Baseline Conditions Technical Memorandum

Prepared for:

The Upper Kings Basin Water Forum
and The Kings River Conservation District

WRIME Water Resources & Information Management Engineering, Inc.

KRCD Kings River Conservation District

March 2006

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Prepared by:

Water Resources & Information
Management Engineering, Inc.
(WRIME, Inc.)

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SECTION 1 INTRODUCTION AND PURPOSE

The purpose of this technical memorandum is to document existing institutional and engineering conditions in order to provide the Upper Kings Basin Water Forum (Water Forum) with a sound basis for discussions of water management strategies. Baseline conditions provide a snapshot of the current water management situation and serve as a benchmark for evaluation of future water management strategies.

The institutional baseline is presented in two sections: 1) existing organizations and 2) plans, policies, programs, and agreements. The first section describes the local, regional, state, and federal organizations that are involved with or have an influence on development of the Upper Kings Basin Integrated Regional Water Management Plan (IRWMP). The subsequent section describes the programs, projects, policies, funding, and regulations affecting the IRWMP. These sections are followed by a description of the engineered environment and water management facilities within the IRWMP Region.

Activities under this task included review of city and water district capital facilities plans and of engineering data on current water supply facilities (storage, diversion, and distribution), flood control facilities, recharge and extraction facilities, drinking water treatment plants, wastewater treatment plants, and reclamation and flood control facilities. Data collected under this subtask were organized into a Geographic Information System (GIS) to the degree that available source data were in compatible electronic formats.

The description of the environmental baseline is to be prepared by the Kings River Conservation District (KRCD) as part of the in-kind services contribution to the IRWMP. When completed, the document will be an attachment to this technical memorandum and will describe the important ecological processes and environmental resources within the IRWMP Region. Understanding the environmental baseline will help to avoid, minimize, or mitigate any potential impacts during project planning.

SECTION 2 INSTITUTIONAL BASELINE — ORGANIZATIONS

This section presents a review of existing local, regional, state, and federal organizations participating in the IRWMP or which may have an influence on the development and implementation of the IRWMP. Both water and land use agencies are participating in the IRWMP in recognition of the critical relationship between the uses of water and land. The IRWMP Region's groundwater and surface water management is accomplished by public and private water agencies, districts, and utility companies. Land use decisions are made by the various city councils and the county boards of supervisors, while water use decisions are made by the numerous independent water boards.

Water Forum Participants

- Kings River Conservation District
- Alta Irrigation District
- Consolidated Irrigation District
- Fresno Irrigation District
- Raisin City Water District
- County of Fresno
- County of Kings
- County of Tulare
- City of Clovis
- City of Dinuba
- City of Fresno
- City of Fowler
- City of Kerman
- City of Kingsburg
- City of Parlier
- City of Reedley
- City of Sanger
- City of Selma
- Fresno Audubon Society
- California Native Plant Society
- Kings River Fisheries Management Program Public Advisory Group
- El Rio Reyes Trust, Kent Kinney;
- California Water Institute
- California Department of Water Resources
- California Department of Fish & Game
- Regional Water Quality Control Board
- Kings River Water Association

THE UPPER KINGS BASIN WATER FORUM

The Water Forum is the regional stakeholder group responsible for coordinating the IRWMP development effort. The Water Forum is working to achieve a common vision for regional solutions: a vision of a sustainable supply of the Kings River Basin's finite surface and groundwater resources through regional cooperation, planning, and implementation of projects that are balanced and beneficial for the environment, quality of life, economy, and future generations.

The Water Forum was established in 2004 by the local water districts, land use agencies, and other stakeholders. A wide array of water, urban, agricultural, and environmental interests are currently involved in the Water Forum so that a diverse range of perspectives is considered.

The Water Forum is the successor to a regional water resources planning process that was initiated in 2001 through a Memorandum of Understanding (MOU) among the local water district partners and the California Department of Water Resources (DWR). The MOU partners included KRCD, Alta Irrigation District (AID), Consolidated Irrigation District (CID), and Fresno Irrigation District (FID). These four water districts

compose the water management group pursuant to the IRWMP standards and guidelines[1] (DWR, 2004).

This collaboration resulted in a number of important technical studies, provided assessment of the groundwater basin conditions, and helped set the tone for further cooperation and creation of the Water Forum. Continuity and leadership of this cooperative process have been provided by KRCD, AID, CID, and FID.

Participation in the Water Forum is voluntary and has been open to all stakeholders within the region, including new members who have been actively sought. Water Forum *partners* are stakeholders who have matched state funding with local funding. *Participants* represent stakeholder interests but have not provided funding. The roles and responsibilities of the regional agency and regional water management group were authorized by the governing bodies of the public agencies.

The Water Forum recognizes that all of the stakeholders have valid interests in ensuring there is sufficient clean, reliable water in the IRWMP Region and it has taken the initiative to keep all of these groups working together to solve the interrelated water and land use and environmental issues.

LOCAL AND REGIONAL AGENCIES

The success of an IRWMP depends on the participation of those agencies that have jurisdictional authority to implement the plan. Therefore, jurisdictional authority provided an important basis for defining the boundary of the IRWMP region. Both water supply and land use authorities are needed to effectively develop and implement an IRWMP, and, as such, the Water Forum includes representatives of each from the overlying counties, the incorporated cities, and the water districts and agencies. The IRWMP Region is shown on Figure 1 and spans over parts of three counties: Fresno, Kings, and Tulare.

Local, regional, state, and federal agencies that have relationships and potential roles in developing the IRWMP are listed in Table 1. Table 1 also compares the agencies' roles to the water management strategies recommended by DWR. These water management strategies are opportunities to be considered by the Water Forum for integration and inclusion in the IRWMP.

[1] IRWMP Standard A — Regional Agency or Regional Water Management Group.

Table 1. Agencies and Roles and Relation to DWR Strategies

Organization	Roles Related to DWR Water Management Strategies																					Other Roles		
	Agricultural lands stewardship	Agricultural water use efficiency	Conveyance (canals)	Drinking water treatment and distribution	Economic incentives (Loans, Grants, and Pricing)	Ecosystem restoration	Floodplain management	Groundwater storage. Conjunctive Use	Groundwater remediation Aquifer remediation	Matching water quality to water use	Pollution prevention	Precipitation enhancement	Recharge areas protection	Recycled municipal water	Surface storage--regional/local	System re-operation	Urban land use management	Urban runoff management	Urban water use efficiency	Water-dependent recreation	Watershed management	Water transfers	Wastewater treatment	Permit Requirements
Local																								
Special Districts																								
Alta Irrigation District		●	●		●	●		●		●					●	●		●				●		
Consolidated Irrigation District		●	●		●	●		●		●					●	●		●				●		
Fresno Irrigation District		●	●		●	●	●	●		●				●	●	●		●				●		
King River Conservation Distict		●			●	●	●	●		●	●	●	●		●	●					●	●		
Freso Metropolitan Flood Control Distict			●		●	●	●	●					●		●		●	●			●			
Water Associations																								
Kings River Water Association															●	●						●		
Friant Water Users		●	●			●	●	●							●	●						●		
Community Services Districts				●										●			●	●	●				●	
Counties (Fresno, Kings, Tulare)																								
Public Works			●	●	●		●	●						●				●	●				●	
Planning	●				●	●	●										●							●
Health/Environmental Health				●	●				●		●			●									●	
Cooperative Extension	●	●																						
Agricultural Commissioner											●													
Cities																								
Clovis				●	●			●			●		●	●	●		●	●	●				●	●
Fresno				●	●			●			●		●	●	●		●	●	●				●	●
Fowler				●	●						●						●	●	●					●
Kerman				●	●						●						●	●	●				●	●
Kingsburg				●	●						●						●	●	●					●
Parlier				●	●						●						●	●	●				●	●
Reedley				●	●						●						●	●	●				●	●
Sanger				●	●						●						●	●	●				●	●
Selma				●	●						●						●	●	●					●
Dinuba				●	●	●					●			●			●	●	●				●	●
Other Regional																								
Selma Kingsburg Fowler Regional Sanitary District																							●	

Organization	Roles Related to DWR Water Management Strategies																					Other Roles		
	Agricultural lands stewardship	Agricultural water use efficiency	Conveyance (canals)	Drinking water treatment and distribution	Economic incentives (Loans, Grants, and Pricing)	Ecosystem restoration	Floodplain management	Groundwater storage. Conjunctive Use	Groundwater remediation Aquifer remediation	Matching water quality to water use	Pollution prevention	Precipitation enhancement	Recharge areas protection	Recycled municipal water	Surface storage--regional/local	System re-operation	Urban land use management	Urban runoff management	Urban water use efficiency	Water-dependent recreation	Watershed management	Water transfers	Wastewater treatment	Permit Requirements
State																								
Department of Water Resources		●	●		●	●	●	●	●	●					●	●			●			●		
Regional Water Quality Control Board					●				●	●	●			●				●			●		●	●
State Water Resources Control Board		●		●	●	●			●	●	●			●	●						●	●	●	●
Department of Fish and Game					●	●														●	●			
Department of Health Services				●					●	●	●		●	●									●	●
Department of Food and Agriculture	●				●						●													
Department of Pesticide Regulation									●		●													●
Department of Toxics Substances Control									●		●												●	●
Federal																								
Corps of Engineers					●	●	●			●	●		●		●	●				●	●			●
Bureau of Reclamation		●	●		●	●		●		●					●	●				●		●		
Fish and Wildlife Service, NOAA Fisheries					●	●				●											●	●		●
Environmental Protection Agency					●	●				●	●			●				●			●		●	●
Department of Agriculture, NRCS	●	●			●	●					●										●			

1) DWR Water Management Strategies as defined inthe California Water Plan Update 2005 . Strategies not applicable to the IRWMP Region include Deslination and Surface storage-CALFED,

WATER DISTRICTS/SPECIAL DISTRICTS

General and Special Districts are the two major types of water districts. General Districts like AID, CID, and FID are formed under specific sections of the state code that define the procedures, powers, authorities, and other characteristics of the district. Special Districts like KRCD or the Fresno Metropolitan Flood Control District (FMFCD) are formed by special acts of the legislature creating the districts and prescribing their powers. In addition, there are many types of districts formed, such as public utility districts and community services districts, to provide unique or specialized services to local land owners. Each of the districts has specific powers and authorities, governance, electoral processes, funding mechanisms, and programs for its jurisdiction. Water districts, private ditch companies, and municipal water service providers located in and around the IRWMP area are shown in Figure 2.

AID, CID, and FID all have designated powers and authorities for managing and developing water supplies in their respective areas and have extensive water rights on the Kings River, and all have been actively operating conjunctive use projects in their respective jurisdictions. While there is no single groundwater management authority in the Kings Groundwater Basin, groundwater management is practiced through conjunctive use programs implemented by individual districts or groups of districts in the basin. KRCD boundaries overlap with those of AID, CID, and FID, and KRCD has served as the regional agency for purposes of the IRWMP.

The Kings River Conservation District

KRCD is the lead agency for development and implementation of the IRWMP for the Kings Basin. KRCD was created in 1951 by the state legislature pursuant to the Kings River Conservation District Act and has regional authority and responsibilities similar to the IRWMP goals for groundwater management, flood control, water quality preservation, environmental stewardship, and dissemination of public information.

The principal reason for the formation of KRCD was to create one overall public agency to act on behalf of the entire Kings River service area to (1) safeguard local water rights, negotiate, (2) contract with the state and federal agencies for water supply and power generation, and (3) plan, finance, construct, and operate hydroelectric power plants on the Kings River. The KRCD Act also gives KRCD the appropriate legal authority to prepare and submit the grant applications, to develop plans, and to enter into contracts with state and federal agencies. KRCD's jurisdiction encompasses an area greater than the jurisdictional boundaries of any other single local public agency.

The KRCD Master Plan (KRCD, 1974) proposed development of the Pine Flat Power Plant, Piedra Afterbay Reservoir to re-regulate flows, Dinky Creek Reservoir, Rogers Crossing Reservoir, and a dam on Mill Creek. Only the Pine Flat Power plant has been completed. The

Dinky Creek Reservoir was within two months of starting construction in 1986 when plans were halted for lack of a buyer of the energy that the project would generate (KRCD/KRWA, 1997). The Rogers Crossing project was studied on several occasions, but the formation of a federal management area put the project into dormancy and it would now take an act of Congress for the dam's development.

KRCD has a "Policy Statement Governing Joint Development of Groundwater Recharge Facilities" that was adopted in 1991, updated in 1993, and used to guide how KRCD supports conjunctive use and groundwater recharge. KRCD also initiated the MOU with the DWR that produced the initial assessment of the groundwater basin and conjunctive use potential, and resulted in a number of important studies (WRIME, 2002 a, b; 2003 a, b). These early efforts documented the hydrogeologic conditions, evaluated the feasibility of conjunctive use projects, served as an initial Groundwater Management Plan (GWMP), defined potential projects, and led AID, CID, FID, and KRCD to expand the program and develop the Water Forum. KRCD provided support to the Water Forum. Major program efforts include:

- Water supply planning;
- Groundwater management, including recharge investigations, feasibility studies, annual reporting, and groundwater management plan development and implementation;
- Power generation, including operations and maintenance of the Pine Flat facilities and the new peaking plant;
- Grower assistance and conservation;
- Environmental management, including the fisheries management program;
- Flood control; and
- Water quality planning, including coordination with local growers to comply with the Central Valley Regional Water Quality Control Board's (RWQCB's) requirements for agricultural waste discharge.

Alta Irrigation District (AID)

The AID was formed under the Wright Act, passed in 1887, and is one of the oldest irrigation districts in the state. AID provides surface water from the Kings River to farms in its 129,000-acre service area through a series of unlined canals. AID diverts water at Cobbles Weir into canals that transport water into a system that serves the area from Reedley to west of Orange Cove in eastern Fresno County, as well as the Dinuba, Orosi, and Traver areas of northern Tulare County. AID has 100,000 acre-feet (AF) of storage in Pine Flat and 19,275 AF storage in the other upstream reservoirs.

In addition to providing surface water to meet irrigation demands, AID uses flood flows from the Kings River to recharge the groundwater basin. No estimate of the amount of water recharged through the basins is available. AID estimates it gets 45,600 AF of incidental recharge annually along its 360 miles of unlined irrigation delivery canals.

