. 2006. Final Environmental Impact Report. City of Bakersfield Wastewater Treatment Plan No. 3 Expansion and Upgrade (CUP# 05-0669).

Bakersfield, City of and County of Kern. August 2007. The Kern River Plan Element.

Belridge Water Storage District. January 2006. Water Management Plan.

Berrenda Mesa Water District. Water Management Plan.

Brewer, Chris. 2001. An Illustrated History of Kern County. San Antonio, Texas: Historical Publishing Network.

Buena Vista/Rosedale-Rio Bravo Water Banking and Recovery Program. September 2002. Final Environmental Impact Report.

California Climate Change Center. 2009. Using Future Climate Projections to Support Water Resources Decision Making in California.

California Department of Conservation, Oil and Gas Statistics, Annual Report, December 31, 2006.

California Department of Finance. 2009. Bulletins and Reports. Website: www.dof.ca.gov/bulletins_andreports/

California Department of Health Services. 1991.

California Department of Public Health.2008. Drinking Water Program Annual Compliance Report of Public Water Systems Website: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Publications.aspx

California Department of Water Resources. 2003. California's Groundwater - Bulletin 118 Updated 2003.

California Department of Water Resources. December 2005. Final California Water Plan Update 2005.

California Department of Water Resources. July 2006. Progress on Incorporating Climate Change into Management of California's Water Resources.

California Department of Water Resources. 2007. State Water Project Delivery Reliability Report 2007.

California Department of Water Resources. 2009. Water Quality in the State Water Project 2004 and 2005. April.

California Employment Development Department. 2009. California's Labor Market at a Glance. Website: www.labormarketinfo.edd.ca.gov/?PAGEID=4

California Employment Development Department. 2009. Kern County Profile. Website: www.labormarketinfo.edd.ca.gov/?PAGEID=4

California Natural Resources Agency. August 2009. 2009 Climate Adaptation Strategy Discussion Draft.

California Regional Water Quality Control Board Central Valley Region. January 2004. Water Quality Control Plan for the Tulare Lake Basin, Second Edition.

California State Legislature Assembly Bill 32. December 2006. The Global Warming Solutions Act of 2006.

California State Parks, Brochure. 2009.

California Water Plan Update 2009. Volume 3 Regional Reports. Tulare Lake Hydrologic Region.

California Water Service Company. 2008. 2008 Water Quality Report for the City of Bakersfield.

California Water Service Company, Bakersfield District. 2006. 2006 Water Quality Report for Bakersfield Ground and Surface Water.

California Water Service Company, Bakersfield District . 2007. 2007 Water Quality Report for Bakersfield Ground and Surface Water.

California Water Service Company, Kern River Valley District. June 2011. 2010 Urban Water Management Plan.

Carollo Engineers. December 2006. City of Delano 2005 Urban Water Management Plan.

Central Valley Regional Water Quality Control Board. 2006. 2006 Update of California's 303(d) List of Impaired Water Bodies. Website: www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/swrcb/r5_final303dlist.pdf.

City-data.com. Advameg. Web. 2009.

Coachella Valley Water District Berrenda Mesa Water Transfer. 2006. Draft Subsequent Environmental Impact Report.

Delano, City of. December 2005. General Plan.

Delano, City of. December 2006. Urban Water Management Plan.

Department of Interior (DOI). 2009. San Joaquin River Restoration Program Water Year 2010 Interim Flows Project Environmental Assessment/Initial Study. June.

Dudley Ridge Water District. 2005. 2005 Water Management Plan.

East Niles Community Services District. 2007. 2007 Water Quality Report.

Eco:Logic. 2007. City of Wasco Water Master Plan.

Federal Register. 1999. Executive Order 13123-Greening the Government through Efficient Energy Management.

Garcia and Associates. December 2006. Draft Kern County Valley Floor HCP, First Public Draft.

Gomez, Robert. June 2009. Tubatulabals of Kern Valley Tribal Elder and Cultural Preservation Committee Chairperson. CA Tribal Environmental Justice Transportation – Tribal perspective presentation.

Integrated Resource Management, LLC. Draft Existing Conditions Report Greater Tehachapi Area Specific Plan Water Supply and Sewer Availability, 2009.

Jasper, Bob, General Manager Tehachapi-Cummings Water District. Conversation with Bruce Myers, California Department of Water Resources, San Joaquin District. August 29, 2000.

Johnson, J.R. 2002. Arlington Springs Revisited.

Kern Council of Governments. May 2007. 2007 Destination 2030 Regional Transportation Plan.

Kern, County of. January 2004. Recirculated Draft Program Environmental Impact Report.

Kern, County of. January 2006. Draft Environmental Impact Report. Frazier Park Estates.

Kern, County of. July 1985. The Kern River Plan Element.

Kern, County of. September 2003. Kern River Specific Trails Plan.

Kern, County of. Kern County Planning Department. June 2004. Kern County General Plan.

Kern, County of. January 2006. Kern River Valley Specific Plan.

Kern, County of. 2009. Tejon Mountain Village by TMV, Draft Environmental Impact Report. May 2009.

Kern County Agricultural Commissioner. June 2009. 2008 Kern County Crop Report.

Kern County Water Agency. 2009. Unpublished Data.

Kern County Water Agency Improvement District No. 4. 2005. 2005 Urban Water Management Plan.

Kern County Water Agency Improvement District No. 4 and North of the River Municipal Water District. 2011. 2010 Urban Water Management Plan.

Kern County Water Agency Improvement District No. 4. 2010. Report on Water Conditions 2010.

Kern Fan Element. 1994. Habitat Conservation Plan.

Kern Water Bank. 2009. Website: www.kwb.org

Moratto, Michael J. 1984. California Archaeology. Academic Press, New York.

North of the River Municipal Water District. 2007. Annual Water Quality and Consumer Confidence Report.

Personal communication. Melville, Dale. Dudley Ridge Water District. 2009.

Personal communication. Melville, Dale. Dudley Ridge Water District. 2011.

Personal communication. Besecker, Rick. Dudley Ridge Water District. 2010.

Public Policy Institute of California. 2006. Special Survey of the Central Valley in Collaboration with the Great Valley Center

RBF Consulting. June 2002. Draft Metropolitan Bakersfield General Plan Update Environmental Impact Report, SCH No. 1989070302, for City of Bakersfield and County of Kern.

Rosedale-Rio Bravo Water Storage District. July 2001. Final Master Environmental Impact Report Groundwater Storage, Banking, Exchange, Extraction and Conjugative Use Program.

Rosedale-Rio Bravo Water Storage District. 2007. Groundwater Management Plan.

San Joaquin River Restoration Program. June 2009. Stipulation of the Settlement in NRDC, et al., v. Kirk Rodgers, et al. Water Year 2010 Interim Flows Project Draft Environmental Assessment/Initial Study.

Shafter, City of and Dee Jaspar & Associates. 2005. 2005 Urban Water Management Plan.

State Water Resources Control Board. 2006. Ground-Water Quality Data in the Southern Sierra Study Unit, 2006 – Results from the California GAMA Program.

SWCA Environmental Consultants. July 2008. Biological Resources Draft Existing Conditions Report for the Greater Tehachapi Area Specific Plan, Kern County, California.

Tejon-Castac Water District. December 2005. Urban Water Management Plan 2005 Update.

Tejon Ranch Conservancy. 2009. About the Conservancy. Website: www.tejonconservancy.org/

The Wildlands Conservancy. 2010. Wind Wolves Preserve. Website: http://wildlandsconservancy.org/preserve_windwolves.html

Unpublished KCWA Data. Groundwater Recharge Activities.

US Army Corps of Engineers. 2009. Lake Isabella Situation Report March 6, 2009. Website: www.spk.usace.army.mil/organizations/cespk-pao/lakeisabelladam/

US Census Bureau. 2005. General Demographic Characteristics. 2005 American Community Survey, Kern County, California.

US Department of the Interior. 2009. Water Releases Begin October 1 for the San Joaquin River Restoration Program; Final Environmental Document Available, News Release, dated October 1, 2009. MP-09-133.

2009. Final Environmental Assessment/Initial Study for the San Joaquin River Restoration Program. September.

US Fish and Wildlife Service. 2009a. Kern National Wildlife Refuge. Website: www.fws.gov/kern/refuges/kern/.

US Fish and Wildlife Service. 2009b. Bitter Creek National Wildlife Refuge. Website: www.fws.gov/Refuges/profiles/index.cfm?id=81672

US Fish and Wildlife Service. 2009c. Draft Tehachapi Upland Multiple Species Habitat Conservation Plan.

US Forest Service. 2009a. Sequoia National Forest. Website: www.fs.fed.us/r5/sequoia/centennial/centennial08-wilderness.html.

US Forest Service. 2009b. Sequoia National Forest. Website: http://www.fs.fed.us/r5/sequoia/gsnm.html

Vaughn Water Company. 2005. 2005 Urban Water Management Plan.

Wasco, City of. 2002. General Plan. August.