AID has long recognized the significance of groundwater resources to the area, and has been monitoring the declines in water levels for 80 years. In August 1994, AID adopted an AB 3030 Groundwater Management Plan and will be updating the plan to meet revised state requirements. Agricultural irrigation is the single biggest water user in the AID currently but the cities and communities within the District are growing rapidly and this trend is expected to continue. Agricultural water demands not met by AID-provided surface water are satisfied with groundwater pumping from private wells. All urban demands are met with groundwater. AID estimates that its annual average groundwater overdraft is 22,000 AF.

AID's irrigation canals are also used for flood control purposes by the county, cities, and communities in the area to convey stormwater. The District has agreements with cities for use of District facilities for the purpose of stormwater management, though no special assessments or fees are charged for flood control benefits. The system includes ponds for tailwater recovery and redistribution. AID has been a leader in developing Agricultural Water Management Plan (AWMP) pursuant to state requirements[2]. The AID AWMP documents how agricultural water is beneficially used in the District by growers and the implementation of Efficient Water Management Practices (EWMPs). The AID AWMP was updated in 2005 and approved by the Agricultural Water Management Council. AID, which does not currently provide treated surface water to municipal customers, is evaluating surface water delivery and treatment for the Cutler/Orosi area.

The District raises revenues through a land-based benefits assessment which includes surface water and groundwater components and a water surcharge based on the volume of water delivered. An assessment study is currently being conducted to evaluate rates. In addition, AID has an urban assessment on new development that is based on a percentage of the total project cost of new services or facilities. When agricultural land is annexed to the City, it remains in AID and is assessed based on the urban charges.

Consolidated Irrigation District (CID)

CID was organized on September 8, 1921, in accordance with the Irrigation District Law of the State of California Water Code. CID diverts water at the Gould and Fresno Weirs to provide surface water from the Kings River to farms within the 235,000-acre service area using a series of unlined canals. The District has 119,000 AF of storage in Pine Flat and another 22,937 AF in other upstream storage facilities. CID has been monitoring groundwater levels since the 1920s. The current groundwater monitoring program consists of about 80 wells spaced on a 2-mile grid throughout the district. In July 1995, the CID adopted an AB 3030 Groundwater Management Plan.

[2] AB 3616, Agricultural Water Management Practices Act.

For the last 40 years, the total water demand within CID has increased slightly and totals just more than 300,000 AF per year. Agriculture is the largest water demand within CID. Agricultural demands within the area served by surface water are supplemented with groundwater pumping from private wells when surface water is inadequate. There are 53,000 acres of agricultural land that rely exclusively on groundwater from private wells to meet their irrigation needs. All the urban demands in the District are met with groundwater.

CID has implemented groundwater recharge programs to bank the surplus surface water for later use during dry periods. This has resulted in a decrease in district-wide groundwater levels during dry years, with recovery during wet years. Even with the existing recharge programs in place, CID estimates that the annual average groundwater overdraft is in the order of 53,000 AF.

Voters in CID recently approved an increase of the benefits assessments to support current maintenance and operations programs and to further develop groundwater management facilities. The primary source of revenue to the District is the acreage assessments on water users. CID currently provides two types of services to its users and variable assessments for each: gravity surface water delivery and groundwater recharge. The lands that are typically inundated during heavy rains or flood releases are assessed at a "pond" rate. District users not eligible or currently able to receive surface water still receive benefits and are assessed accordingly. The benefits of the groundwater recharge program include increased groundwater levels and reduced pumping costs. When agricultural land is annexed by an incorporated city, it is de-annexed from CID, though these entities continue to receive the benefits of the recharge operations. Cities which are within the overall CID boundary, but are excluded from the District, are still assessed a percentage of the pump rate.

CID canals and distribution facilities are also used for regional flood control and stormwater management. This also serves to support additional recharge of the groundwater basin, but the benefits of the flood control or additional recharge have not been established, and CID has no official flood policies or assessments for flood control functions. CID does not have an AWMP and has not developed a GWMP.

Fresno Irrigation District (FID)

FID was organized in accordance with the Irrigation District Law of the State of California Water Code. The FID service area is approximately 245,000 acres. FID diverts Kings River water from the Fresno Weir into the 680-mile canal and pipeline distribution system for both agricultural and municipal water uses. FID has rights to store 120,000 AF in Pine Flat reservoir and an additional 23,130 AF of storage in upstream reservoirs. This storage and Kings River water are used by FID to deliver an average annual supply of approximately 500,000 AF.

FID obtains most of its surface water supplies from the Kings River but also has a contract with the United States Bureau of Reclamation (Reclamation) for 75,000 AF of Class 2 water from the

Friant Division of the Central Valley Project (CVP). In addition to its own Reclamation contract, FID has contractual agreements with the City of Fresno to take delivery of the City's 60,000 AF of Class 1 water and deliver it to Leaky Acres recharge basins and other basins for groundwater recharge.

For the last 40 years, the total water demand within FID has decreased slightly as agricultural land has been converted to urban uses with a lower net water use, but agricultural irrigation is still the biggest water user within FID. The current demand totals about 420,000 AF per year. Agricultural demands within the area served by surface water are supplemented with groundwater pumping from private wells when surface water supplies are inadequate. Until recently, all of the urban and industrial demands in the district were met with groundwater. Two surface water treatment plants have been constructed by the Cities of Fresno and Clovis as part of the regional conjunctive use program. This is part of the 'in lieu' recharge program that delivers surface water when possible to minimize groundwater pumping.

In order to extend its available surface water supplies, FID has implemented groundwater recharge programs to bank the surplus surface water for later use during dry periods. Even with the existing recharge programs in place, average groundwater elevations in the District have declined by about 25 feet. FID estimates that the annual average groundwater overdraft within the District is in the order of 10,000-20,000 AF. Surface water diverted to recharge facilities has averaged about 34,000 AF annually since 1979 (FID, 1993). FID prepared a detailed background report and inventory of groundwater resources (FID, 1993) that was used to support adoption of the FID GWMP in 1996 (FID, 1996). The GWMP has recently been updated to meet the revised state requirements (FID, 2005).

FID works closely with the Cities of Fresno and Clovis and the FMFCD to increase groundwater recharge. This program includes using available ponds to meet multiple objectives for groundwater recharge, stormwater management, and open space whenever possible. FID facilities serve to move stormwater around and away from the cities. When land is annexed by cities it de-annexes from FID and the water rights for the lands transfer to the cities after reorganization.

Mid-Valley Water Authority

The Mid-Valley Water Authority (MVWA) is a Joint Powers Authority that was created to secure a supplemental water supply and to support the construction of a conveyance facility for the delivery of supplemental water to the MVWA service area; KRCD is the lead agency. MVWA was formed in 1982 with 30 public agencies, though currently the MVWA has 20 agencies and has become relatively inactive. The service area extends from Merced County in the north to the southern boundary of the Arvin-Edison Water Storage District (AEWSD), and includes approximately 3.4 million acres. The MVWA completed the San Joaquin Valley Conveyance Investigation in cooperation with Reclamation. The Reclamation Reform Act and

the Central Valley Project Improvement Act (CVPIA) have precluded the MVWA from obtaining a water supply from the CVP and stalled further development of the proposed conveyance and delivery facilities.

Community Services Districts, Public Utility Districts, and County Service Areas

Community Services Districts (CSDs) are formed by a county to provide water, sewer, or other public services to unincorporated communities and they are usually managed by county public works departments. Public Utilities Districts (PUDs) are formed under specific provisions of state code and have their own boards of directors. There are a number of small County Service Areas (CSAs) within the IRWMP Region that provide water or sewer service. The county Local Agency Formation Commission (LAFCO) keeps track of the various special districts within the county, maintain maps of the service area, and approve any boundary changes. Table 2 lists CSDs and PUDs found in the IRWMP region, also indicating the counties where they are located. Figure 2, presented previously, showed the current service area boundaries for the CSDs or PUDs. The county LAFCOs also maintain maps of the districts and smaller CSA boundaries. All of the listed districts provide both water and wastewater treatment services. Many of the CSDs and PUDs provide service to small areas with limited tax bases and many of the areas served are rural and can be defined as disadvantaged communities.

Table 2. Community Service Districts and Public Utility Districts in the IRWMP Area

County	Service Provider	Population (2000)
Fresno	Biola CSD	1,037
Fresno	Caruthers CSD	2,103
Tulare	Cutler PUD	4,491
Fresno	Del Rey CSD	950
Tulare	East Orosi CSD	426
Fresno	Laton CSD	1,236
Tulare	Orosi PUD	7,318
Tulare	Seville Zone of Benefit	360
Tulare	Sultana CSD	507

In the Fresno County part of the IRWMP Region, water service is also provided by CSAs 5, 10, 14, and 42 (Fresno LAFCO, 2005). These are very small service areas with a limited number of connections.

Fresno Metropolitan Flood Control District

The FMFCD provides flood control and urban storm water services for streams in the Fresno stream group in a 400-square mile watershed located between the Kings and San Joaquin Rivers. It is a special district with jurisdictional authorities defined by the California Water Code. The FMFCD manages the local drainage and regional flood control programs in and surrounding the Fresno-Clovis area and its programs are closely integrated and coordinated with FID and the Cities of Fresno and Clovis to provide efficient, comprehensive services. The District is governed by a seven-member board that must approve the District budget, fees and assessments, direct matters of policy, enact ordinances, and perform other responsibilities authorized and required by the District Act. Capital facilities, such as pipeline and basins, are funded through local development ordinances. Construction of reservoir and dams and FMFCD operations are funded through a limited voter-authorized tax. The District is authorized to collect property taxes within its service area.

The FMFCD Services Plan guides district actions and serves as a good example of an integrated program (FMFCD, 2004). The Services Plan provides detailed description of the goals, programs, facilities, regulations, agreements, and implementation plans for each of the major program areas. The major program areas include flood control, rural streams, local storm water drainage, storm water quality management, water conservation, recreation, and wildlife management. The FMFCD program is unique in that it uses a multipurpose, multi-objective approach and most retention pond facilities are designed for flood control, groundwater recharge, and recreational purposes.

FMFCD facilities provide water supply and water quality benefits by capturing an average of 90% of all urban runoff. This is accomplished through a cooperative groundwater recharge program in partnership with the Cities of Fresno and Clovis, Fresno County, and FID. The FMFCD participates in the land use and development review process to ensure that design requirements are met; to make recommendations regarding new development; and to help the land use agencies prevent flood loss and damage to rural streams, private property, and district facilities. The Service Plan seeks to be consistent with the general plans of the city and county land use agencies, and incorporates the key general plan elements of the City and County of Fresno, and the City of Clovis. The Service Plan documents the various interrelated elements of the three prevailing general plans. GIS coverages of FMFCD facilities were obtained and added to the IRWMP GIS.

Selma Kingsburg Fowler Regional Wastewater District

The Selma-Kingsburg-Fowler County Sanitation District (SKFSD) provides wastewater treatment services to the Cities of Selma, Kingsburg, and Fowler, as well as to the unincorporated areas along the corridor between the cities. The SKFSD is a public agency

formed in February 1971 by the Fresno County Board of Supervisors through authority granted in the County Sanitation Districts Act and the Health and Safety Code of the State of California. The purpose of this special district is to provide for the collection, treatment, and disposal of wastewater emanating from the residential, commercial, institutional, and industrial dischargers within the service area.

RESOURCE CONSERVATION DISTRICTS

Resource Conservation Districts (RCDs) are established locally under the provisions of Division 9 to the Public Resource Code and the rules of the LAFCO of each county. RCDs have close ties to county governments, but have their own locally appointed independent boards and are not county government entities. RCDs are grass roots organizations that undertake projects for soil and water conservation, wildlife habitat enhancement and restoration, watershed restoration, conservation planning, and education. RCDs are usually supported by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service). RCDs have become more active in the past ten years with increased emphasis on watershed planning and water quality protection. As described below, there are two RCDs that are active in the IRWMP Region.

Navelencia Resource Conservation District

The Navelencia Resource Conservation District (NRCD) was established in October 1956. Although the original area of the NRCD included 26,560 acres, it currently encompasses 781,075 acres, an area approximately one-fifth of Fresno County. NRCD is bounded by the Kings River in the north, by the Fresno-Tulare County line and the Sequoia National Park boundary in the south, and by the Fresno Inyo and Fresno-Mono County lines in the east. NRCD can be divided into three distinct sections: the eastern 70% is in the Sierra Nevada major watersheds that drain towards the Kings River; a mid-section (20%) is in the foothill region of the Sierra Nevada used for cattle grazing and subdivision housing with elevation ranging between 600-4000 feet (ft), and the lower (500-foot elevation) western portion (10%) is in the great San Joaquin Valley noted for its high agricultural production. The NRCD adopted a Long Range Plan in 2000 (NRCD, 2000) to take a more proactive stand and to reach out to the landowners and homeowners in the District. Program funding is through grants that provide seed money for educational programs, water quality monitoring, and land maintenance projects that complement the six identified problem areas addressed in the Long Range Plan. The six basic problem areas to address are erosion and sedimentation, irrigation water management, rangeland (fire and brush control), surface and subsurface drainage problems, environmental education, and alternate energy sources.

Tulare County Resource Conservation District

The Tulare County Resource Conservation District, encompassing 758,037 acres on the eastern side of the Tulare County, is composed mostly of private lands, the Tule River Indian Reservation, and publicly owned lands in the Sequoia National Forest. There were extensive flooding problems in the Tulare County rural agricultural areas in 1997-1998, many of which originated in the watersheds in the eastern part of the Tulare County, with a significant portion of these watersheds lying within or adjacent to the District. Hence, the District has focused its conservation efforts on flood control within the watersheds of the White River, Frazier Creek, Lewis Creek, and Deer Creek. The District also supports or assists viable efforts to implement flood protection measures; water conservation and water quality enhancements, such as reduction of soil erosion or sedimentation production in upper watersheds; irrigation water management; conservation education programs; and wildlife habitat conservation and restoration.

KRWA Members

- Alta Irrigation District*
- Burrel Ditch Company
- Clark's Fork Reclamation District #2069
- Consolidated Irrigation District*
- Corcoran Irrigation District
- Crescent Canal Company
- Empire West Side Irrigation District
- Fresno Irrigation District*
- James Irrigation District
- John Heinlen Mutual Water Company
- Kings River Water District
- Laguna Irrigation District
- Last Chance Water Ditch Company
- Lemoore Canal Company
- Liberty Canal Company
- Liberty Mill Race Company
- Lovelace Water Corporation
- Peoples Ditch Company
- Reed Ditch Company
- Riverdale Irrigation District
- Southeast Lake Water Company
- Stinson Canal and Irrigation Company
- Stratford Irrigation District
- Tranquility Irrigation District
- Tulare Lake Basin Water Storage District
- Tulare Lake Canal Company
- Tulare Lake Reclamation District #761
- Upper San Jose Water Company

*Water Forum Members

WATER ASSOCIATIONS

Water associations are private groups which work together to represent the interests of their members. Kings River Water Association (KRWA), the Friant Water Authority, and the Southern San Joaquin Valley Water Quality Coalition (SSJVWQC) are three associations in the IRWMP Area.

Kings River Water Association

The history of water management on the Kings River is marked by numerous disputes over water rights. These disputes eventually led to the formation of the KRWA as a way to solve disputes and to coordinate water management along the river. Under a series of complex agreements and water schedules documented in the "Blue Book," KRWA serves as the water master to manage the Kings River flow and the conserved storage in Pine Flat Reservoir. KRWA is comprised of

28 member agencies that have contracts for the 1,006,000 AF of conserved storage in Pine Flat Reservoir. Figure 3 shows the boundaries of KRWA that are within and surrounding the IRWMP Region.

The boundaries of KRWA define the Place-of-Use for the Kings River water rights held by KRWA in trust for the individual members. The Place-of-Use must be defined in the water rights permits issued by the California State Water Resources Control Board (SWRCB). The areas outside of the KRWA boundaries do not have surface water rights to the Kings River and are reliant solely on groundwater. Under KRWA policies, surface water can be transferred between KRWA members within the adopted KRWA Place-of-Use. Through KRWA, members pay for irrigation storage benefits on the Pine Flat Dam and for retirement of the bonds and obligations to the federal government.

Friant Water Authority and CVP Contractors in IRWMP Region

The Friant Water Authority represents the entities from the Friant Unit of the CVP that house federal water contracts with Reclamation. The Friant Unit includes Millerton Lake, the Madera Canal, Friant-Kern Canal, and associated facilities. The Friant-Kern Canal crosses the IRWMP Region and is operated and maintained by the Friant Water Authority. The DMC ends at Mendota Pool, just north and west of the IRWMP Region, and provides water to federal contractors in this area.

The Friant Unit provides two classes of water service. *Class 1 water* is the most dependable supply and would normally be available in-whole or in-part for delivery each year. Class 1 water is typically contracted to districts that serve areas with limited or no access to groundwater of acceptable quality. *Class 2 water* is that supply in excess of Class 1 that is only periodically available for delivery. Because of uncertainty regarding availability and time of occurrence, Class 2 water is not as dependable as Class 1. Class 2 water is typically under contract to districts with access to good groundwater supplies or other surface water sources. These districts can accept recurring CVP deficiencies and rely primarily on their other sources of supply.

Class 1 and Class 2 distinctions are not used for water delivered through the DMC from the Delta Division; instead, these water entitlements are referred to as *project water*. Eleven water service providers in the Kings model area have long-term contracts with Reclamation to provide water from the Friant Division (See Table 3).

Table 3. CVP Contractors in IRWMP Area

Contractor	Contract Date	Duration	Type	Entitlement (AF)	Use
Fresno Irrigation District	January 2001	25 years	Class 2	75,000	M&I and Irrigation
Garfield Water District	January 2001	25 years	Class 1	3,500	Irrigation
International Water District	January 2001	25 years	Class 1	1,200	M&I and Irrigation
Orange Cover Irrigation District	January 2001	25 years	Class 1	39,200	M&I and Irrigation
City of Orange Cove	January 2001	25 years	Class 1	1,400	M&I
City of Fresno	August 2005	40 years	Class 1	60,000	M&I
Fresno County Waterworks District #18	January 2001	25 years	Class 1	150	M&I
Tranquility Irrigation District	February 2005	25 years	Project Water	13,800	M&I and Irrigation
Tranquility Public Utility District	February 2005	25 years	Project Water	70	M&I and Irrigation
James Irrigation District	February 2005	25 years	Project Water	35,300	M&I and Irrigation
Coelho Family Trust	February 2005	25 years	Project Water	2,080	M&I and Irrigation

FID is the only CVP contractor in Fresno County that has a Class 2 contract entitlement. The City of Fresno has a Class 1 contract, which is unusual for a large urban center. This represents a secure source of supply which is very important to the Fresno-Clovis Metropolitan Area. Some of the CVP contractors in Fresno County receive their surface water through Friant Unit facilities under the provisions of an exchange contract involving the Cross Valley Canal.

The exchange agreement is between the respective federal water contractors and the AEWSD located in Kern County near the terminus of the Friant-Kern Canal. A total of 128,300 AF of CVP Delta water supply contracted to the federal Cross Valley Canal water users is delivered to AEWSD. This water is exchanged for 40,000 AF of AEWSD's Class 1 contractual entitlement and 134,000 AF of its Friant Unit Class 2 contractual entitlement, which is delivered to the various Cross Valley Canal contractors in accordance with their contracts. Approximately 10,000 AF of Cross Valley Canal water is contracted to agencies within Fresno County (Fresno County, 2000).

SOUTHERN SAN JOAQUIN VALLEY WATER QUALITY COALITION

KRWA and KRCD are participating in the SSJVWQC, which was established in 2002 to deal with water quality issues and concerns affecting the Kings River area and the Tulare Lake Basin. Some of the pending water quality issues identified by the SSJVWQC are:

- Expiration of the agricultural waiver exemption for water discharge requirements;
- The State and Regional Water Quality Control Boards' 303(d) list of impaired waterways to be used to calculate Total Maximum Daily Load (TMDL) under the Clean Water Act; and
- The Regional Board's triennial review of the San Joaquin and Sacramento River Basin Plan, including examination of TMDL and water quality issues.

The SSJVWQC participating agencies believe that they will be better served approaching these and other water quality issues using a regional approach rather than individually.

GROUNDWATER PLANNING AND PROJECT DEVELOPMENT GROUPS

Two other local groups, the McMullin Group and North Fork Group (NFG), are active in the Lower Kings Basin just to the west of the IRWMP Region. Both are local stakeholder groups cooperating on groundwater projects and obtaining grants and loans. The NFG has an MOU with DWR for conjunctive use projects. KRCD is working to support both groups in identifying capital facilities and programs that would provide regional benefit.

LAND USE PLANNING AGENCIES — INCORPORATED CITIES AND UNINCORPORATED COMMUNITIES

The incorporated cities, unincorporated communities, and county boundaries were shown in Figure 1. The IRWMP region overlaps parts of Fresno, Tulare, and Kings Counties. The legal authority for the various city and county actions and programs is derived from two essential powers of local government: corporate and police powers. Using their "corporate power," local governments collect money through bonds, fees, assessments, and taxes and spend it to provide services and facilities, such as police and fire protection, streets, water systems, sewage disposal facilities, drainage facilities, and parks. Using their "police power," local governments regulate the use of private property through zoning, subdivision, and building regulations in order "to promote the health, safety, and welfare of the public." City and county general plans provide the formal framework for the exercise of these powers by local officials, for guiding land use decisions over a specified planning horizon, and for making assumptions about the future for planning purposes. A city defines its planned growth over a specific planning horizon in the city's general plan. The city's defined growth area and Sphere of Influence (SOI) are important

for forecasting future land use conversions from agricultural to urban uses and are used to determine future water requirements.

LOCAL AGENCY FORMATION COMMISSION (LAFCO)

Fresno, Kings, and Tulare Counties' LAFCOs are responsible for overseeing the formation and boundary changes (jurisdictional areas) of cities and special districts. Proposals for reorganization or annexation are subject to review by the appropriate county's LAFCO under the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 (CKHA).[3] Annexation is the inclusion, attachment, or addition of territory to a city or district[4] and can involve detachments from other special districts. The process is also referred to as reorganization.

LAFCOs have numerous powers under CKHA, but those of primary concern are the powers to act on local agency boundary changes and to adopt SOIs for local agencies and special districts. An SOI is a plan for the probable physical boundaries and service area of a city or district, as determined by the LAFCO.[5] The SOI serves as a basis for making future annexation decisions and is intended to provide for orderly growth and development. Changes to the SOI define which land use plan applies and have an influence on city, county, and special district finances.

For the IRWMP, the city and county general plan land use diagrams and LAFCO-approved SOIs provide the basis for calculation and evaluation of potential future water demands. A consolidated map of the SOIs in the IRWMP Region is presented in Figure 4, which shows the proposed and accepted future city boundaries at build-out. For unincorporated areas, the SOI for the water service provider is shown. The SOI is established for the specific planning horizon as defined by the prevailing general plans for cities or as currently recognized for water districts that are the purveyors to the unincorporated community. A LAFCO must review and update SOIs every five years, which means that it periodically considers whether the city's or district's growth warrants changes to the physical limits of its ultimate service area.

LAFCOs are playing an increasingly more important policy role in water resources management and are now required to determine timely availability of water supplies[6] as specified in California Government Code[7] when evaluating annexations or incorporation decisions. They also prepare comprehensive water services reviews;[8] assess firm yield water supply availability, reliability, and quality for annexations and extension of services; consider water and wastewater management regionally, including ability of public facilities to meet

[3] California Government Code (CGC) §56000, et seq.
[4] CGC §56017
[5] CGC §56076
[6] CGC §56668
[7] CGC §65352.5
[8] CGC §56430

current and future service needs; and evaluate extension of services outside of existing boundaries.[9]

Prior to updating an SOI, state law requires a LAFCO to approve a Municipal Service Review (MSR) for public services provided within the SOI. Local LAFCOs are required to have MSRs completed by December 2007. The MSRs provide a regional review of any proposed annexation or SOI amendment. In accordance with Government Code Section 56430, the state Office of Planning and Research (OPR) developed guidelines to help LAFCOs in developing their processes for conducting MSRs and addressing all of the substantive issues required by the law. As part of its review of municipal services, a LAFCO is required to prepare a written statement of its determination with respect to each of the following:

1. Infrastructure needs or deficiencies;
2. Growth and population projections for the affected area;
3. Financing constraints and opportunities;
4. Cost avoidance opportunities;
5. Opportunities for rate restructuring;
6. Opportunities for shared facilities;
7. Government structure options, including advantages and disadvantages of consolidation or reorganization of service providers;
8. Evaluation of management efficiencies; and
9. Local accountability and governance.

Fresno County LAFCO is in the process of developing policies on how MSRs will be prepared, but has not prepared any MSRs for local water districts. Tulare County LAFCO plans on completing an MSR by June 2006 for key areas that anticipate SOI amendments

STATE AND FEDERAL AGENCIES

A number of state and federal agencies are currently involved in various aspects of water management in the IRWMP Region and surrounding areas. This section discussed the state agencies and their potential influence on the IRWMP development and implementation.

DWR has IRWMP Standards that help to define the content of an IRWMP (DWR, 2004). The IRWMP Standards state that an IRWMP needs to identify state or federal agencies involved with strategies, actions, and projects; areas where a state agency or other agencies may be able to assist in funding, communication, cooperation, or implementation of IRWMP components or processes; or where state or federal regulatory decisions and approvals are required for implementation.[10]

[9] CGC §56133
[10] IRWMP Standards O - Coordination

The complexity of the regulatory compliance and permitting process may be one of the ways to rank and evaluate IRWMP projects. The state and federal agencies have a wide range of jurisdictional authority and responsibilities assigned by law that can help or influence the IRWMP. The state and agency authority is often exercised only during review of environmental documents prepared pursuant to the California Environmental Quality Act (CEQA) or the National Environmental Policy Act (NEPA) or when considering issuance of a permit. This usually occurs late in the planning process and can result in schedule delays, unanticipated mitigation costs, and conflicts. Early consultation and involvement of the resources agencies during IRWMP project planning can avoid these issues.

DEPARTMENT OF WATER RESOURCES (DWR)

DWR has been a partner in the IRWMP planning process from the beginning and has provided technical and financial support to the Water Forum and KRCD. DWR operates and maintains the State Water Project (SWP), including the California Aqueduct; provides dam safety and flood control services; assists local water districts like KRCD in water management and conservation activities; promotes recreational opportunities; and plans for future statewide water needs. DWR is not a regulatory agency. DWR has historically provided both grant and loan funding to local agencies to plan and build water supply projects and implement groundwater programs. Proposition 50 is the most recent program with the guidelines, standards, and process used to evaluate projects and distribute funds to local agencies (DWR 2004). DWR also establishes standards and guidelines and provides support for Urban Water Management Plans (UWMP) and GWMPs. There has been an increased emphasis on groundwater planning and development of conjunctive use programs throughout the state.

STATE WATER RESOURCES CONTROL BOARD/REGIONAL WATER QUALITY CONTROL BOARDS (SWRCB/RWQCB)

The California Water Code (CWC) defines the roles and responsibilities of the SWRCB and the nine RWQCBs. The SWRCB administers surface water rights, water pollution control, and water quality functions throughout the state, while the nine RWQCBs conduct planning related to water quality, permitting, and enforcement activities. The SWRCB sets statewide policy and, together with the RWQCBs, implements state and federal laws and regulations. Federal water quality requirements are managed by the SWRCB under the Porter-Cologne Water Quality Control Act.[11] The SWRCB does not have the authority for managing groundwater or determining groundwater rights. The SWRCB distributes and manages a range of grant- and loan-funded programs, including the State Revolving Loan fund to build water and wastewater facilities, and grants for watershed management programs.

[11] CWC §13000 et seq.

Both the Kings River and the San Joaquin River have been determined to be fully appropriated by the SWRCB.[12] This means that there is no water on the Kings River that could be assigned a new water rights permit.[13] Minor potential sources of surface water may still be subject to appropriation through water impounded by flood control detention facilities built on the Fresno Stream Group, Mill Creek, or the Arroyo Pasajero Stream group on the west side of the San Joaquin Valley. A water rights application has been filed for potential impounded water on the Fresno Stream Group, for purposes of groundwater recharge, by FID, the Cities of Fresno and Clovis, and FMFCD.