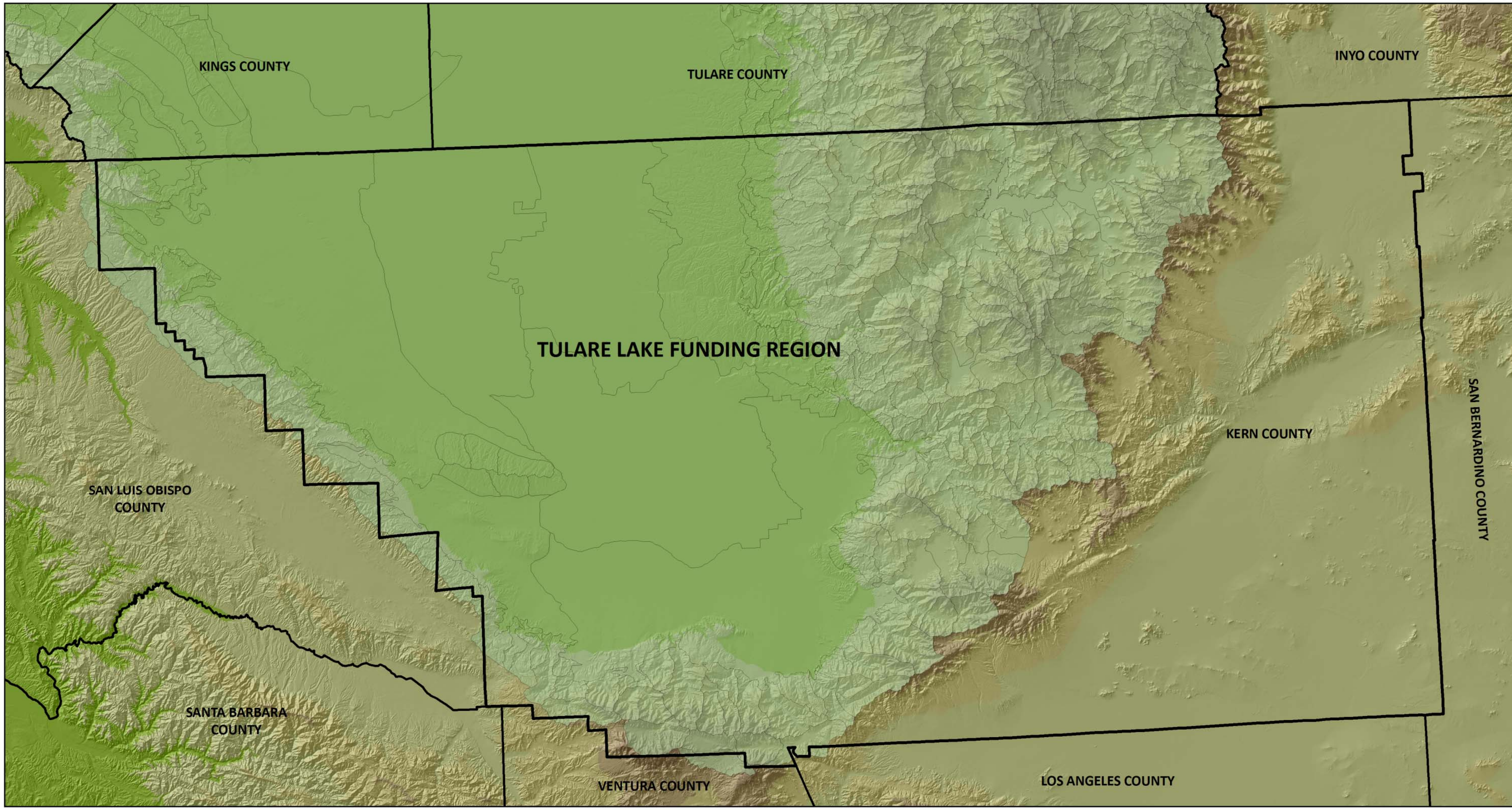
.2007a. 2005 Urban Water Management Plan. August.

.2007b. Water Master Plan. April.

West Kern Water District. 2010. 2010 Urban Water Management Plan.

Western Regional Climate Center, Precipitation data for Bakersfield, CA www.wrcc.dri.edu/cgi-bin/clilcd.pl?ca23155, National Weather Service Forecast Office Climate Summary 1971 to 2000 for Glennville, CA www.wrh.noaa.gov/hnx/coop/glennvil.htm

Figures



KERN COUNTY WATER AGENCY
Bakersfield, CA

TULARE LAKE FUNDING REGION BOUNDARY

Created: 2009-0320, S. Chambless
Revised: 2009-1015, S. Chambless
Filename: Tulare_Lake_Funding_Area_09-0320.mxd

Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Tulare Lake Funding Region Boundary

K/J 0889044*00

November 2011

FIGURE 1-1

KERN COUNTY WATER AGENCY
Bakersfield, CA

TULARE LAKE BASIN PORTION OF KERN COUNTY REGION
(KERN REGION)

Created: 2009-0318, S. Chambless
Revised: 2009-1015, S. Chambless
Filename: TLBKC_Boundary_Region_09-0318.mxd

N

0 5 10 20 30 Miles
1 inch = 15 miles

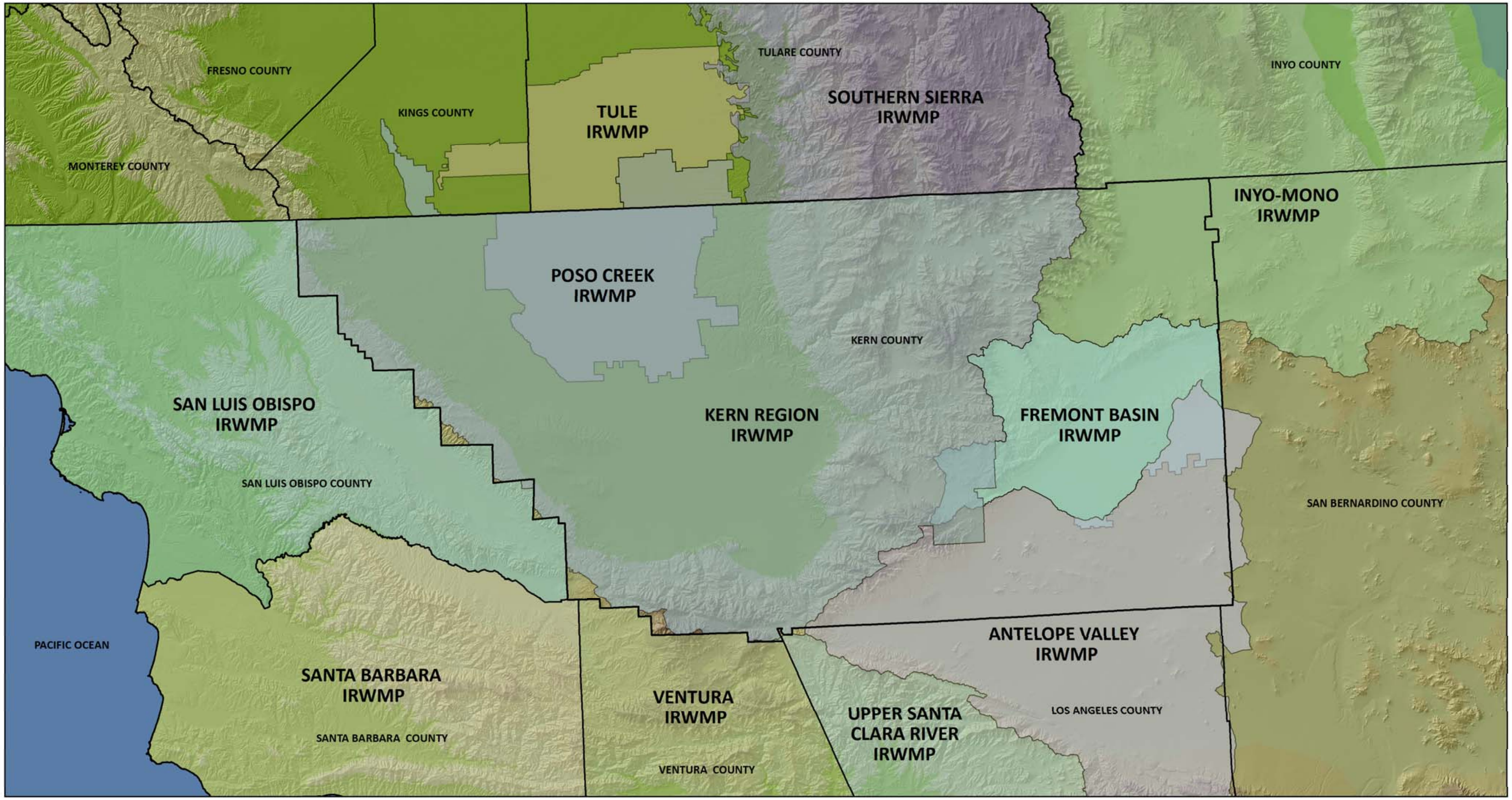
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Tulare Lake Basin Portion of
Kern County Region

K/J 0889044*00

November 2011
FIGURE 1-2



KERN COUNTY
WATER AGENCY
Bakersfield, CA

ADJACENT IRWMP PLANNING REGIONS

Created: 2009-0325, S. Chambless
Revised: 2011-0824, S. Chambless
Filename: Adjacent_IRWMP_Regions_11-0726.mxd