The IRWMP Region is covered by the Central Valley Water Quality Control Plan — Tulare Lake Basin (Basin Plan) last revised in January 2004 (RWQCB, 2004). The Basin Plan establishes the water quality objectives and standards for the IRWMP Region and the policies and programs of the RWQCB to ensure that water quality is protected and meets all of the designated beneficial uses. The Basin Plan is to be updated in 2006.

DEPARTMENT OF FISH AND GAME

The mission of the California Department of Fish and Game (DFG) is to manage California's diverse fish, wildlife, and plant resources, as well as the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. DFG has both a planning and a regulatory function and is responsible for protection and enhancement of public trust resources, like the Kings River. For planning purposes, DFG is a partner with KRCD and KRWA to plan and develop the Kings River fisheries management program. DFG also supports development of habitat conservation plans and strategies for upland, aquatic, and riparian habitats, so it can serve as a resource in these areas. DFG regulatory functions that could influence the implementation of the IRWMP and are related to the California Endangered Species Act, and to environmental review and permitting of potential projects. State law requires any person, state or local governmental agency, or public utility to notify DFG before beginning an activity that will substantially modify a river, stream, or lake. DFG will determine if the activity could have a substantial, adverse affect on an existing fish and wildlife resource and whether a Lake or Streambed Alteration Agreement is required.

DEPARTMENT OF HEALTH SERVICES

The California Department of Health Services (DHS) permits municipal drinking water systems, regulates contaminant sources, establishes and enforces regulations for the use of reclaimed wastewater, and runs a range of other programs to protect water quality and public health and safety. DHS also possesses extensive data on water quality for existing systems in the IRWMP Region.

[12] Decision 1290.
[13] CW C §§ 1205–1207

The DHS is the lead agency for developing and implementing the Drinking Water Source Assessment and Protection (DWSAP) Program. The drinking water source assessment is the first step in the development of a complete drinking water source protection program. The assessment includes a delineation of the area around a drinking water source through which contaminants might move and reach the drinking water supply; an inventory of Possible Contaminating Activities (PCAs) that might lead to the release of microbiological or chemical contaminants within the delineated area; and a determination of the PCAs to which the drinking water source is most vulnerable. Assessments have been conducted for water systems in the IRWMP Region. The DHS set Maximum Contaminant Levels (MCLs) for trace elements, different types of organic contaminants, microbial (biological) contaminants, trihalomethanes (THMs), and many other potential contaminants to ensure that the water is safe for human consumption.

The DHS will be concerned about IRWMP goals for protection of water quality and any IRWMP projects that may negatively impact municipal and domestic beneficial uses. The DHS has produced "The Purple Book," which contains California health laws related to reuse of disinfected tertiary recycled water (DHS, 2001b), and works with the RWQCBs to ensure protection of water quality and to review projects that propose to make use of reclaimed water. Any IRWMP projects that include delivery and treatment of surface water would need to meet Title 22 standards. At a minimum, water designated for municipal uses cannot contain concentrations of chemical constituents that exceed the MCLs specified in Title 22 of the California Code of Regulations which are incorporated by reference into the water quality objectives for groundwater in the RWQCB Basin Plan.

U.S. CORPS OF ENGINEERS

The U.S. Corps of Engineers (Corps) operates and maintains Pine Flat Dam and Reservoir, administers recreation facilities around the reservoir, and is in charge of all matters related to flood control, including flood releases. The Corps has important flood control and flood plain management responsibilities in areas with federal levies. The Corps is also responsible for the Clean Water Act 404 permits in situations where waters of the United States may be impacted by projects such as those that may be developed under the IRWMP.

In 1993 the Corps began a fish and wildlife habitat enhancement study for the Kings River and Pine Flat Reservoir. This resulted in a reconnaissance study that identified possible projects and led to a cost-sharing agreement between KRCD and the Corps in 1996 to further evaluate the feasibility of potential projects and develop the Pine Flat Dam Fish and Wildlife Habitat Restoration Feasibility Study. The earlier reconnaissance work identified the turbine bypass project that was subsequently built in 2002 and was funded in cooperation with KRCD. The turbine bypass project provides for flexible operations and allow for the release of cold water from the Reservoir to support the downstream fishery at times when the power plant is not in

operation. Both efforts are part of the coordinated fisheries management program in cooperation with KRCD, KRWA, and DFG.

U.S. Bureau of Reclamation

Reclamation's Mid-Pacific Region has historically had a complex relationship with agencies in the IRWMP Region and a limited role in the development of the local Kings River water resources. The role of Reclamation was established by the 1982 Reclamation Reform Act which specifically exempted the Kings River and other Corps flood control projects from some of the limitations and restrictions placed on other federal water project users sponsored by Reclamation. This resolved prior issues over repayment and operations of the water storage components of Pine Flat Reservoir.

Reclamation is the owner and operator of the CVP. This includes the Friant Division on the San Joaquin River and all of the other facilities north of the project area, including the East Side, San Luis, San Felipe, Delta, American River, Shasta/Trinity, and Sacramento River Divisions. The CVPIA has significantly changed the way the CVP is operated. All of the long-term CVP contracts have been subject to renewal and are in various stages of completion. Those without long-term contracts have been operating with interim contracts.

CVP facilities could be used to transfer or import water from other areas into the IRWMP region. The IRWMP might evaluate using the CVP facilities to "wheel" or convey water obtained through agreement for transfer or exchange. Water from the CVP Friant Unit is currently delivered under contract to entities in the IRWMP Region. Water diverted at the Delta is delivered down the DMC to contractors in the lower part of the Kings basin. These operations could be influenced by the CVPIA or other Reclamation programs on the San Joaquin River, including the Upper San Joaquin River Basin Storage Investigation and the San Joaquin River Riparian Habitat Restoration Program.

U.S. Fish and Wildlife Service, NOAA Fisheries

The U.S. Fish and Wildlife Service (FWS) is the federal agency that conducts a wide range of activities for conservation, habitat planning, and protection of endangered species. It is the primary federal agency charged with management and enforcement of the Federal Endangered Species Act (Federal ESA) as it applies to terrestrial and aquatic habitats. The National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries Service) manages marine fishery resources, including inland waters that support anadromous species. This includes compliance with the Federal ESA for salmon, steelhead, and other anadromous species issues.

Within the IRWMP Region, the FWS or NOAA Fisheries could become involved if there is a related federal action associated with IRWMP project. This would include any action that

involves use of federal facilities, permits, or funding. NOAA Fisheries would become involved if there is a potential impact to salmon or steelhead species. In their conservation role, the FWS manages habitat and refuges, such as the Mendota Wildlife Refuge located in the western part of Fresno County. The FWS has also developed the San Joaquin Upland Species Recovery Plan which seeks to protect listed species in the area and preserve important habitat.

U.S. Department of Agriculture, Natural Resources Conservation Service

The U.S. Department of Agriculture NRCS works with local agencies and land owners and provides technical support for conservation of land and water, prevention of erosion, preservation or restoration of habitat, and other programs to help conserve resources. NRCS provides financial assistance for many conservation activities. Participation in NRCS programs is voluntary. Some NRCS programs, such as the Farm Bill, help farmers and ranchers resolve environmental issues on their land, enhance the long-term quality of the environment, and conserve natural resources. This includes technical support and funding programs, such as the Agricultural Management Assistance and Wetland Reserve programs. NRCS can make incentive payments to agricultural producers to voluntarily address issues and incorporate conservation practices into their farming operations. Producers may construct or improve water management structures or irrigation structures; plant trees for windbreaks or to improve water quality; and mitigate risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming. NRCS has also been active in helping dairies develop nutrient and conservation management plans.

SECTION 3 INSTITUTIONAL BASELINE — PLANS, POLICIES, PROGRAMS, AND AGREEMENTS

This section provides an inventory of existing local, state, and federal plans, policies, programs, and agreements. These documents define the current institutional planning environment and how the local communities are managing land, water and other biological resources and habitats.

Consistent with the IRWMP Standards, the Kings Basin IRWMP will discuss how it is related to planning documents and programs established by local agencies.[14]

The IRWMP is not the only regional resource management effort in the Kings Basin. There have been other important regional water planning efforts. The IRWMP will seek to integrate existing regional planning documents where appropriate to avoid duplicative efforts. Coordination with these efforts will ultimately support the development and implementation of the IRWMP. These complementary regional efforts may help the Forum in prioritizing the regional projects. The IRWMP is an opportunity to ensure that there is a consistent body of technical information and analysis to support both water and land use decisions at the local level.

Key Plans and Programs Related to IRWMP Development

- Urban water management plans
- Groundwater management plans
- Water supply master plans
- Wastewater master plans
- City and County General Plans
- Watershed management plans
- Integrated resource plans
- Habitat conservation plans
- Multi-species conservation plans
- Floodplain management plans
- Regional drinking water quality plans
- Other regional planning efforts

STATE WATER PLAN

The California Water Plan Update 2005 (CWP) was prepared by DWR to define the statewide approach to water management, to set state priorities, and to provide guidance to water planners throughout the state (DWR, 2005). The CWP is a master plan that guides the orderly and coordinated control, protection, conservation, development, management, and efficient use of the water resources of the state.[15] The CWP promotes regional water planning to integrate multiple water and resource management activities to meet a wide range of local objectives and it is intended to help water agencies, local governments, and the Legislature promote and support integrated regional water management. The CWP makes neither project-specific nor site-specific recommendations, but instead provides a framework to guide local agencies. The CWP has new features that include a strategic plan with vision, goals, recommendations and an implementation plan. It was developed with a different analytical approach than prior state

[14] IRWMP Standard M- Relation to Local Planning (DWR, 2004)
[15] CW C § 10005(a)

water plans, and relies on extended information and tools, including use of water portfolios, regional reports, a protocol for future scenarios, and defined resource management strategies.

The CWP identifies resources management strategies (Table 4) which should be used by the Water Forum to develop the IRWMP so that it fits into the state's priorities. This will increase the competitiveness of IRWMP Projects for future state funding. A key objective of the CWP is to present a diverse set of resource management strategies to meet the needs of each region as well as and statewide needs. The strategies can be adapted and combined within an IRWMP Region depending on climate, projected growth, existing water system, and environmental and social conditions.

It is important that the proposed strategies complement the operation of the existing water system within the IRWMP Region. The basic intent of the CWP is to help areas to prepare good plans that satisfy regional and state needs, meet multiple objectives, include public input, address environmental justice, mitigate impacts, protect public trust assets, and are affordable.

Table 4. CWP Resource Management Strategies

■ Agricultural lands stewardship ■ Agricultural water use efficiency ■ Conjunctive management and groundwater storage ■ Conveyance ■ Desalination ■ Drinking water treatment and distribution ■ Economic incentives (Loans, Grants, and Water Pricing) ■ Ecosystem restoration ■ Floodplain management ■ Groundwater remediation/Aquifer remediation	■ Matching water quality to water use ■ Pollution prevention ■ Precipitation enhancement ■ Recharge areas protection ■ Recycled municipal water ■ Surface storage-CALFED ■ Surface storage—regional/local ■ System re-operation ■ Urban land use management ■ Urban runoff management ■ Urban water use efficiency ■ Water-dependent recreation ■ Watershed management ■ Water transfers

URBAN WATER MANAGEMENT PLANS (UWMPS)

Since 1983, the Urban Water Management Planning Act[16] has required urban water suppliers that serve more than 3,000 customers or that deliver more than 3,000 AF per year, to prepare and adopt a UWMP. The Act provides that urban water suppliers must prepare, adopt, and submit UWMPs to DWR to be eligible to receive funding for certain programs, including Proposition 50.

[16] CWC § 10610

The UWMPs must contain several specified elements, including estimates of water use, identification of existing conservation measures (best management practices), identification of alternative conservation measures, a schedule of implementation of actions proposed by the plan, and identification of the frequency and magnitude of water shortages. In 1991, the Act was amended in response to the drought and now requires water suppliers to estimate water supplies available at the end of one, two, and three dry years, and to develop contingency plans for severe shortages. The Act requires water suppliers to review and update their plans at least once every five years. New requirements for UWMPs are periodically passed by the State Legislature (see SB 610, SB 672, and SB 1518). Current plans were due in December 2005. Table 5 lists the status of local UWMPs in the IRWMP Region.

Table 5. Entities Required to Submit Urban Water Management Plans and Status

Urban Water Suppliers Required to Submit UWMP	UWMP 2000 Complete	UWMP 2005
Clovis	Yes	Submitted
Dinuba	Yes	Submitted
Fresno	No	In Progress
Reedley	Yes	Submitted
Sanger	Yes	Submitted
Selma: California Water Service	Yes	In Progress

AGRICULTURAL WATER MANAGEMENT PLANS (AWMPS)

There are state and federal incentives and requirements for agricultural water providers to develop Agricultural Water Management Plans (AWMPs). These plans are intended to document that agricultural water is being used efficiently.

The Agricultural Efficient Water Management Act of 1990 (AB 3616) defines state requirements for AWMPs and requires DWR to support and assist in implementation of practices that increase statewide water use efficiencies. DWR supports the Agricultural Water Management Council (Council) that consists of members of the agricultural and environmental communities and other interested parties. The Council's goal is to help agricultural water suppliers to voluntarily develop AWMP and implement EWMPs. Members sign the Memorandum of Understanding Regarding EWMPs by Agricultural Water Suppliers in California. The MOU includes a comprehensive methodology by which each and every EWMP is analyzed and allows for a consistent analysis by all participating water suppliers. DWR is responsible to provide technical review and evaluation of AWMPs that are submitted to the Council. The Council reviews and approves the submitted plans.

Under the CVPIA, CVP contractors using water for agriculture are required to prepare AWMPs pursuant to the Federal Reclamation Reform Act (RRA) of 1982 and the Central Valley Improvement Act of 1992. Section 210 of the RRA requires contractors to prepare and submit plans with definitive goals, appropriate water conservation measures, and timetables. Contractors are to submit plans every 5 years. Section 3405(e) of the CVPIA requires that the Secretary of the Interior establish criteria to evaluate AWMP prepared by CVP contractors. Reclamation has developed standards for reviewing plans (Reclamation, 2005). Typically, a plan prepared to meet AB 3616 requirements will also meet Reclamation requirements.