N

0 5 10 20 30 Miles
1 inch = 15 miles

Kennedy/Jenks Consultants

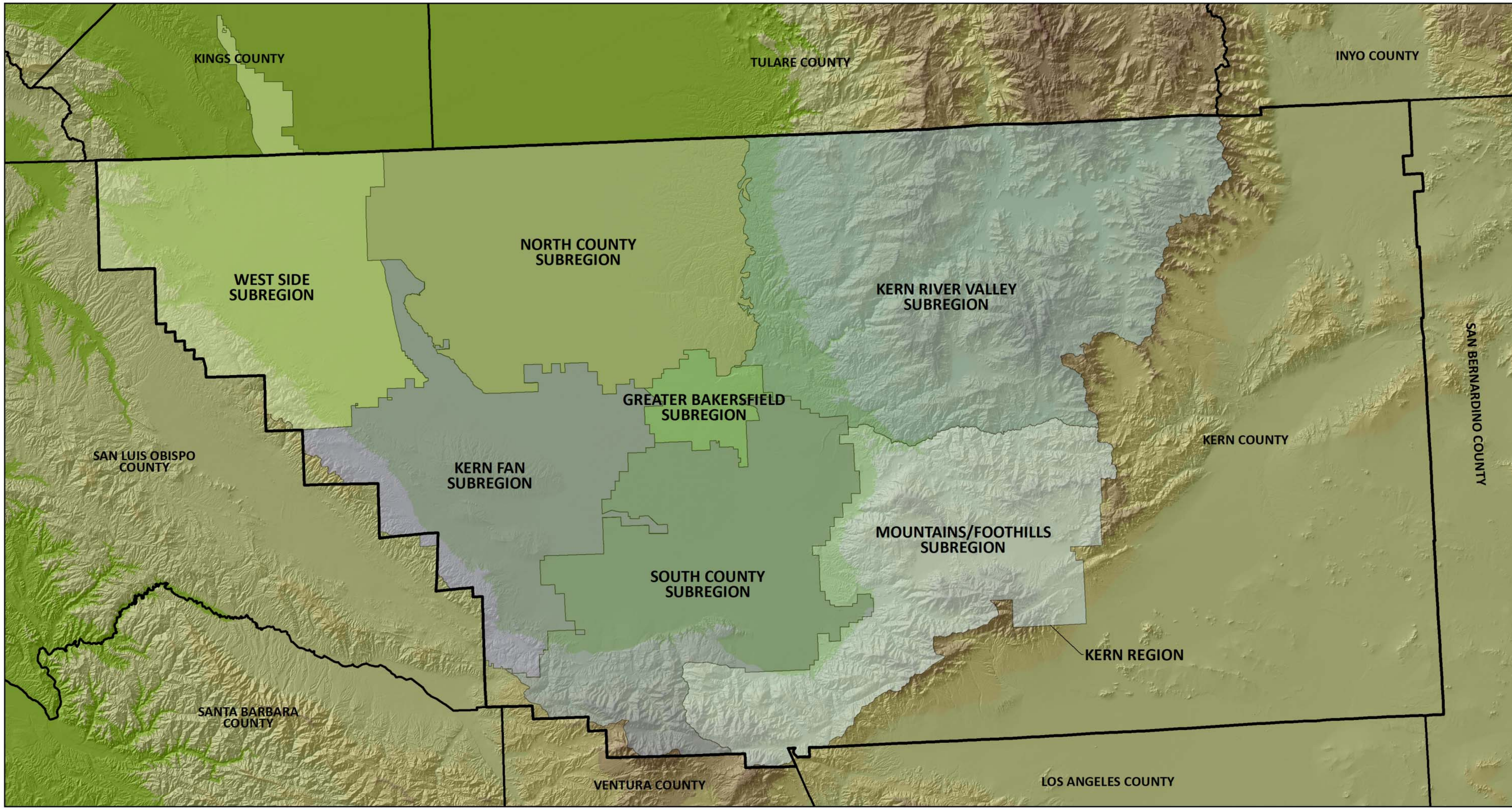
Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Adjacent IRWMP Planning Regions

K/J 0889044*00

November 2011

FIGURE 1-3



KERN COUNTY WATER AGENCY
Bakersfield, CA

Created: 2009-0323, S. Chambless
Revised: 2011-0824, S. Chambless
Filename: Subregions_09-0323.mxd

KERN IRWMP SUBREGIONS
DRAFT

NOTE: Kern County Water Agency and County of Kern subregions not shown.

N

0 2.5 5 10 15 20 Miles

1 inch = 10 miles

Kennedy/Jenks Consultants

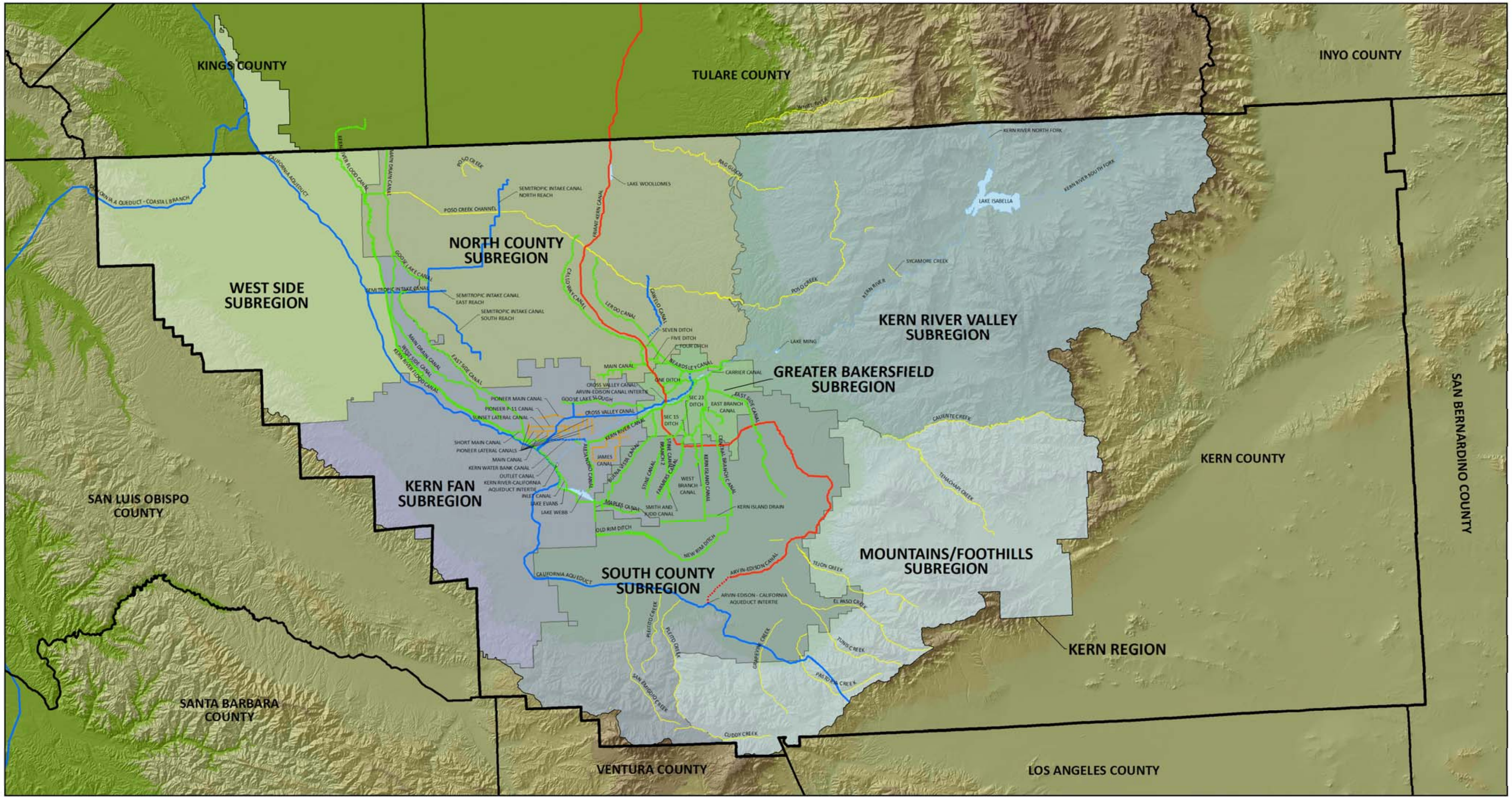
Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Kern IRWMP Subregions

K/J 0889044*00

November 2011

FIGURE 1-4



WATER RELATED INFRASTRUCTURE WITHIN THE KERN REGION

KERN COUNTY WATER AGENCY
Bakersfield, CA

Created: 2009-1019, S. Chambless
Revised: 2011-0824, S. Chambless
Filename: Water_Features_Infrastructure_11-0721.mxd

NOTE: Kern County Water Agency and County of Kern subregions not shown.

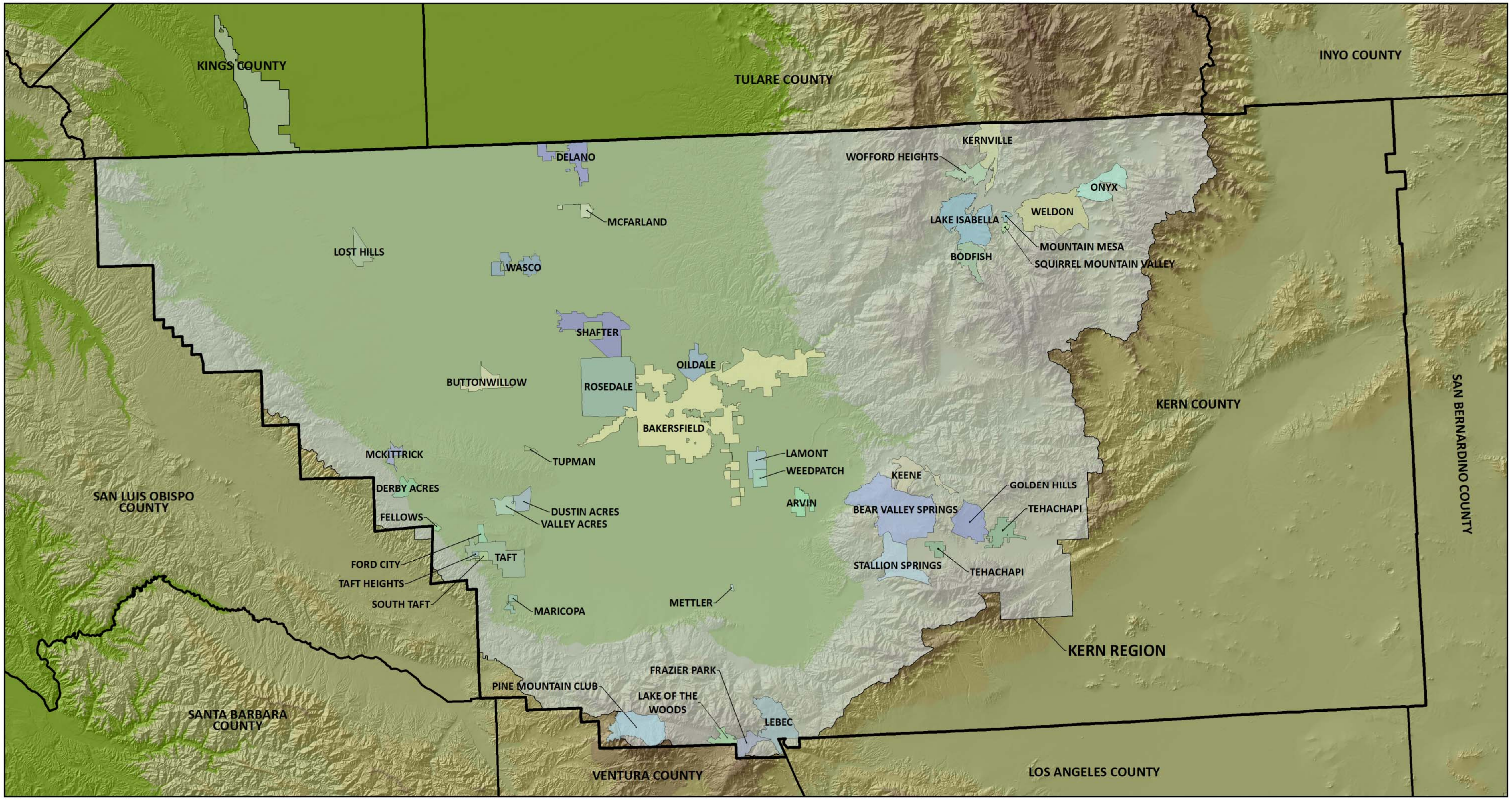
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of Kern County, IRWMP – Final Update