AID was one of the original members of the Agricultural Water Conservation Council and both AID and FID have adopted AWMPs. CID does not have a current plan and since it is not a federal water contractor, it is not required to prepare a plan to meet federal requirements.

GROUNDWATER MANAGEMENT PLANS (GWMPS)

Groundwater management is the planned and coordinated local effort of sustaining the groundwater basin to meet future water supply needs. With the passage of AB 3030 in 1992, local water agencies were provided a systematic way of formulating GWMPs.[17] AB 3030 also encourages coordination between local entities through joint-power authorities or MOUs. SB 1938, passed in 2002, further emphasized the need for groundwater management in California. SB 1938 requires AB 3030 GWMPs to contain specific plan components to receive state funding for water projects. The GWMP also addresses the 12 specific technical issues identified in the California Water Code along with the seven recommended components identified in DWR Bulletin 118 (DWR, 2003). The requirements are listed in Table 6.

Table 7 lists the GWMPs and status in and surrounding the IRWMP Region. There are a number of plans that are in the process of being updated for areas that overlie the Kings Basin.

Eligibility for Proposition 50 program funding includes requirements for GWMPs (DWR, 2004). For groundwater management and recharge projects and for projects with potential groundwater impacts, the applicant or the participating agency responsible for such projects must demonstrate that either:

- It has prepared and implemented a Groundwater Management Plan in compliance with CWC § 10753.7,
- It participates or consents to be subject to a Groundwater Management Plan, basin-wide management plan, or other IRWM program or plan that meets the requirements of CWC §10753.7(a),
- The proposal includes development of a Groundwater Management Plan that meets the requirements of CWC § 10753.7 which will be completed within 1-year of the grant application submittal date, or

[17] CWC §10750 et seq.

Table 6. Groundwater Management Plan Components

SB 1938 Mandatory Components
1. Documentation of public involvement
2. Basin Management Objectives (BMOs)
3. Monitoring and management of groundwater elevations, groundwater quality, inelastic land subsidence, and changes in surface water flows and quality that directly affect groundwater levels or quality
4. Plan to involve other agencies located in the groundwater basin
5. Adoption of monitoring protocols
6. Map of groundwater basin boundary, as delineated by DWR Bulletin 118, with agencies boundaries that are subject to GWMP
7. For agencies not overlying groundwater basins, prepare the GWMP using appropriate geologic and hydrogeologic principles
AB 3030 and SB 1938 Voluntary Components
1. Control of saline water intrusion
2. Identify and manage well protection and recharge areas
3. Regulate the migration of contaminated groundwater
4. Administer well abandonment and destruction program
5. Control and mitigate groundwater overdraft
6. Replenish groundwater
7. Monitor groundwater levels
8. Develop and operate conjunctive use projects
9. Identify well-construction policies
10. Develop and operate groundwater contamination cleanup, recharge, storage, conservation, water-recycling, and extraction projects
11. Develop relationships with state and federal regulatory agencies
12. Review land use plans and coordinate with land use planning agencies to assess activities that create reasonable risk of groundwater contamination
DWR Bulletin 118 Suggested Components
1. Manage with guidance of advisory committee
2. Describe area to be managed under GWMP
3. Create links between BMOs and goals and actions of GWMP
4. Describe GWMP monitoring programs
5. Describe integrated water–management planning efforts
6. Report of implementation of GWMP
7. Evaluate GWMP periodically

Table 7. Groundwater Management Plans in the IRWMP Region and Surrounding Areas

Agency	Plan Name	Date Adopted	Status
IRWMP Area			
FID	Groundwater Management Plan (Draft)	December 23, 2005	Updated plan in Draft.
AID	Groundwater Management Plan	August 14, 1994	Developing plan. Plan to update in 2006.
CID	Groundwater Management Plan	July 26, 1995	Not current with SB 1938.
Lower King Basin	Lower Kings Basin Groundwater Management Plan	April 2005	Adopted by KRCD Board
Mid-Valley Water District	Lower Kings Basin Groundwater Management Plan	April 2005	Adopted by KRCD Board
Laguna ID	Water Management Plan	May 1992	Can be covered by Lower Kings GWMP if adopted by Board.
Liberty WD	Groundwater Management Plan	May 14, 1996	Can be covered by Lower Kings GWMP if adopted by Board.
James ID	Amended Ground Water Management Plan	February 14, 2001	Can be covered by Lower Kings GWMP if adopted by Board.
Raisin City WD		No prior plan	Can be covered by Lower Kings GWMP if adopted by Board.
Tranquility ID	Groundwater Management Plan		Covered by Lower Kings GWMP if adopted
Riverdale ID	Groundwater Management Plan		Covered by Lower Kings GWMP if adopted
Areas Surrounding IRWMP Region			
Empire Westside ID	Groundwater Management Plan AB 3030	September 21, 2005	
Westlands WD	Groundwater Management Plan AB 3030	September 16, 1996	
Tulare Lake Basin Water Storage District	Coordinated Groundwater Management Plan	N/A	
Kings County WD	Groundwater Management Plan	2001	1993 GWMP updated in 2001

- It conforms to the requirements of an adjudication of water rights in the subject groundwater basin.

LOWER KINGS GROUNDWATER MANAGEMENT PLAN

The Lower Kings Basin Groundwater Management Plan (LKGWMP) was the first plan in the IRWMP Region updated to meet the SB 1938 requirements. KRCD helped the Lower Kings Basin Advisory Panel develop the LKGWMP. The LKGWMP combines six previously independent GWMPs and covers the area where overdraft is most apparent in terms of falling groundwater levels and the existence of a regional trough in the water table. The area covered by the LKGWMP is shown in Figure 5. Water Management Areas have been defined to recognize the unique institutional and physical conditions. The LKGWMP covers a large part of the Kings Groundwater Basin area and is down gradient of the IRWMP Region. The LKGWMP and the IRWMP Region overlap in the Raisin City area.

The Basin Advisory Panel determined that local and regional benefits could be realized through conjunctive use. To be successful in both economic terms (highest benefit, lowest cost) and engineering terms (highest yield), local problems were put in the context of regional solutions and local interests established BMOs to set priorities and measure progress in meeting overall LKGWMP goals. The BMOs will be used to help screen and evaluate alternative project solutions to meet the overall LKGWMP goals and objectives. The LKGWMP provides a guide for groundwater management and defines the approach to overcome technical and organizational challenges. The final LKGWMP was adopted by the KRCD Board of Directors in the spring of 2005. Other districts seeking coverage under the LKGWMP must adopt a resolution by their Board of Directors.

The BMOs recognized near-term and longer-term project development priorities and responded to the local political, institutional, legal, and technical constraints and opportunities. The BMOs link both basin operations and project engineering criterion and will be used to identify and prioritize specific near-term and long-term projects. There are two primary types of BMOs for each Water Management Area: Groundwater Stabilization BMOs and Project Development BMOs.

Groundwater Stabilization BMOs were used to establish a target Operating Zone which sets specific groundwater elevations objectives to stabilize the basin. Near-term projects are identified in the LKGWMP implementation strategy to help stabilize the groundwater level in the Operating Zone by 2015. The 2015 forecasted groundwater level will serve as the target for the average future water level, recognizing that hydrologic variability (wet, normal, dry) would result in variations in water level within the target Operating Zone.

The Opportunity Zone defines a separate set of upper and lower groundwater level targets that provide both the technical and policy basis to develop larger projects over the longer term; to locally manage the available groundwater storage space; to define target groundwater basin

storage capacity; to provide long-term benefit to the overlying water users and regional partners; and to create cooperative agreements to fund, govern, and implement the LKGWMP.

Project Development BMOs were established to provide preliminary engineering design targets to size recharge and banking facilities. Flow rates were established to provide target design capacities because surface water availability from local sources is the limiting design constraint. The GWMP proposes both near- and the long-term actions to implement and construct capital facilities. The near-term facilities would be associated with projects to supplement natural recharge and stay within the Operating Zone for the Area. The long-term projects would be to keep and manage levels in the Opportunity Zone.

CITY AND COUNTY GENERAL PLANS

The counties and cities that overly the groundwater basins are actively engaged in the Water Forum. The list of local General Plans, plan statuses, and planning horizons is provided in Table 8.

Table 8. Status of City and County General Plans

County	City/County	Most Recent Update	Elements Updated						
			Land Use	Circulation	Housing	Open Space	Conservation	Safety	Noise
	Fresno County	2003	2003	2003	2003	2003	2003	2003	2003
	Tulare County	pending	1974	1974	1992	1974	1974	1974	1974
Fresno	Clovis	1993	1993	1993	2000	1993	1993	1993	1993
Fresno	Fresno	2002	2002	2002	2004	2002	2002	2002	2002
Fresno	Fowler	1976	1976	1976	1992	1976	1976	1976	1976
Fresno	Kerman	1993	1993	1993	1991	1993	1993	1993	1993
Fresno	Kingsburg	2003	1997	1992	2002	1992	1992	1992	1992
Fresno	Orange Cove	2002	2002	2002	2003	2002	2002	2002	2002
Fresno	Parlier	1998	1998	1998	1998	1998	1998	1998	1998
Fresno	Reedley	1994	1994	2003	1994	1994	1994	1994	1994
Fresno	Sanger	1995	1988	1988	1991	1995	1988	1988	1988
Fresno	Selma	1998	1998	1998	1993	1983	1983	1991	1991
Fresno	San Joaquin	1996	1996	1996	2003	1996	1996	1996	1996
Tulare	Dinuba	1997	1997	1997	2004	1997	1997	1975	1997

Source: 2005 Planners Book of List, Office of Planning and Research

California state law requires each city and county to adopt a general plan "for the physical development of the county or city, and any land outside its boundaries which bears relation to

its planning."[18] The California Supreme Court has called the general plan the "constitution for future development." The goals, policies and objectives contained in each of the city or county general plans are intended to underlie most land use– and resource-related decisions, including those that affect water supplies and quality. Each of the general plans in the IRWMP Region address water issues in different ways. Most plans acknowledge overdraft and document the reliance on groundwater, but many do not identify programs to resolve this regional issue.

General plans have both information and procedural requirements. There are seven mandatory elements: land use, circulation, housing, conservation, open-space, noise, and safety. These elements must be internally consistent with one another, creating an integrated, usable document. Pursuant to state law, subdivisions, capital improvements, and development agreements, land use actions must be consistent with the adopted general plan.

Of the seven mandatory elements that cities and counties must cover in their general plans, some degree of water management information is required in five of them: land use, circulation, conservation, open-space, and safety. However, there are no specific guidelines or requirements for how or where these are to be addressed (OPR, 2003). These elements are used in various ways to address water supply, water quality, wastewater treatment and disposal, flood management, watershed management, and stormwater management. This allows local water and land use agencies the ability to respond based on unique local conditions.

There is no specific requirement for how far into the future the general plan must project, or for how frequently it must be updated, although it should be reviewed regularly and revised as new information becomes available (OPR, 2003). Inconsistent horizons between the prevailing general plan and water management or supply plan may be a source of conflict or subject the plans of related actions to legal challenge.

Fresno and Tulare general plans are discussed below since the county plans take a more regional perspective than the city plans. This is intended to help facilitate further discussion of land use policies by the Water Forum. Only a small portion of Kings County is in the IRWMP Region and it is primarily agriculture and expected to remain in agriculture with few land use issues.

FRESNO COUNTY GENERAL PLAN

The Fresno County General Plan is a good example of how the land use plan can recognize the regional water resources issues and groundwater overdraft. The Fresno County General Plan (Fresno County, 2004) is a comprehensive, long-term framework for the protection of the county's agricultural, natural, and cultural resources. The Fresno County General Plan was designed to meet State general plan requirements and outlines policies, standards, programs and plans to guide day-to-day decisions concerning Fresno County's future. A comprehensive

[18] California Government Code (CGC) §65300

background report was prepared (Fresno County, 2000) that documents issues and provides detailed descriptions of the existing conditions. The Planning Commission reviews the countywide general plan implementation programs to assess the County's progress in carrying out the plan.

Fresno County has entered into an MOU with all 15 incorporated cities regarding land use and tax sharing for the development and annexation of lands within city spheres of influence. In general, the memoranda state that the County will consult with the affected city regarding growth management policies and when new development is proposed within the city's SOI. In most cases the memoranda state that such development will be referred to the city for annexation before the County will consider approval, and that such development must be consistent with the City's general plan and development standards.

The Fresno County General Plan recognizes that there are a number of factors affecting the County's existing water resources. Throughout much of the County, groundwater is in a state of overdraft. In some County areas, contamination from natural or manufactured sources has reduced groundwater quality such that its use requires treatment. Increased contamination of surface water sources is also an emerging concern. There are also concerns regarding the import and export of surface water that could affect long-term supplies. Supplies of imported surface water have been reduced because of changing regulations and there is growing pressure to allow long-term transfers of water out of the county. Finally, there is an increase in water demand that will accompany the County's anticipated growth.

The Fresno County General Plan contains policies to ensure an adequate water supply for both domestic and agricultural users, provide necessary facility improvements, ensure water availability, and utilize water conservation measures.[19]

The Fresno County General Plan includes policies in the Open Space and Conservation Element which seek to protect and enhance the surface water and groundwater resources in the county. The policies address broad water planning issues, groundwater recharge, the relationship of land use decisions to water issues, and water quality problems.[20]

The General Plan has important policies that direct County actions to address water resources issues from a regional perspective. Key policies and programs are related to:

- Updating and implementing the groundwater management plan;
- Providing leadership for regional coordination and efforts to protect, enhance, monitor, and manage groundwater;
- Using a Water Advisory Committee to advise the Board of Supervisors;
- Developing a centralized water resources database;

[19] Goal PF-C1, Policies PF-C.1 through 30 and the associated implementation programs.
[20] Goal OS-A, and Policies OS-A.1 through 30 and the associated implementation programs.

- Developing a water budget to track impacts and the status of the groundwater basin;
- Conducting an inventory of recharge sites and using land use authorities to protect prime recharge areas;
- Supporting direct and indirect recharge projects and water banking;
- Encouraging multiple uses of public lands for flood control, open space and recharge;
- Preparing a water sustainability plan; and
- Integrating policies to:
  - Protect water quality and reduce overdraft,
  - Control pollution sources,
  - Protect recharge areas,
  - Conserve water,
  - Use treated wastewater,
  - Develop conjunctive use, and
  - Monitor water quality.