Water Related Infrastructure within the Kern Region

K/J 0889044*00

November 2011
FIGURE 2-1



KERN COUNTY WATER AGENCY
Bakersfield, CA

Created: 2009-0330, S. Chambless
Revised: 2009-1012, S. Chambless
Filename: City_Boundaries_09-0330.mxd

CITIES AND COMMUNITIES WITHIN THE KERN REGION

LEGEND

CITY / COMMUNITY

KERN REGION BOUNDARY

Data taken from U.S. Census Bureau; specifically the Census 2000 TIGER/Line.

N

0 2.5 5 10 15 20 Miles

1 inch = 10 miles

Kennedy/Jenks Consultants

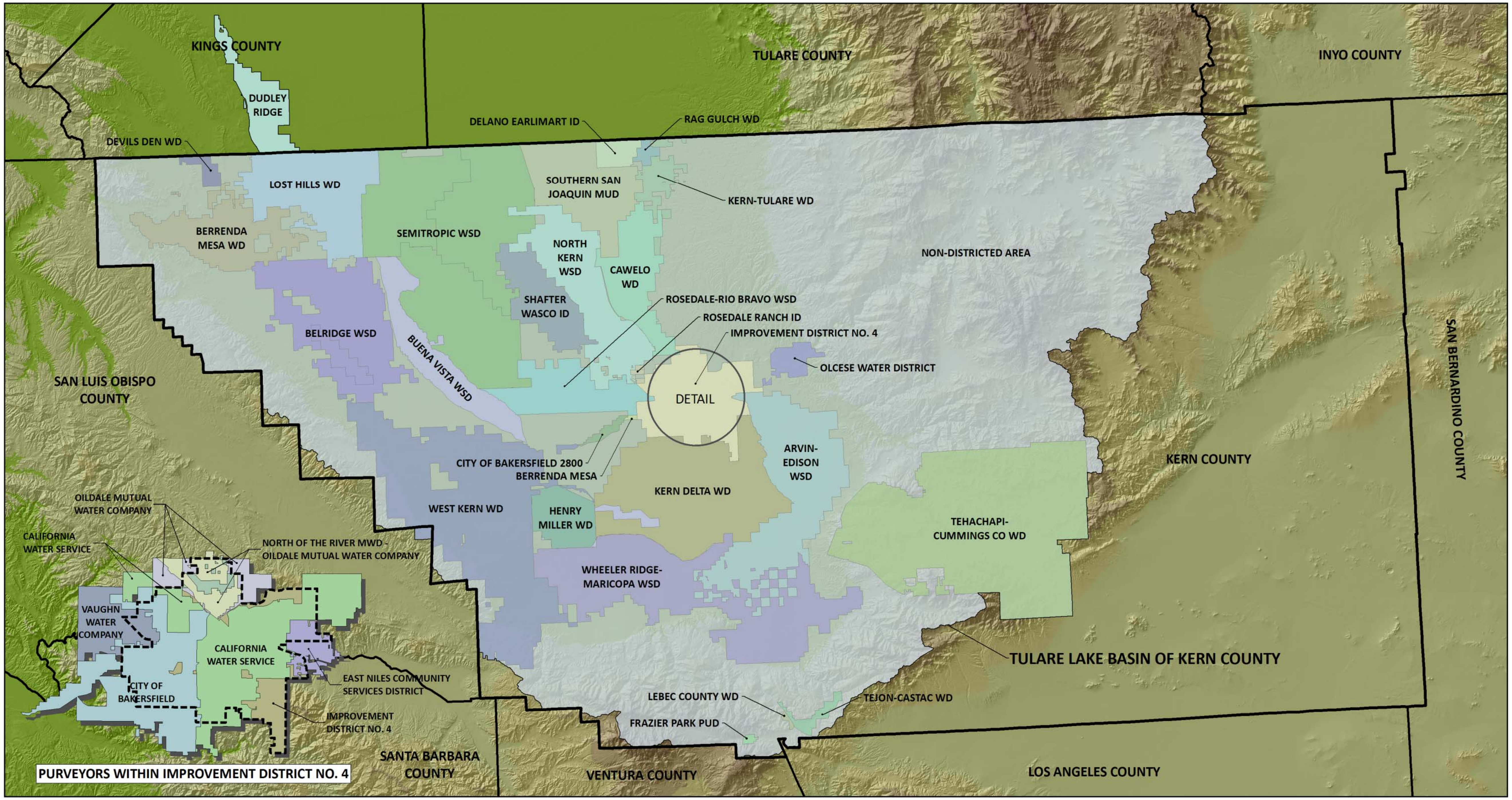
Tulare Lake Basin Portion of Kern County , IRWMP – Final Update

Cities and Communities within the Kern Region

K/J 0889044*00

November 2011

FIGURE 2-3



KERN COUNTY WATER AGENCY
Bakersfield, CA

WATER AGENCIES AND SPECIAL DISTRICTS WITHIN THE KERN REGION

Created: 2009-0316, S. Chambless
Revised: 2009-1119, S. Chambless
Filename: Water_Districts_09-0316.mxd

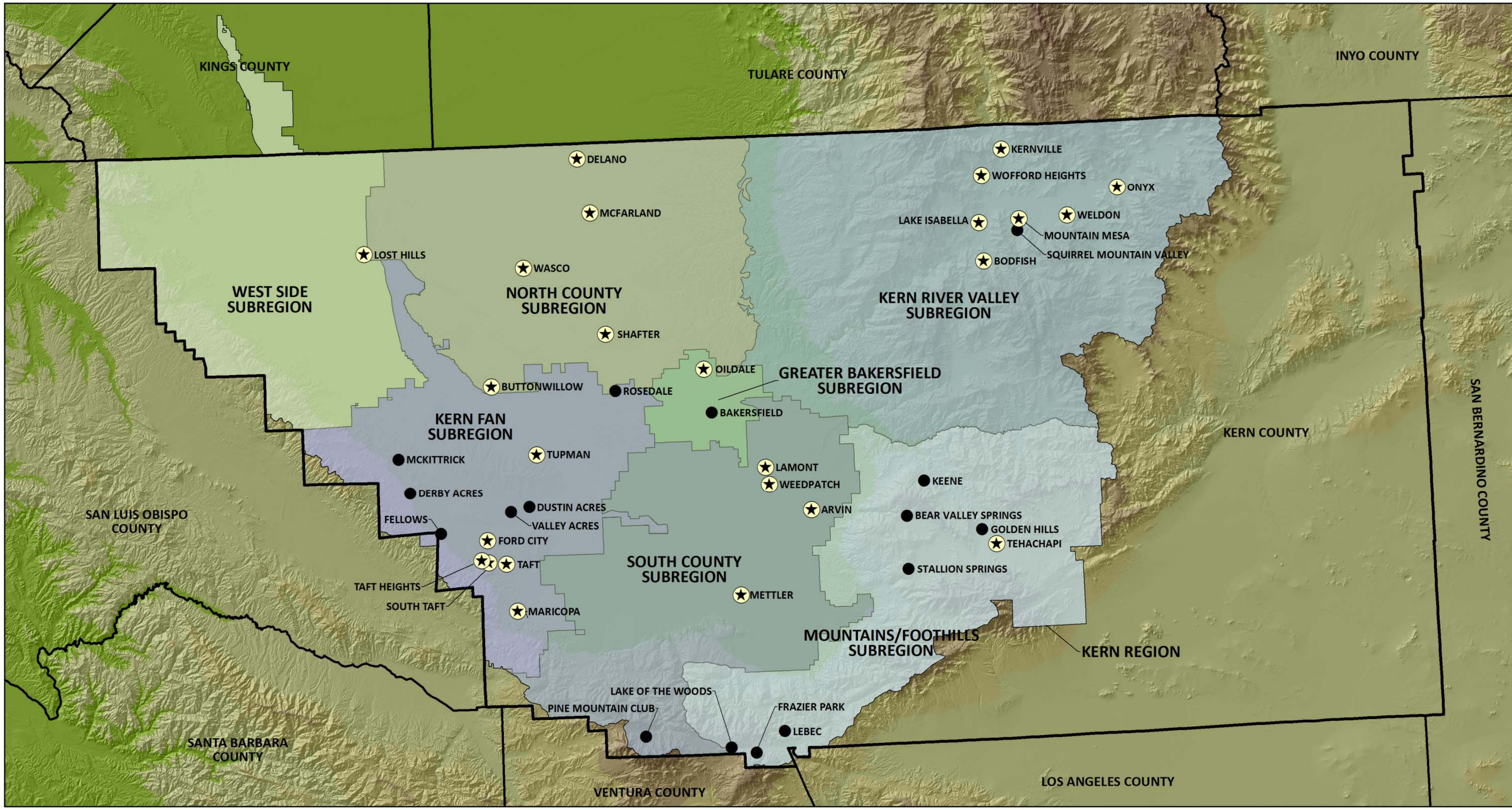
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Water Agencies and Special Districts
within the Kern Region

K/J 0889044*00

November 2011
FIGURE 2-4



KERN COUNTY WATER AGENCY
Bakersfield, CA

Created: 2009-0406, S. Chambless
Revised: 2011-0824, S. Chambless
Filename: Subregions_with_DAC_11-0721.mxd

DISADVANTAGED COMMUNITIES WITHIN THE KERN REGION

NOTE: Kern County Water Agency and County of Kern subregions not shown.

LEGEND
- CITY / COMMUNITY
- DISADVANTAGED COMMUNITY

Data taken from U.S. Census Bureau; specifically the Census 2000 TIGER/Line.

N

0 2.5 5 10 15 20 Miles
1 inch = 10 miles

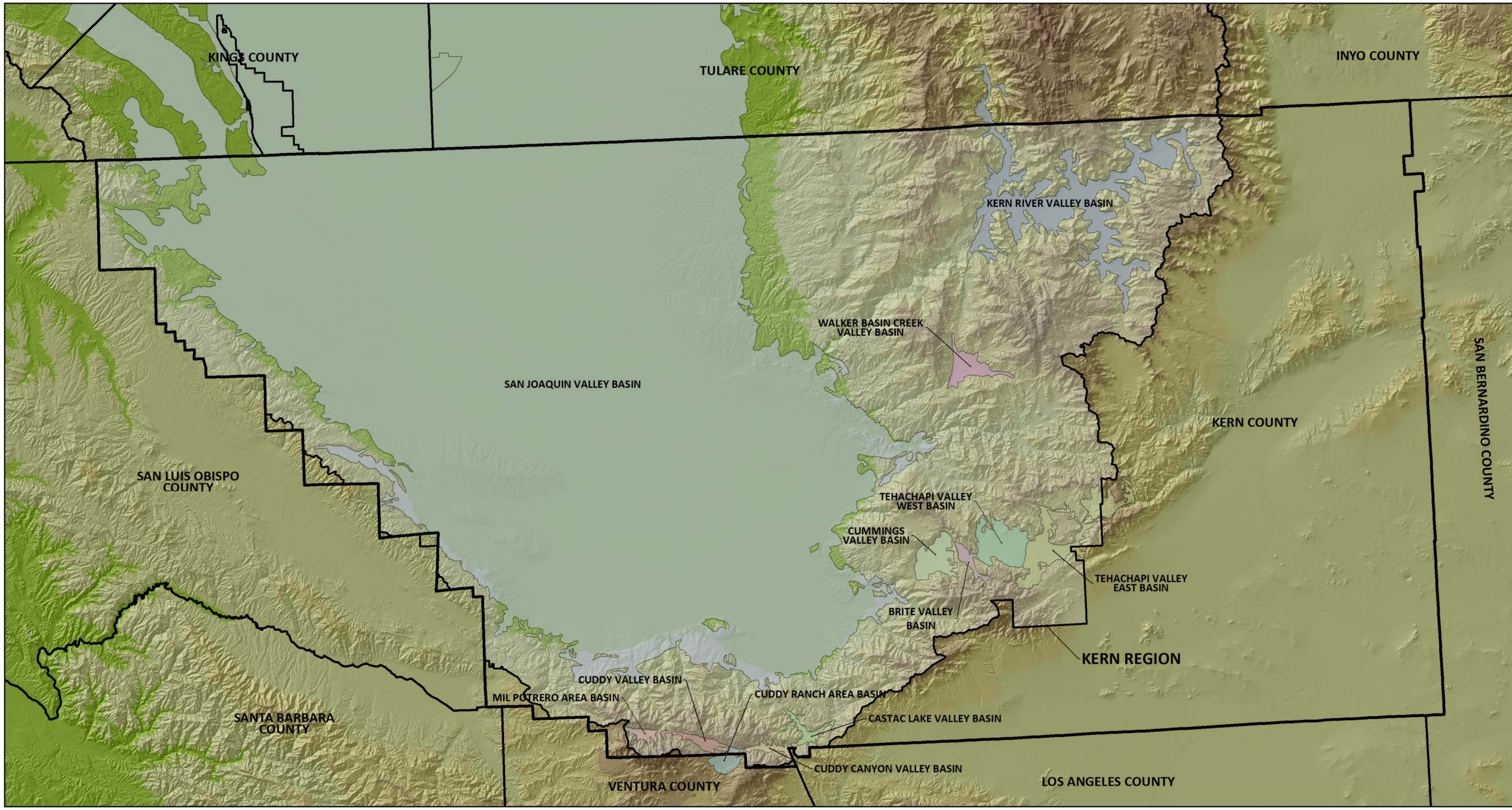
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Disadvantaged Communities
within the Kern Region

K/J 0889044*00

November 2011
FIGURE 2-6



KERN COUNTY WATER AGENCY
Bakersfield, CA

DWR BULLETIN 118 GROUNDWATER BASINS WITHIN THE KERN REGION

Created: 2009-0409, S. Chambless
Filename: 2009-1015, S. Chambless
Filename: DWR_Bulletin_118_GW_Basins_09-0409.mxd

N

0 2.5 5 10 15 20 Miles

1 inch = 10 miles

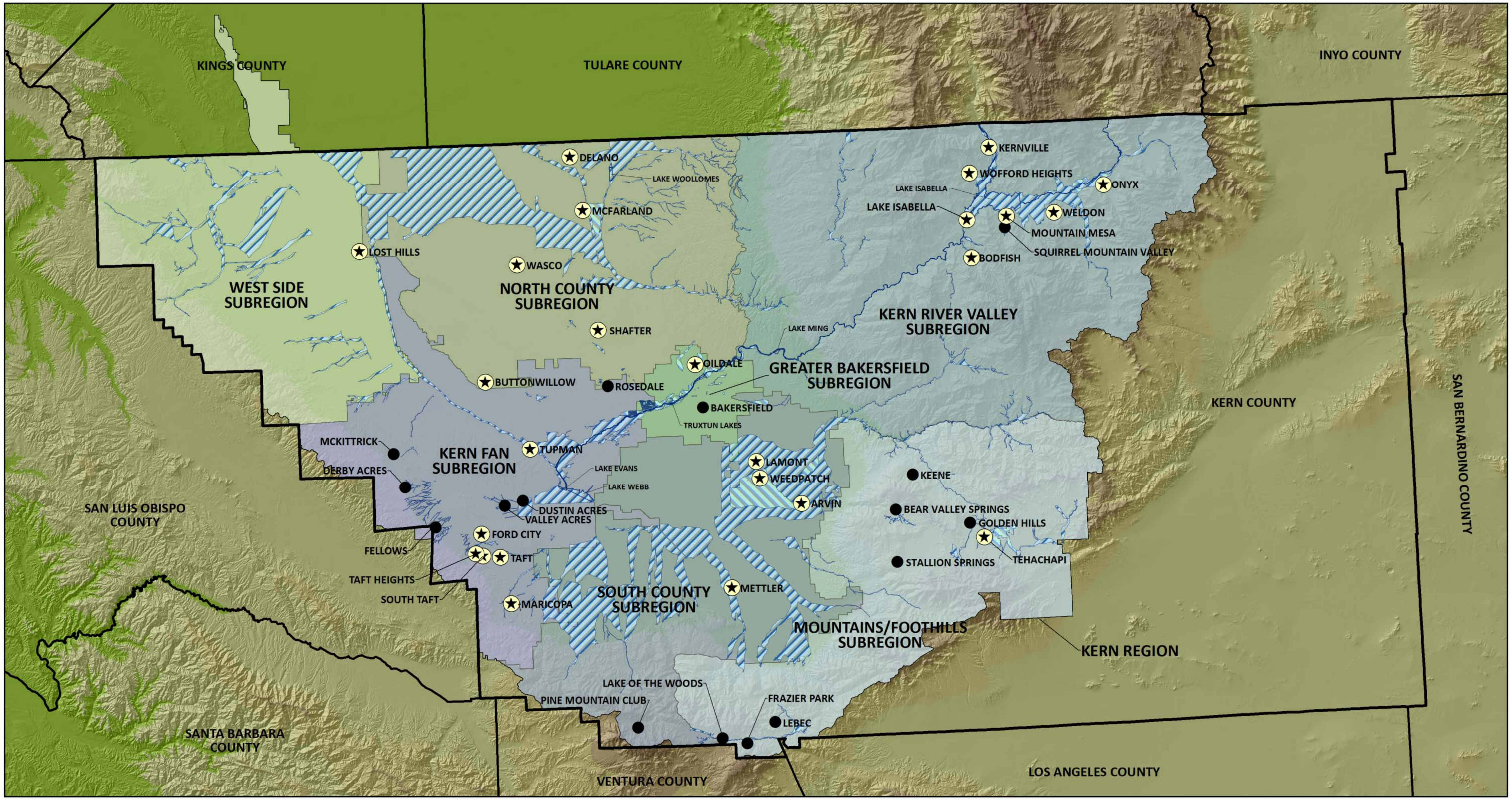
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

DWR Bulletin 118 Groundwater Basins
within the Kern Region

K/J 0889044*00

November 2011
FIGURE 2-7



FEMA DESIGNATED HIGH RISK FLOOD AREAS WITHIN THE KERN REGION

KERN COUNTY WATER AGENCY
Bakersfield, CA

Created: 2009-0409, S. Chambless
Revised: 2011-0824, S. Chambless
Filename: Floodplains_11-0721.mxd

NOTE: Kern County Water Agency and County of Kern subregions not shown.