TULARE COUNTY GENERAL PLAN

In the summer of 2003, the Tulare County Board of Supervisors approved a work program to prepare an update of the County's General Plan. The Tulare County program recognizes the necessity for a comprehensive and cooperative city-county approach to the problems and opportunities for the future. The planning and legislative bodies of the County and seven of the cities have embarked on an area- wide planning program. The Tulare County Area Planning Commission includes representation from each of the seven cities and the County and serves as the coordinating and advisory body. An intensive two year program has been used to guide the preparation of the Tulare County General Plan (Tulare County 2004, 2005a, b). The Commission has identified future needs and recommends policies to the local governments of which it is a part and which it serves. Its key role has been to formulate long-range development policies of mutual concern to the county and its cities.

The general plan will recognize that the county is the sum of all of its parts and that planning decisions of the county, even those which are not directly related to any one community, nevertheless are of interest to and affect both urban and rural populations. A summary of current goals and policies has also been produced by the County that presents the policies that were developed from planning documents from 1964 to 1998 (Quad, 2001). Existing policies and implementation plans are limited in terms of water supply, water quality, and flood control.

Issues of primary concern to the public have been identified and include human health issues associated with air and water quality and the availability of water. Overdraft is acknowledged as a problem. The General Plan Policy Alternatives analysis (Tulare County, 2005 b, c)

evaluated the direction in four primary areas: Economic Development, Land Use, Infrastructure, and Natural Resources. Based on direction from the Planning Commission and Board of Supervisors, the general plan update is likely to include goals and policy responses for Natural Resources and Water Resources that include:

- Promoting more water storage and capture;
- Upgrading water treatment facilities;
- Encouraging water reuse and recycling;
- Protecting habitat;
- Identifying and addressing groundwater contamination sources;
- Requiring long-term water availability, reliability, and usability studies;
- Increasing surface water use;
- Increasing groundwater recharge;
- Metering (pricing) water use;
- Reduce the use of private wells;
- Implementing water conservation by use type;
- Preparing a water export ordinance; and
- Improving water quality.

These goals and policies will be used by the County as appropriate depending on the location and land use types for specific new developments (Tulare County, 2005).

CITY GENERAL PLANS

The city general plans all recognize regional water and environmental issues in various ways and, as a result, the general plans goals and policies demonstrate varying degrees of awareness and recognition of regional water supply issues, groundwater protection and recharge, overdraft, water conservation, water quality, habitat conservation, preservation of open space, and flood control.

The city general plans generally focus on developing water supply and wastewater infrastructure facilities needed to service new development and generally have placed limited emphasis on the underlying water resources issues, such as overdraft. Most of the goals, policies, objectives, and programs are directed at ensuring that such development provides for needed public services.

Most of the cities have historically relied on groundwater pumping. As a result, the cities' policies require developers to construct wells, storage, and distribution infrastructure and the cities have developed water distribution systems based on wells. This practice limits the ability to develop surface water treatment as part of an in-lieu conjunctive use strategy. When cities' water supplies are based on groundwater, the distribution systems are based on pressure zones and lack major trunk lines to convey water from a centralized source. If surface water sources

were to be used in-lieu of groundwater, additional distribution infrastructure improvements would be necessary.

The Cities of Fresno and Clovis have developed surface water treatment facilities in recognition of groundwater overdraft and the need to diversify the water supply portfolio. Their experience provides a good case study for other cities in the IRWMP region.

WATER SUPPLY AND WASTEWATER MASTER PLANS

Many water districts and municipal entities have prepared water supply and/or wastewater master plans to anticipate future conditions and guide future investments in infrastructure. Efforts were made to identify and collect published water supply master plans and capital facilities plans. These plans represent local agencies' evaluation of their water supply and wastewater facilities needs and, where such plans are available, may be used by the Water Forum to identify water management strategies and planned facilities. Recent changes in state legislation and case law require that water supply and wastewater master plans be consistent with the prevailing land use plan. Plan consistency will help avoid legal challenge. Review of all the available water and wastewater plans for consistency with the related general plan was not part of this task**.**

RWQCB AND CENTRAL VALLEY WATER QUALITY CONTROL PLAN - TULARE LAKE BASIN (BASIN PLAN)

This section discusses current water quality protection requirements, plans, and programs of the SWRCB and RWQCB. Specific surface and groundwater quality conditions will be discussed in more detail in a separate IRWMP technical memorandum.

The quality of the available surface water and groundwater supplies within the IRWMP Region influences the ability to put the water to use. If the quality of the water is degraded beyond the ability to put the water to the intended use, overall supply may become limited or the costs for treatment may increase. One of the IRWMP objectives is to improve groundwater management through conjunctive use. For conjunctive use to be effective, surface water of appropriate quality must be available either for direct use in lieu of a groundwater supply or for storage in the groundwater basin. State policy prevents water of poor quality to be put into the groundwater basin if the quality of the underlying groundwater would be degraded. Conversely, if clean sources of surface water are to be stored in a groundwater basin for subsequent withdrawal, the underlying groundwater quality must be such that the quality of the stored surface water would not be impaired.

BENEFICIAL USE AND WATER QUALITY STANDARDS

The Basin Plan defines the following beneficial uses of water and the narrative or numerical water quality standards and objectives to protect the identified beneficial uses. The Basin Plan for the IRWMP Region designates beneficial uses for the Kings River (Table 9).

Table 9. Tulare Lake Basin Plan Kings River Beneficial Uses

River Section	MUN	AGR	IND	PRO	POW	REC-1	REC-2	WARM	COLD	WILD	RARE	SPWN	GWR	FRSH
Pine Flat Reservoir					X	X	X	X	X	X			X	X
Pine Flat Dam to Friant-Kern	X	X			X	X	X	X	X	X		X	X	X
Friant-Kern to Peoples Weir	X	X		X		X	X	X		X			X	
Peoples Weir to Stinson Weir on North Fork and to Empire Weir No. 2 on South Fork		X				X	X	X		X			X	

MUN: municipal, AGR: agricultural, IND: industrial service supply, PRO: Industrial process supply, REC-1: water contact recreation, REC-2: non-water contact recreation, WARM: warm water fishery, COLD: cold water fishery, WILD: wildlife habitat, RARE: rare, threatened or endangered species habitat, SPWN: spawning, reproduction, or early development, GWR: groundwater recharge, FRSH: freshwater replenishment.

Groundwater Water Recharge (GWR) is a designated beneficial use for Kings River surface water. GWR is defined as the "uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers." In addition to the primary beneficial use for agricultural purposes, surface water rights on the Kings River may also recognize groundwater recharge beneficial uses. Those water rights filings that do not already include groundwater recharge in the permit or license may need to file an underground storage supplement with the SWRCB. The Basin Plan identifies the water quality objectives for specific constituents. Recommended numerical limits to translate water quality objectives have also been developed by the RWQCB. The standards and objectives are to protect the designated beneficial uses and prevent third-party effects and impacts to the environment. The potential for a project to exceed these limits is the basis for evaluating threats to water quality and likelihood of impairment to groundwater or surface water.

Kings River groundwater beneficial uses are identified as municipal and domestic supply, agricultural supply, industrial service supply, and industrial process supply. At a minimum, water designated for municipal uses cannot contain concentrations of chemical constituents that exceed the MCLs specified in Title 22 of the California Code of Regulations which are incorporated by reference into the water quality objectives for groundwater in the Basin Plan. Agriculture is dependent on an adequate supply of water of satisfactory quality. Agricultural uses of groundwater and surface water for irrigation are the primary beneficial uses in the

IRWMP Region. The RWQCB lists requirements intended to protect agricultural use and sustain the agricultural economy in the IRWMP area. Water quality requirements vary by crop types and agronomic conditions. Water quality objectives to protect agricultural uses are reflected in the numerical water quality standards of the RWQCB and Basin Plan.

The Basin Plan and SWRCB policy do not require water quality improvements over baseline conditions or naturally occurring background concentrations. The water quality objectives are developed to ensure that there is no degradation from historical conditions. Because of this, it is important to document the current baseline water quality conditions so that the proposed action does not have to mitigate or resolve an existing problem. A separate technical memorandum on water quality conditions is to be prepared as part of the IRWMP.

PROTECTED AREAS AND IMPAIRED WATER BODIES WITHIN THE IRWMP REGION

Water quality is defined as limited or impaired if current water quality conditions do not meet the specific water quality standards and objectives for the defined beneficial use. Known water quality problems are identified by the RWQCB by comparing monitoring data to the standards and objectives for each of the beneficial uses. Waters that do not meet standards are placed on the 303(d) List of Water Quality Limited Segments which identifies water bodies of impaired quality. This list indicates whether the water body is meeting the needs of the designated beneficial use. If a stream segment in defined as impaired, specific management programs and specific management actions are defined in context of the Basin Plan. Any IRWMP project that would have the potential to further impair a designated water body would receive increased scrutiny from the RWQCB. IRWMP projects might also be constrained by impaired waters.

The latest available 303(d) list was prepared by SWRCB and RWQCB in 2002. It includes the segments of the north and south forks of the Kings River from Island Weir to the Stinson and Empire Weirs. The Kings River in this reach has elevated levels of electrical conductivity, molybdenum, and toxaphene. The 303(d) list gives the reach a low priority for the development of a TMDL.

Mendota Pool, on the western edge of the Kings Groundwater basin is also listed in the 303(d) list and has been defined as impaired by elevated selenium levels, potentially because of agriculture, groundwater withdrawal, or other sources. The 303(d) list also gives Mendota Pool a low priority for the development of a TMDL. The Lower Kings Basin is not likely a significant contributor to the issues at Mendota Pool, but could be affected by water quality issues should Mendota Pool water be considered as a source of water for recharge.

WASTE DISCHARGE REQUIREMENTS AND NATIONAL POINT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS IN THE IRWMP REGION

The RWQCB requires that any person discharging waste or proposing to discharge waste to file a Report of Waste Discharge if such actions could affect water quality.[21] The RWQCB has a statutory obligation to prescribe Waste Discharge Requirements (WDRs) except where the Regional Board finds that a waiver of waste discharge requirements for a specific type of discharge is not against the public interest. Any such waiver must be conditional and may be terminated at any time.[22] If there is no waiver of WDRs, the RWQCB would issue either a general permit or an individual permit to the discharger. The RWQCB may establish WDRs or require a discharger to operate under an individual and general National Point Discharge Elimination System (NPDES) permit.

Cities and industrial facilities are required to have WDRs for any discharge to land for disposal of wastewater. Individual NPDES permits are required for direct discharge to surface water bodies. The larger facilities treating municipal waste in the IRWMP region are operating either under WDRs or an NPDES permit.

The RWQCB was contacted to identify other industrial facilities or small dischargers operating under WDR in the IRWMP Region. There are roughly 200 permitted facilities with WDR. They are all relatively small discharges and are not believed to be a threat to water quality so long as they remain in compliance with the conditions of the WDR. The RWQCB data is not in a format that allowed for mapping the location of these facilities.

Based on the report of waste discharge, the RWQCB may require any discharger to apply for and obtain an individual permit under the NPDES. Requirements for individual NPDES permits are a determination of the RWQCB.[23] NPDES general permits may also be issued for stormwater and construction sites. Each of the cities within the IRWMP with population of more than 100,000 is required to operate its municipal stormwater system under a general stormwater NPDES permit. Typically, cities also require developers to demonstrate proof of clearance from the RWQCB under the general NPDES permits for management of stormwater from construction sites.

IRWMP projects could be subject to WDRs or NPDES permit requirements. The permitting and regulatory compliance constraints will be evaluated as part of the alternatives evaluation and development of the IRWMP implementation plan.

[21] CWC 13260(a)
[22] CWC 13629
[23] 40 CFR 122.28(b)(3)

RWQCB Requirements for Discharges from Irrigated Lands

Discharges from irrigated lands can contain wastes that could affect the quality of the waters of the state. The discharge of tail water, wastewater, or storm water from irrigated lands occurs to both surface water and groundwater. In the IRWMP Region, the SSJVWQC is addressing the agricultural waste discharge requirements of the RWQCB imposed since the waiver of agricultural WDRs expired in 2003.[24] The SSJVWQC is identifying and correcting water quality impairments without the need for issuance of WDRs.

The goal of the agricultural waivers program is to improve and protect water quality by providing a program to manage discharges from irrigated lands that cause or contribute to conditions of pollution or nuisance as defined in Section 13050 of the California Water Code or that cause or contribute to exceedance of any RWQCB or SWRCB numeric or narrative water quality standard by reducing discharges of waste. The SSJVWQC has developed a monitoring program to assess the sources and impacts of discharges from irrigated lands and, where necessary, it is tracking progress in reducing the amount of waste discharged that affects the water quality of the IRWMP Region and its beneficial uses.

NONPOINT SOURCE MANAGEMENT PLAN AND WATERSHED MANAGEMENT INITIATIVES

Nonpoint sources of contamination are the result of broadly accepted societal practices where the source of contamination is widely dispersed and individual liability is not easy to establish. The State Board has adopted the "Plan for California's Nonpoint Pollution Control Program" (SWRCB, 2000). The purpose of the Nonpoint Source Program Plan is to improve the state's ability to effectively manage nonpoint source pollution and conform to the requirements of the federal Clean Water Act. The Nonpoint Source Management Plan establishes the framework for statewide nonpoint source activities, statewide objectives, and implementation strategies to manage nonpoint source problems. Both cities and agricultural land uses are facing increased pressure to prevent nonpoint source contamination of surface water and groundwater.

The RWQCB is adopting individual Watershed Management Initiatives (WMIs) to implement the statewide strategy for nonpoint source control (RWQCB, 2002). The RWQCB is attempting to assess water quality problems in each watershed, develop and implement strategies to correct problems, and evaluate success. Inherent in the process is the need to prioritize work to maximize the use of resources.

State of the Watershed Reports have been prepared for the three watersheds and several sub-watersheds, including the Tulare Lake Region. The Tulare Lake Watershed comprises the drainage area of the San Joaquin Valley south of the San Joaquin River. The Tulare Lake Watershed is essentially a closed basin. The Watershed is divided into six Watershed Management Areas. The IRWMP Region is in the Kings Basin Management Area which

[24] Resolution No. R5-2003-0105

includes the Kings River drainage area (as well as the drainage area for the tributaries and distribution systems of the Kings River) and the designated groundwater basin.

The reports present the current known water quality concerns in the watersheds and describe: (1) priorities within the watershed based on the known water quality problems; (2) current efforts to address the problems; (3) recommendations for future actions (including monitoring to track progress); (4) time schedules for high priority activities; and (5) preliminary budget allocations. The reports provide the framework for discussions with stakeholders. Discharges from nonpoint sources, such as agriculture, silviculture, urban runoff, past mining activities, dairies, and individual wastewater disposal systems, have been identified as the most significant and widespread surface water and ground water quality problems in the region.

POLICY WITH RESPECT TO MAINTAINING HIGH QUALITY WATER

The regulations implementing the Clean Water Act (40 CFR 131.6; 131.12(a)) require that each state develop and adopt a statewide antidegradation policy. In California this requirement is satisfied by SWRCB Resolution No. 68-16, the Statement of Policy with Respect to Maintaining High Quality Waters of California. The SWRCB policy requires the continued maintenance of existing high quality waters unless there is a demonstration: (1) that allowing some degradation is consistent with the maximum benefit to the people of the state, and (2) that such degradation would not unreasonably affect existing or potential beneficial uses. Actions which may adversely affect surface water quality must satisfy both Resolution No. 68-16 and the federal antidegradation policy (40 CFR 131.12). A reduction in water quality can be allowed only if there is a demonstration that such a reduction is necessary to accommodate important economic or social development. This RWQCB has recently begun to consider how this policy is to be applied to groundwater recharge operations such as may be proposed in the IRWMP.

SOURCES OF DRINKING WATER POLICY

The Sources of Drinking Water Policy (Resolution No. 88-63) declares that, with specified exceptions, all waters of the state are to be considered suitable or potentially suitable for municipal or domestic supply and water should be protected to meet drinking water standards and beneficial uses. There are exceptions for surface water and groundwater with total dissolved solids (TDS) levels in excess of 3,000 mg/L; surface water and groundwater that are contaminated, either by natural process or by human activity, to the extent that they cannot reasonably be treated for domestic use; and surface waters in systems designated or modified to carry municipal, industrial, or agricultural wastewaters or stormwater runoff. Under this policy, the entire Kings Basin groundwater is a potential source of drinking water and should be protected accordingly.

KINGS RIVER FISHERY MANAGEMENT PROGRAM

Water dedicated to environmental uses cannot be put to use for other purposes in the location where the water is reserved; however, it may be put to other uses farther downstream. The main stem of the Kings River and the South and Middle forks above 1,590-feet elevation have been designated as Wild and Scenic Rivers and have water reserved for this purpose. However, after flowing through these sections of river the same water is then used to meet urban and agricultural demand once it reaches the valley. The Kings River Fishery Management Program seeks to maintain the fishery below Pine Flat Dam.

There are ongoing fisheries studies in the Kings River below Pine Flat Dam as part of the Kings River Fishery Management Program. Preliminary results indicate that meeting fishery flow requirements and environmental demands associated with restoration in this area could be integrated with a conjunctive use project in the Upper Basin to provide multiple benefits. This will be studied further during the development of the Kings Basin IRWMP.

The KRWA, the KRCD, and the California Department of Fish and Game (CDFG) have jointly implemented habitat enhancement projects and conducted a series of monitoring programs in the lower Kings River and Pine Flat Reservoir. These activities have been conducted in response to the Kings River Fisheries Management Program Framework Agreement, which was approved on May 28, 1999. The Framework Agreement is a voluntary, 10-year program and includes a number of actions designed to protect and enhance fishery habitat within the lower Kings River and reservoir. The project area covers Pine Flat Reservoir and approximately 60 miles of river downstream of Pine Flat Dam. A Technical Steering Committee is responsible for implementing the actions authorized under the agreement and approved by the Executive Committee. A Public Advisory Group comprises fishing, river, and landowner interests and provides input and direction to the program. A variety of tasks have been implemented during the first five years of the program, including:

- A 100,000-AF-minimum pool in Pine Flat Reservoir;
- Increased flows in the lower Kings River during fall and winter;
- Contribution of $1,000,000 by the Kings River Conservation District and Kings River Water Association over the 10-year period;
- Contribution of $1,000,000 in funds and services by the CDFG over the 10-year period;
- Monitoring of hydrology and operations within the river and reservoir;
- Monitoring of water temperature and dissolved oxygen within Pine Flat Reservoir and the lower Kings River;
- Habitat enhancement projects within the river and reservoir;
- Fish stocking within the river and reservoir;
- Implementation of angling regulations;
- Baseline and performance monitoring of fishery program status;

- Public education and outreach;
- Maintenance activities; and
- Development of an annual 5-Year Plan for identifying specific habitat enhancement and monitoring projects on the lower Kings River and Pine Flat Reservoir.

SECTION 4 ENGINEERED ENVIRONMENT AND WATER MANAGEMENT FACILITIES

The IRWMP Region includes a complicated network of engineering facilities managed by the local water and land use agencies. This section discusses engineering facilities, including water storage, water delivery, groundwater recharge, wastewater collection and treatment, flood control, and storm water management. The various systems and their capacities are described and their relationships to the IRWMP are discussed.

GENERAL GEOGRAPHY, RAINFALL, AND SOILS

The western slope of the Sierra Nevada drains into the IRWMP Region via the San Joaquin and Kings Rivers and smaller creeks and stream systems. Average annual precipitation in the IRWMP Region varies from six inches near Mendota to about 70 inches in the upper watershed where the majority of precipitation falls mainly as snow. Most of the upper watershed is federal land. Flows originating in the mountains and foothills contribute to groundwater recharge, but also contribute to drainage and flooding problems on the valley floor. While the flooding potential in the fall and winter is generally from rain, spring flooding is the result of rapid snow melt in the mountains. Soils in the foothills are typically medium to coarse-textured, and gravelly or rocky. Soils in the floodplains are generally level, very deep, and well drained. Soils in the valley floor are fine and poorly drained. A more detailed description of the physical geography and historical hydrology will be developed as part of the hydrologic model development task of the IRWMP.

INTEGRATED WATER SUPPLY AND FLOOD CONTROL FACILITIES

The major water supply and flood control facilities are part of an integrated system that is managed to meet multiple objectives. Multiple districts and land use agencies (city and county) are involved in the operations of the water supply and flood control facilities within the IRWMP Region. The facilities have been uniquely designed and built over time to capture, conserve and manage the available water flowing into the IRWMP Region.

The following discussion characterizes the major, regional water supply and flood control systems within the IRWMP Region, and describe the more localized facilities used to manage water. The Kings and San Joaquin Rivers flow westerly from the Sierra Nevada into the IRWMP Region. The San Joaquin and Kings River watersheds contribute recharge to the Kings Groundwater Basin. Figure 6 shows these watersheds, the Kings Groundwater Basin and surrounding groundwater basins, and the major water supply infrastructure. The Kings Groundwater Basin is designated by DWR (DWR, 2003) and is a smaller sub-basin of the larger

San Joaquin Basin Hydrologic Study Area. Three dams have been constructed to control flows on the San Joaquin and Kings Rivers. These dams are the Pine Flat Dam on the Kings River, and the Friant and Mendota Dams on the San Joaquin River. The upper watershed has a number of smaller dams that provide both hydroelectric and water storage benefits.

These major regional facilities, in combination with the more localized network of canals, recharge/retention ponds, and flood control reservoirs, provide the foundation for identifying water management opportunities to meet IRWMP objectives. The Central Valley Project (Delta Mendota Canal; Friant Kern Canal) and State Water Project California Aqueduct which make up the backbone of the state and federal water distribution system, are also shown in Figure 6. CVP and SWP infrastructure are shown because they could potentially be used to develop new sources of imported water (transfers or exchanges) for the IRWMP Region.

Both the San Joaquin and Kings Rivers are sources of supply and groundwater recharge to the IRWMP Region and are subject to extreme variation in annual runoff resulting from annual changes in mountain precipitation. Reservoir storage has helped to regulate and make more efficient use of available water during dry years and to protect life and property in wet years. However, storage capacity is generally inadequate to accommodate runoff during very wet years and substantial flows are lost to the IRWMP Region due to flood releases. During winter and spring months, river systems in the IRWMP Region swell with heavy rainfall and snow melt runoff. To conserve water, reservoirs are used to store winter rains for use in the summer. These same storage reservoirs are used for flood control.

In addition to the natural stream channels, a complex network of local and regional canals deliver conserved water in summer months for irrigation, groundwater recharge, and municipal purposes, and flood water in winter months for groundwater recharge. The AID, FID, and CID canals convey water supplies primarily to agricultural users, though FID also conveys water to surface water treatment plants in Fresno and Clovis for municipal purposes. In winter months the same facilities are used to convey stormwater around and away from developed areas. In the developed urban areas, local storm drainage systems composed of street gutters, inlets, underground storm drains, retention ponds, pumping stations, and open channels are used to collect and control stormwater runoff and direct runoff to the AID, FID, CID canals for flood control purposes. Many of the stormwater retention ponds are multi-purpose and benefits to groundwater recharge and recreation.

KINGS RIVER

The Kings River flows from the Sierra Nevada southwest through the central part of Fresno County. The Kings River divides in the area near Laton. The North Fork joins Fresno Slough which conveys water through the James Bypass to the San Joaquin River at Mendota Pool. The South Fork conveys water into the Tulare Lake basin. The Tulare Lake area is internally drained; this means the water that flows south into this area has no other outlet, so it either

percolates to groundwater, evaporates, or is used for irrigation. The amount of water that flows north or south is regulated by agreement among the entities that have water rights in the Kings River.

The annual runoff average at the Pre-project Piedra Gage located downstream of Pine Flat Dam is about 1,739,502 AF, with the lowest recorded runoff of 383,310 AF in 1977 (22% of average) and the highest recorded runoff of 4,473,358 AF in 1983 (257% of average). Figure 7 shows this high degree of variability of annual flows at the Pre-project Piedra Gage. This gage is used to represent flow for purposes of managing the release schedule and water rights.

Pine Flat Dam

Pine Flat Reservoir is a major water facility that regulates the flow in the Kings River. It is located approximately 10 miles to the east of the Kings Groundwater Basin in the Sierra Foothills. The dam was completed in 1954 primarily as a flood control project with water conservation storage benefits. It has a capacity to hold 1,000,000 AF of water.

The Pine Flat Dam is managed by three agencies through a cooperative agreement: (1) The U.S. Corps of Engineers determine the flood releases and criteria, (2) KRWA manages the conservation storage, and (3) KRCD operates the hydropower.

The management of the surface water rights has evolved since KRWA's formation in 1927. From its inception, KRWA has coordinated operations to serve each of its 28 members and to manage the Kings River entitlements. In practice, releases, diversions and flow management on the Kings River are carefully coordinated by KRWA. Under the direction of KRWA, the irrigation releases are made from the dam in accordance with the terms of the water rights licenses, the provisions of Decision 1290 set forth by the State Water Resources Control Board, and a complex series of agreements and water entitlement schedules ("Blue Book Agreements"). Pine Flat Dam has established operating parameters that change throughout the year and are used to allocate storage and flood capacity. Management of the reservoir space is based on forecasts, expected runoff patterns, snow measurements, and expected fill date. With a large volume available for snow melt and a sufficient storage to runoff ratio, Pine Flat Dam operations normally avoid emergency spillage.

Other Upstream Kings Storage Facilities

Pacific Gas and Electric (PG&E) owns and operates storage facilities on the Kings River and its tributaries upstream of the Pine Flat Dam. These upstream storage facilities (Courtright Lake and Wishon Dam) have a combined capacity of about 251,700 AF and were shown in Figure 6. These facilities are operated primarily for the production of electrical energy. The operation of these projects does not significantly affect the flow, timing, or availability of water in Pine Flat Reservoir.

Other storage reservoirs and power projects have been proposed on the Kings River, most notably at Rodgers Crossing and on Dinkey Creek. Neither of the projects was developed because of environmental and funding issues. Two potential low elevation reservoirs that were previously identified include an off-stream storage site on Mill Creek in Wonder Valley and the Piedra Afterbay below Pine Flat. Neither of these facilities was developed.

Kings River Diversions and Weirs

There are a number of weirs on the river used to divert and manage Kings River Flows (Figure 8). The individual water districts have authority over the operations for the weirs and water delivery canals. In addition to these 10 major weirs, there are 20 minor weir facilities and a large number of pumps. The weirs control diversions into the specific canals of the various water districts or ditch companies. Water for diversions and use by Upper Kings water users, including the AID, FID, and CID, occurs at the Cobbles, Gould, and Fresno Weirs. Further downstream, water flowing past the Peoples Weir continues to provide groundwater recharge and support other downstream users, but can no longer be diverted and managed by Upper Kings stakeholders or be applied to meeting upper Kings water demands. Figure 9 shows the volume of water flowing past the Peoples Weir and when there were flood releases from Pine Flat Reservoir from 1964 to present.

Three are three weirs that direct the Kings River flow to the north or south. Army Weir is located just upstream from SR 41 and used to direct the flow north or south based on specific operating criteria. Crescent Weir is located at the Crescent Bypass southwest of 22nd and Excelsior Avenues. The Crescent Bypass flows north to Fresno Slough. Stinson Weir is located near the confluence of Murphy Slough and Fresno Slough at Elkhorn Avenue. Normal flows are held by these three weirs in the main channel. During storm events, the first 4,500 cubic feet per second (cfs) is diverted to the North Fork towards the San Joaquin River. The next 4,500 cfs of additional flow is diverted to the South Fork and Tulare Lakebed. Any flows above this amount are split equally.

During time of flood release and high flows, water diverted to the North Fork travels up the Fresno Slough and through the James Bypass. Figure 10 shows the flow past the James Bypass from 1964 to 2005. These flows only occur during the winter in wet years. Once this water flows north and reaches the San Joaquin River, there is no opportunity for further capture or conjunctive use in the Kings Groundwater Basin.