LEGEND

FEMA FLOOD ZONES
100 YEAR FLOOD PLAIN
500 YEAR FLOOD PLAIN

CITIES*
CITY / COMMUNITY
DISADVANTAGED COMMUNITY

*Data taken from U.S. Census Bureau; specifically the Census 2000 TIGER/Line.

N

0 2.5 5 10 15 20 Miles
1 inch = 10 miles

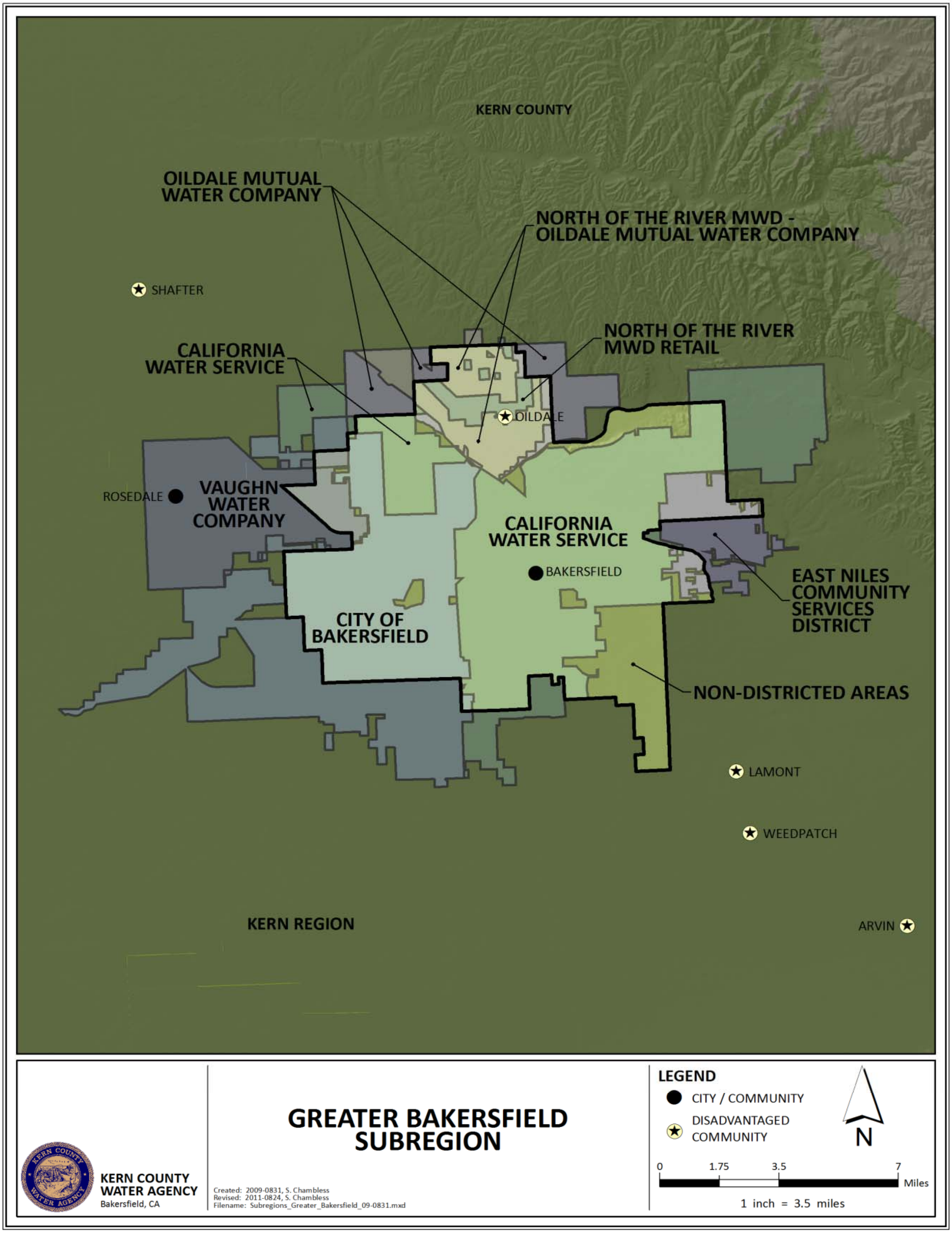
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of Kern County , IRWMP – Final Update

FEMA Designated High Risk Flood Areas within the Kern Region

K/J 0889044*00

November 2011
FIGURE 2-8



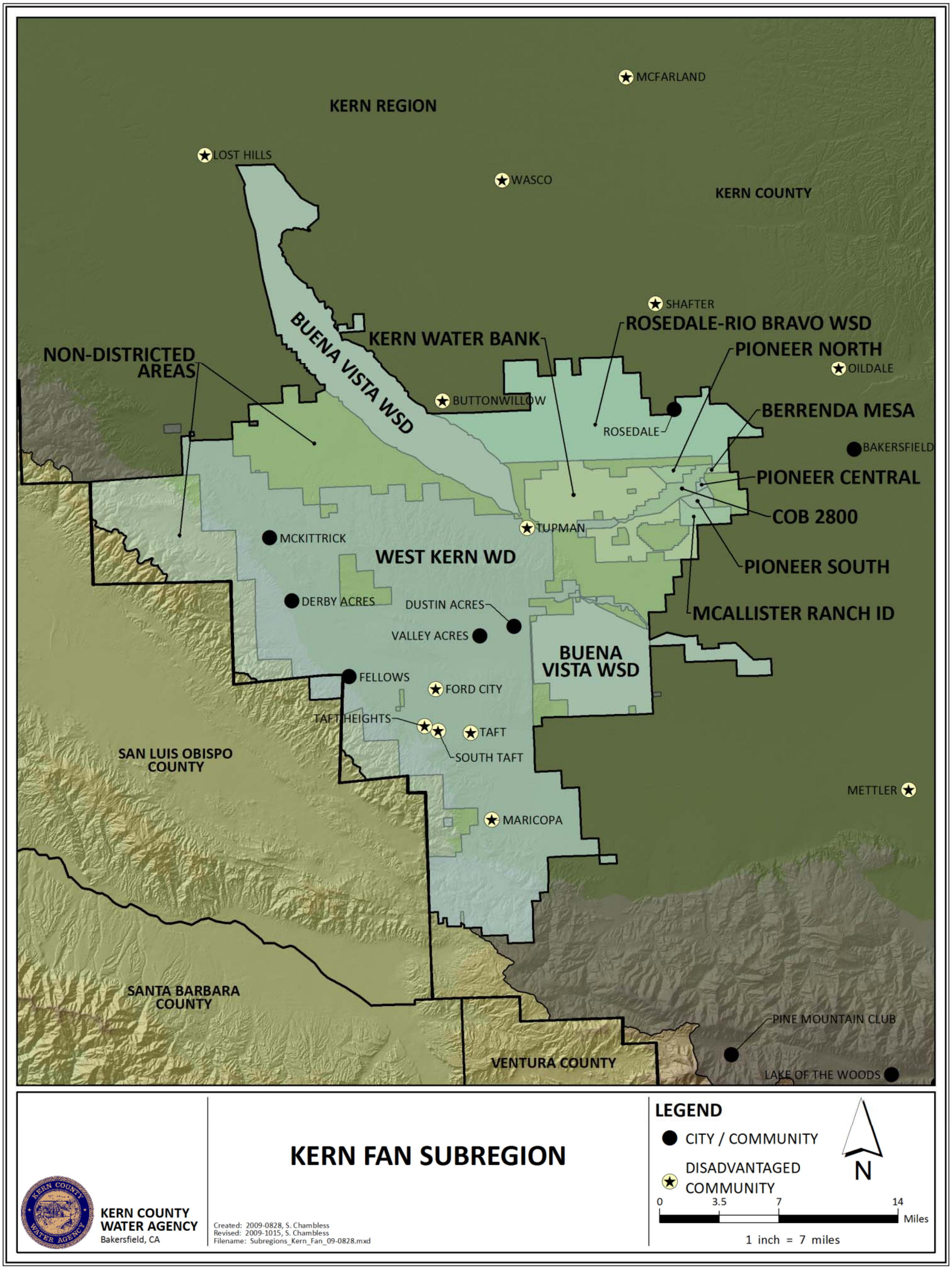
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Greater Bakersfield Subregion

K/J 0889044*00

November 2011
FIGURE 3-1



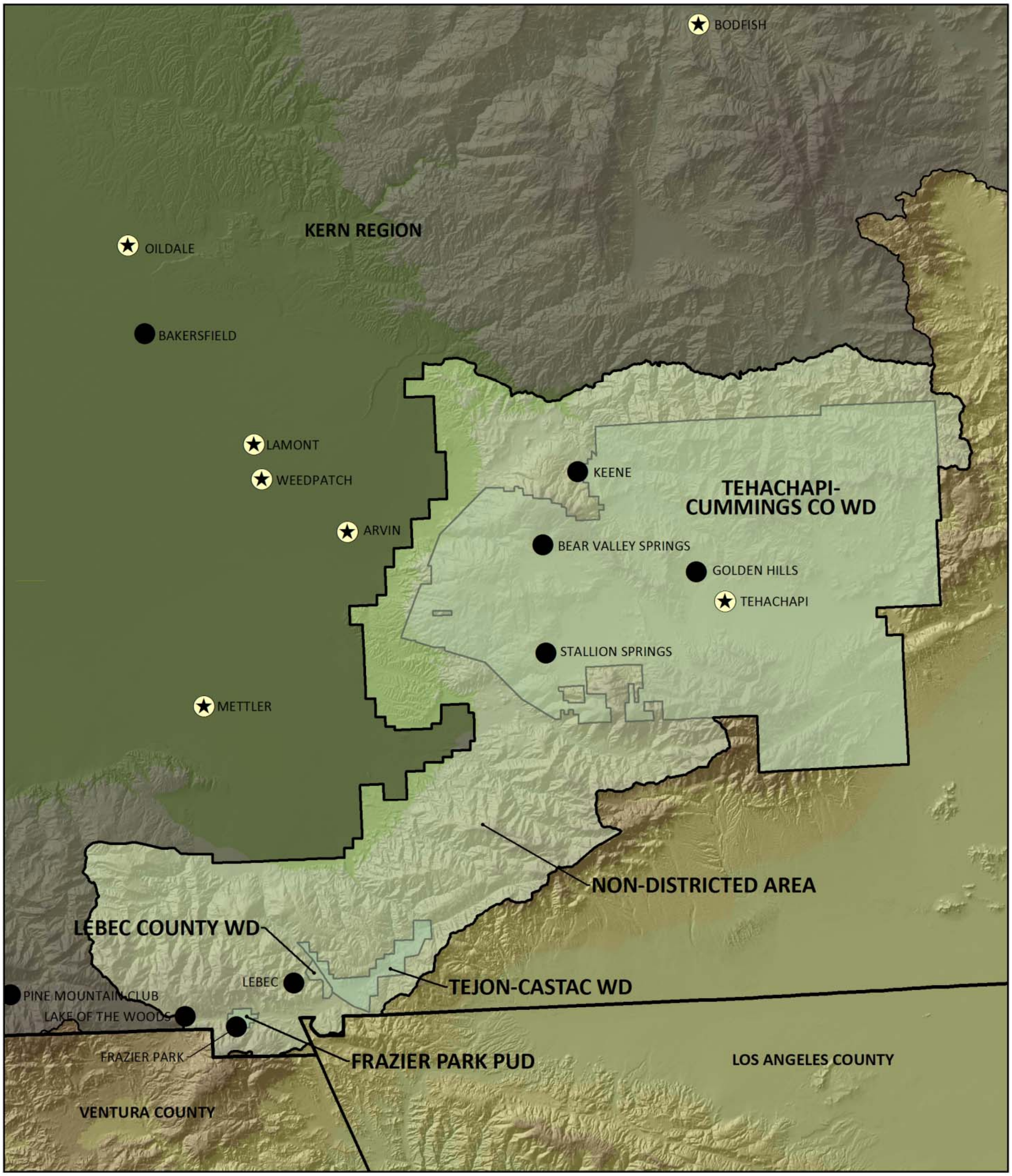
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Kern Fan Subregion

K/J 0889044*00

November 2011
FIGURE 4-1



MOUNTAINS/FOOTHILLS SUBREGION

KERN COUNTY WATER AGENCY
Bakersfield, CA

Created: 2009-0831, S. Chambless
Revised: 2011-0824, S. Chambless
Filename: Subregions_Mountains_Foothills_11-0721.mxd

LEGEND

- CITY / COMMUNITY
- DISADVANTAGED COMMUNITY

N

0 3.5 7 14 Miles

1 inch = 7 miles

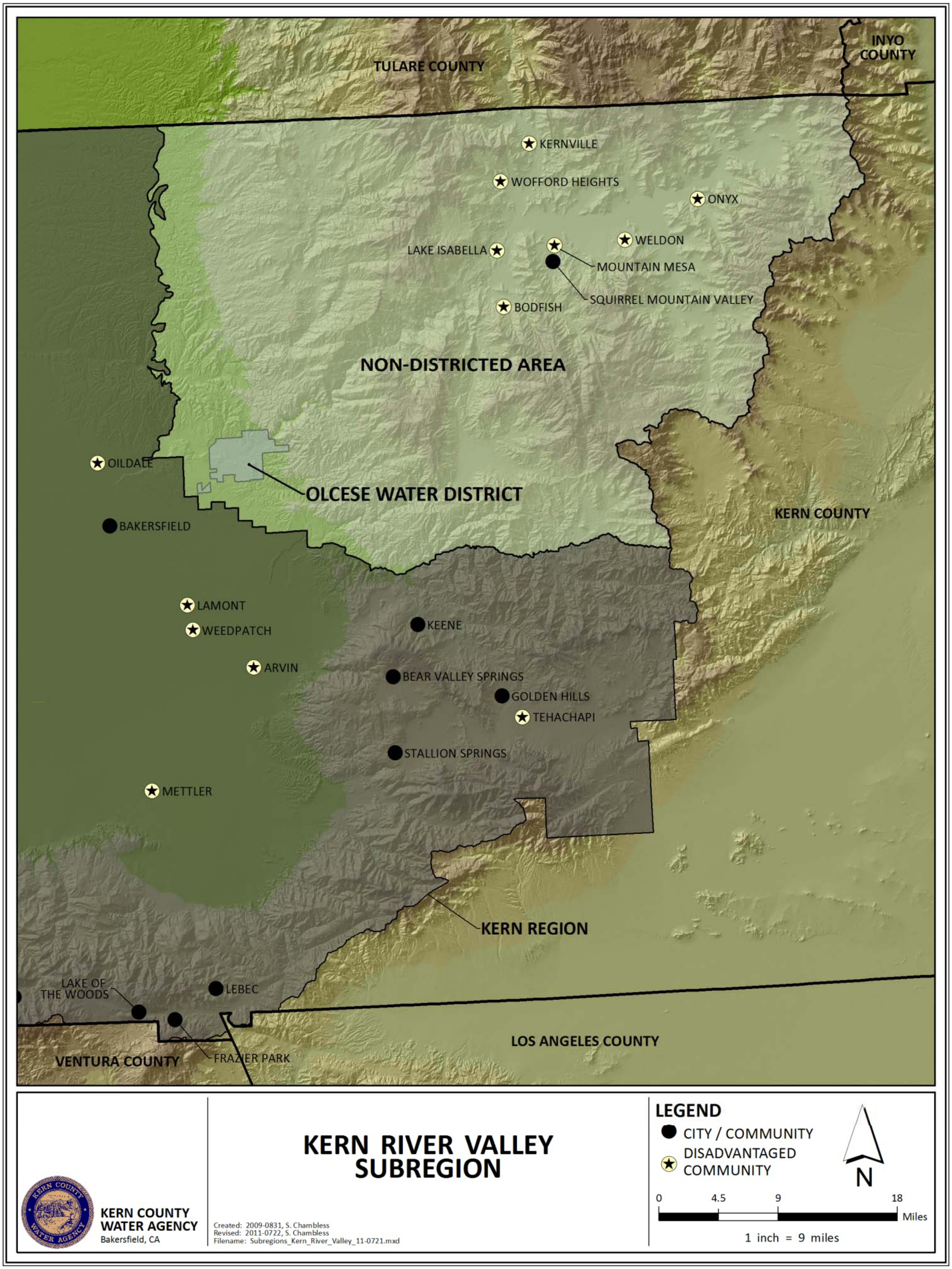
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Mountains/Foothills Subregion

K/J 0889044*00

November 2011
FIGURE 5-1



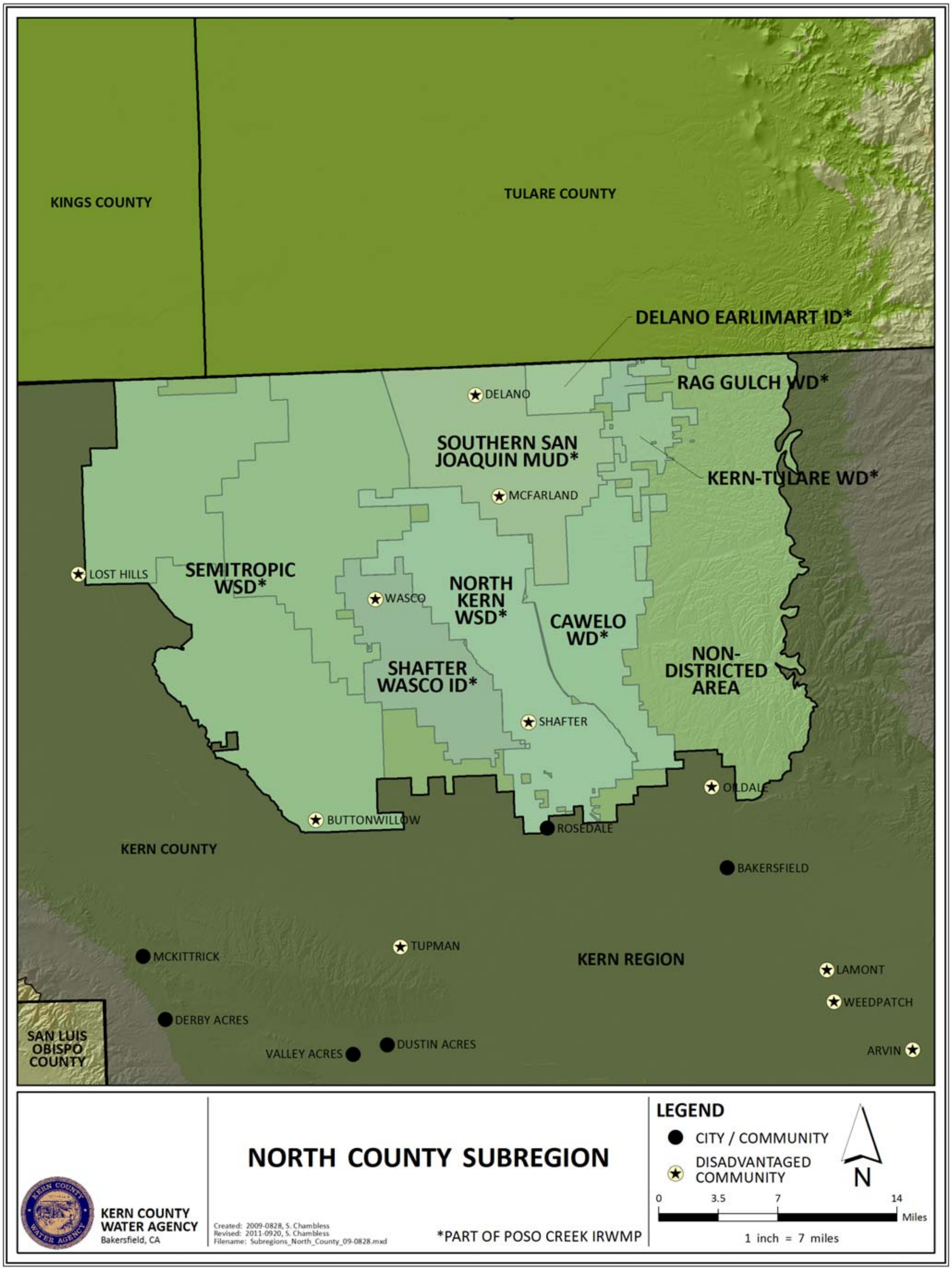
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

Kern River Valley Subregion

K/J 0889044*00

November 2011
FIGURE 6-1



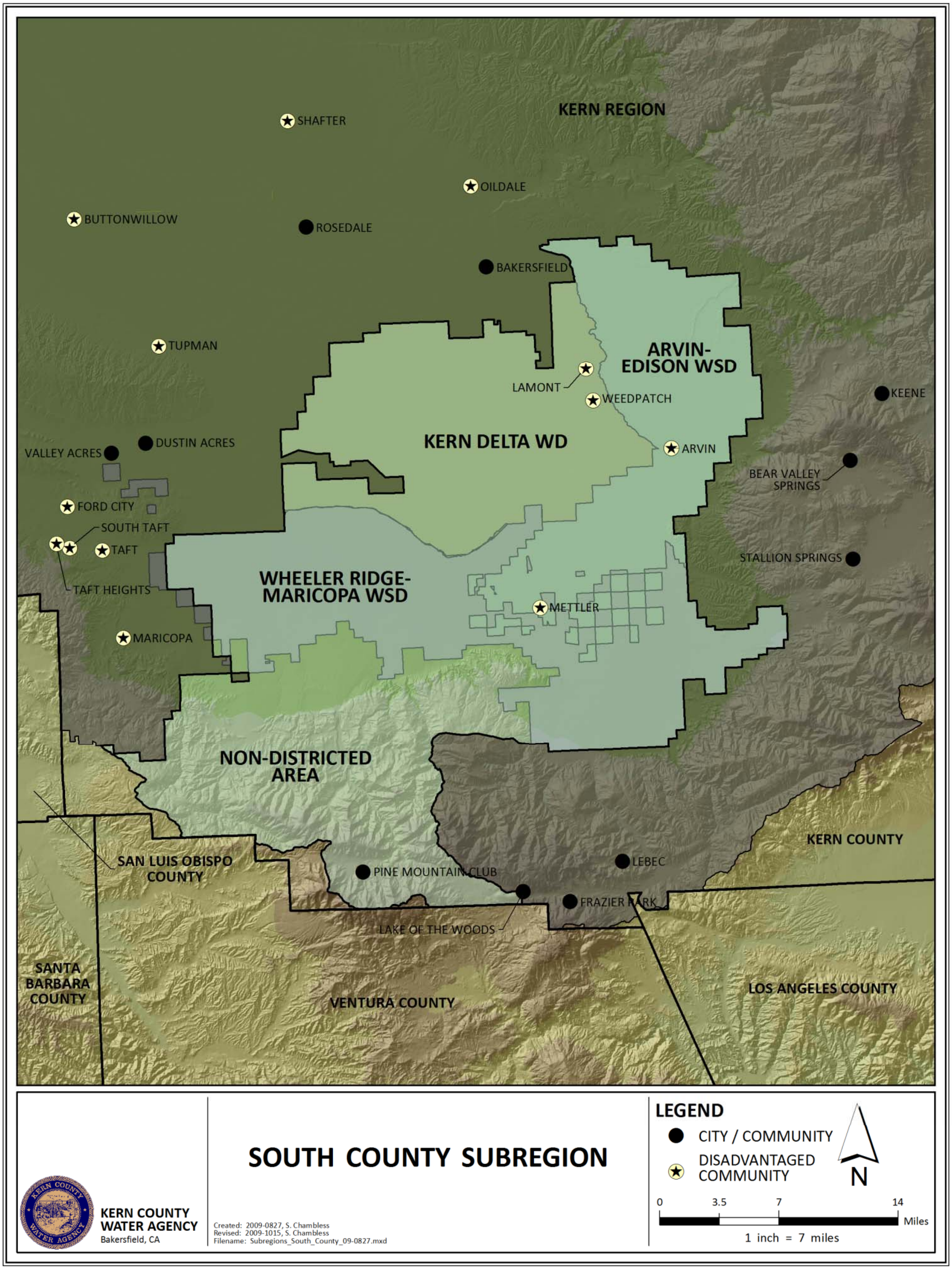
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

North County Subregion

K/J 0889044*00

November 2011
FIGURE 7-1



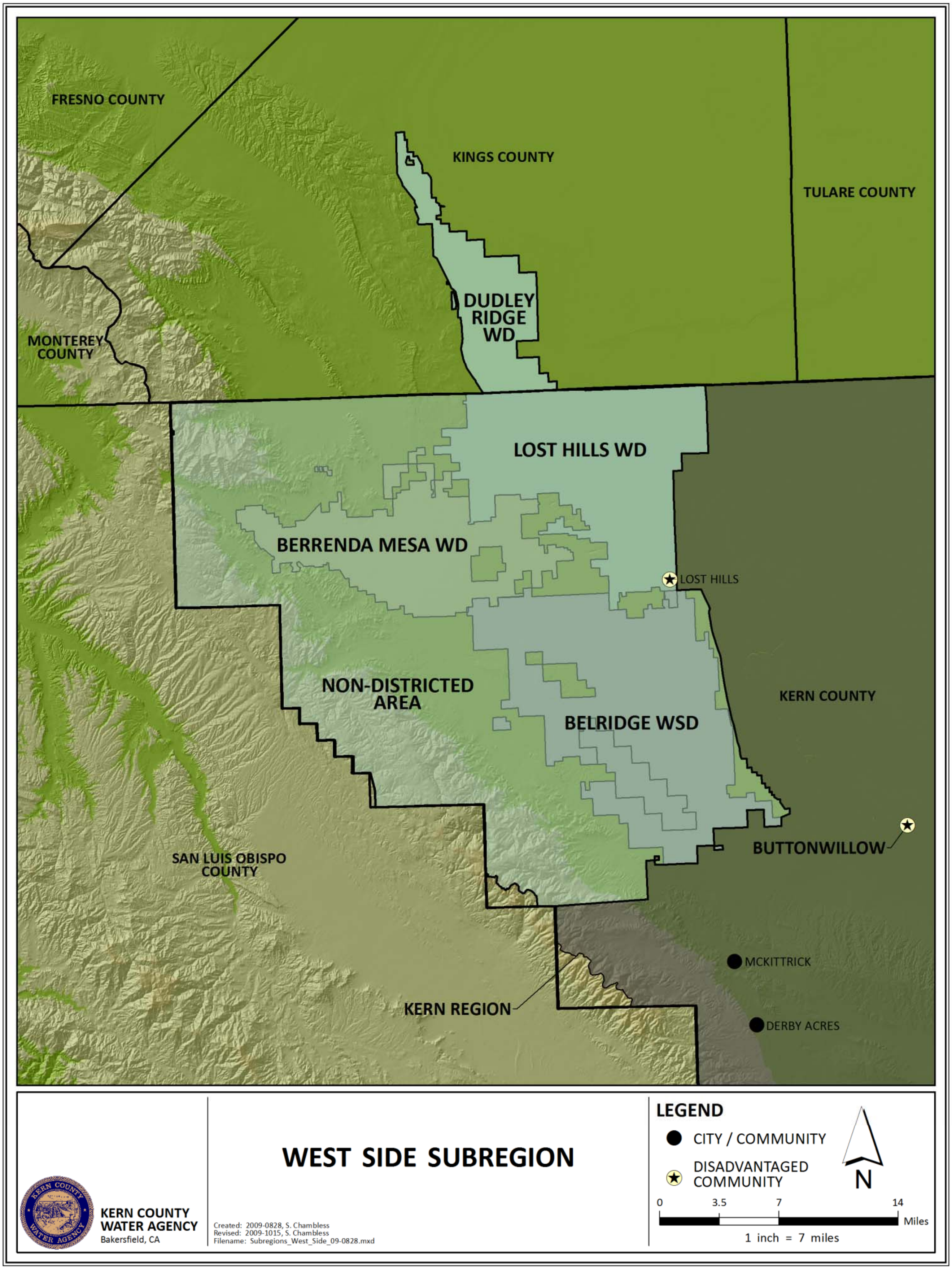
Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

South County Subregion

K/J 0889044*00

November 2011
FIGURE 8-1



Kennedy/Jenks Consultants

Tulare Lake Basin Portion of
Kern County , IRWMP – Final Update

West Side Subregion

K/J 0889044*00

November 2011
FIGURE 9-1