Canals and Delivery Facilities

There is an extensive canal network owned and operated by the AID, the CID, and the FID. The canal network is used to convey water to users within each District. The water is used directly for irrigation and municipal purposes in the FID, and for agriculture in the CID and the AID.

To varying degrees, all three agencies also use their Kings River surface water rights for recharge of the groundwater basin.

The region has more than 1,000 miles of canals to deliver water to agricultural lands and to existing recharge facilities. The major canals that service the Upper Kings Basin include the Fresno Canal, Gould Canal, Alta Canal, and Consolidated Canal. Major AID, CID, and FID canals are shown in Figures 11, 12, and 13.

The Mid-Valley Canal was previously proposed as a major conveyance facility that could be used to import water from the Sacramento–San Joaquin Delta, or other supply sources that could have been conveyed down the Delta Mendota Canal to the Mendota Pool for subsequent diversion and conveyance into the IRWMP Region. The project was put on hold as a result of issues associated with the Delta and CVPIA which reduced the project feasibility and acceptability.

Recharge Ponds

Each of the Upper Kings Basin Districts has carried out extensive recharge operations in the Kings Basin for many years. The general locations of the existing recharge projects in the AID, CID, and FID service areas are shown in Figure 14, 15, and 16, respectively.

The AID uses flood flows from the Kings River to recharge the groundwater basin through approximately 150 acres of existing recharge basins. No estimate is available of the amount of water recharged through these basins, though the AID estimates that it gets about 45,600 AF of incidental recharge annually along its 360 miles of unlined irrigation delivery canals.

The CID also uses flood flows from the Kings River to recharge the groundwater basin. The District currently operates 46 recharge basins, totaling approximately 1,300 acres. The CID also owns and operates about 350 miles of unlined canals, which provide additional recharge to the groundwater basin. Over the last 40 years, the CID estimates it has recharged approximately two million acre-feet in its basins and canals. The District estimates it recharged 308,000 AF in 1969 and about 300,000 AF in the 1982–1983 period. The initial infiltration rates to the recharge basins is estimated to be 1,100 cfs over the 1,300 acres recharge area, with a corresponding long-term infiltration rate of about 700 cfs.

The FID has recognized the importance of preserving and protecting its groundwater resources and has actively facilitated groundwater recharge in cooperation with FMFCD, City of Fresno, and City of Clovis. This includes 'in lieu' recharge programs that deliver surface water when available to minimize groundwater pumping. As of 2004, the in-lieu program includes delivery of surface water for treatment and distribution by Fresno and Clovis.

Intentional groundwater recharge in the FID also involves using the FID's delivery system to deliver portions of Fresno and Clovis water allocations to specific FMFCD-owned basins for recharge during the summer months when basins are not needed to control urban storm runoff.

The FMFCD recharge ponds are joint use flood control and recharge ponds, and many also provide recreation benefits.

The Cities of Fresno and Clovis both own and operate significant recharge facilities to which a portion of the cities' water allocations is delivered through FID's system. The City of Clovis has recharged an annual average of 6,000 AF and, for the period from 1974 to 1999, has recharged a total of 145,140 AF in joint FMFCD facilities and the 63.5 acres of ponds owned by the City. The City of Fresno began artificial recharge at the 200-acre Leaky Acres facilities in 1971 and averaged 16,000 AF per year of recharge from 1980–1999. Under cooperative agreement with FMFCD, Fresno has also recharged Kings River and CVP water. The FID owns recharge facilities located through its service area. Since 1988, an average of 54,450 AF per year has been put into the recharge basins to percolate to groundwater (KRCD, 1999).

Other San Joaquin Storage Facilities

Southern California Edison (SCE) and PG&E own and operate a number of dams and reservoirs on the San Joaquin River and its tributaries upstream of Friant Dam. The most notable of these are Edison Lake and Florence Lake. These upstream storage facilities are operated for the production of electrical energy and have a combined capacity of about 609,530 AF. Their operation affects the flow of water into Millerton Lake and subsequently the timing and availability of releases to Friant Unit Contractors. None of these storage facilities is designed or operated for flood control and the Corps currently has no jurisdiction over releases from these structures. Cumulative flood releases from the upper San Joaquin River dams could result in uncontrolled releases from Friant Dam.

FEDERAL AND STATE FACILITIES

Regional facilities owned and operated by the federal and state governments could have an influence on the IRWMP. Potential sources of future supply could include importation, water transfers, or exchanges that make use of these facilities to convey water into the IRWMP Region. The regional state and federal facilities in the San Joaquin part of the Central Valley are shown in Figure 17.

CENTRAL VALLEY PROJECT RECLAMATION IS THE OWNER AND OPERATOR OF THE CVP

CVP facilities are used to manage water north and south of the Sacramento–San Joaquin Delta and to provide irrigation and municipal supplies to users in the San Joaquin Valley. Major CVP facilities include Trinity River Unit that diverts water into the Sacramento Valley, Lake Shasta, Folsom Lake, the Tracy Diversion Plant, DMC, and the San Luis Unit (owned in cooperation with the State of California). The DMC is used to deliver diverted Delta water at the Tracy Diversion for conveyance down the DMC to water contractors along its length and areas west

and north of the IRWMP Region. The Mendota Pool is the terminus of the DMC. CALFED, CVPIA, and SWRCB requirements place conditions on the CVP and influence the ability of the project to meet contractor's demands while also protecting public trust resources.

Friant Unit of the CVP and San Joaquin River

The San Joaquin River forms the northern boundary of the IRWMP Region. The San Joaquin River flows from the Great Western Divide in the Sierra Nevada southwest along the northern border between Fresno and Madera counties. It joins with the North Fork of the Kings River just east of the IRWMP Boundary at the Mendota Pool. From Mendota Pool the San Joaquin River flows northwest up the San Joaquin Valley toward the Delta.

Annual San Joaquin River runoff averages approximately 1,861,000 AF. The lowest recorded minimum runoff was about 360,000 AF in 1977–78 (19.3% of average) and the highest recorded runoff was about 4,640,000 AF in 1982–83 (249.3% of average).

San Joaquin River flows are regulated by Friant Dam, which was constructed in 1942 and is managed by Reclamation as part of the Friant Unit of the CVP. Although Friant Dam serves to reduce release volumes in the main San Joaquin River, it was not sited, designed, or engineered for the purpose of flood control. Any flood control capability of the Friant Unit is incidental to its function as a water storage and diversion facility. The CVP Friant Unit consists of Friant Dam and Millerton Lake, the Friant-Kern Canal, which runs south to Kern County, and the Madera Canal, which runs northwesterly to Madera County. The Friant-Kern Canal conveys water into and through the IRWMP Region.

Releases from Friant Dam to the San Joaquin River and the Friant-Kern Canal provide surface water to users within Fresno County, including City of Fresno, City of Clovis, and the FID. There are no CVP contracts in the Tulare County portion of the IRWMP Region, which includes all of the AID service area.

The reservoir, Millerton Lake, has a storage capacity of about 520,300 AF. The storage capacity of Millerton Lake is inadequate for full flood protection during wet years and emergency releases may result in downstream flooding problems. The Corps has evaluated the operational plans for all the dams in the San Joaquin River system to determine the possibility of coordinated releases to reduce the likelihood of coincident peak flows downstream. Nevertheless, in 1997, emergency releases from Friant Dam combined with large storm events and several levee breaks downstream contributed to flooding along the San Joaquin River.

The amount of capacity in Millerton Lake that Reclamation keeps available for runoff varies throughout the year according to defined operating criteria that have been developed and agreed to by federal agencies (e.g., Reclamation, Corps) and state agencies (most notably the DWR).

The Friant-Kern Canal carries irrigation water from Millerton Reservoir southeast to Kern County. The Friant-Kern Canal was constructed by the Reclamation and is now managed by the Friant-Kern Water Users Authority. The average annual delivery from the canal is about one million acre-feet with a design capacity of 5,000 cfs. There is a spillway into the Kings River just upstream of a double barrel 24-foot diameter siphon under the river. This spillway can be used to deliver San Joaquin River flood water to the Kings River. San Joaquin flood water conveyed down the Friant-Kern Canal is knows as 215 Water. However, at the times when San Joaquin Flood water can be delivered, the Kings River is usually in flood conditions as well.

Mendota Dam

Mendota Dam is operated primarily for irrigation. Mendota Pool is a 5,000 acre-foot reservoir created by Mendota Dam located just outside the city of Mendota on the San Joaquin River. The primary functions of the dam are storage and diversion of irrigation water for agriculture, although the water level in the pool also functions to maintain water levels in the Mendota Wildlife Management Area. Mendota Pool provides little or no flood protection. Mendota Dam holds flows from the San Joaquin River as well as discharge and releases from the Kings River via the North Fork (Fresno Slough and James Bypass). The DMC conveys water from the Delta to Mendota Pool from the north. Several irrigation channels then divert the Delta flows to irrigation districts with CVP contracts. The Reclamation, in coordination with the Central California Irrigation District, manages this system as which is part of the CVP. The Reclamation has proposed replacing the existing structure with a new Mendota Dam which may raise the water level in the pool.

CVP Exchange Contracts

Reclamation holds the majority of San Joaquin River water rights which were acquired by Reclamation during the development/construction of the CVP Friant Unit facilities. These water rights were obtained through purchase and exchange agreements with the individuals and entities that held those water rights at the time the Friant Unit facilities were developed. Historically, San Joaquin River water was diverted by the downstream users, who became exchange contractors. The exchange contractors receive water from the DMC in exchange for their San Joaquin water. San Joaquin River water is now delivered to the east side of San Joaquin Valley through the CVP Friant-Kern and Madera Canals to supplement groundwater pumping and help mitigate overdraft problems. Reclamation has obligations to deliver project water downstream of Friant Dam through water rights settlement contracts in the IRWMP Region.

Reclamation also provides an exchange supply for larger riparian water right holders farther downstream of Gravelly Ford. These water users, comprising Central California Irrigation

District, Firebaugh Canal Company, San Luis Canal Company, and Columbia Canal Company, obtain their water supply from the Delta via the Delta-Mendota Canal and Mendota Pool.

If Reclamation is not able to meet its contractual obligations for water deliveries from the Delta, the exchange contract provides for releases from Friant Dam and delivery using the San Joaquin River. This could reduce water available for other CVP contractors in the IRWMP Region, but would have the benefit of increasing groundwater recharge along the San Joaquin River adjacent to the Kings Groundwater Basin.

STATE WATER PROJECT

DWR owns, operates, and maintains the SWP facilities on behalf of the water contractors. The SWP includes a wide array of facilities—including pumping and power plants; reservoirs, lakes, and storage tanks; and canals, tunnels, and pipelines—that capture, store, and convey water to 29 water agencies. The SWP contractors receive annual allocations as agreed to in their contracts, which will expire in 2035. In return, the contractors repay principal and interest on both the general obligation bonds that initially funded the SWP's construction and the revenue bonds that paid for additional facilities. The contractors also pay all costs, including labor and power, to maintain and operate the SWP facilities.

Water is diverted from the Delta and conveyed down the California Aqueduct which can convey up to 13,000 cfs. The SWP water supply capability depends on rainfall, snowpack, runoff, reservoir storage, pumping capacity from the Delta, and legal environmental constraints on project operations. Project water supply comes from storage at Lake Oroville and high runoff flows in the Delta. Water deliveries to state contractors have ranged from 1.4 million AF in dry years to almost 4.0 million AF in wet years.

SWP contractors could be involved in multi-party transfers or exchanges as part of the IRWMP implementation strategy. Operations for the SWP may be constrained by SWRCB decisions and requirements to meet water quality objectives and flow standards in the Delta.

REGIONAL AND LOCAL FLOOD CONTROL AND STORM WATER MANAGEMENT

The large scale flood control for the IRWMP Region is provided by Pine Flat Dam and Pine Flat Reservoir and to a lesser degree by Friant Dam and Millerton Lake. More localized flood control and storm water management facilities are operated by a mix of special districts and the land use agencies.

KINGS RIVER FLOOD CONTROL FACILITIES OPERATIONS AND MAINTENANCE

The Federal Flood Control Act of 1944 authorized the construction of Pine Flat Dam and also authorized certain channel improvements along the Kings River downstream from the dam.

Federal law requires that a local agency assume sponsorship of the levee projects. At the urging of the irrigation districts in the area, the KRCD undertook the sponsorship of the channel improvements in 1959 and the waterways banks along the right and left of the Kings River were transferred to the KRCD for operation and maintenance. In total, the KRCD maintains more than 140 miles of levee. Under the general provisions of the flood control regulations, the KRCD is responsible for maintenance and operation of flood control works for structures and facilities during flood periods and for the continuous inspection and maintenance of the project works at other times.

The principle mission of the Corps during flood emergencies is to operate Pine Flat Dam, work with the KRCD to ensure that flood control works are properly operated and maintained, and offer technical advice to enable local interests to obtain maximum flood protection.

Levee maintenance requires periodic inspections to ensure that maintenance measures are being effectively carried out. Such inspections are made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days and such intermediate times as are necessary to ensure the best possible care of the levees. Measures are taken to control erosion; exterminate burrowing animals; provide for removal of wild growth and drifts deposits; suppress or eradicate invasive plants and repair damage caused by erosion or other forces. In order to ensure that channel maintenance is accomplished in a manner which minimizes any adverse environmental impact, removal of healthy, large-diameter trees within the floodway is avoided where practical and vegetation is preserved as a part of selected clearing of the waterside berm, channel bank, or levee slope during normal maintenance operations. Semiannual reports are prepared for the Corps covering inspection of bridges, weirs, and structures within the designated floodway, maintenance, and operation of the protective works.

The Kings River channel improvement was designed by the Corps to protect the adjacent lands, railroads, highways, and towns from floods expected to occur less frequently than once in 100 years and to safely pass to Tulare Lake and the San Joaquin River the stream flows as regulated by the operation of Pine Flat Dam. Construction on the Kings River generally consists of channel improvement and levee construction as needed to maintain the capacities defined in Tables 10 and 11.

Table 10. Flood Capacities to be Maintained on the Kings River

Main Kings River	
Lemoore Weir to Island Weir	9,100 cfs
Island Weir to Crescent Weir	6,300 cfs
Kings River North (Fresno Slough)	4,750 cfs
Kings River South	3,200 cfs
Clarks Fork	2,500 cfs
Crescent Bypass	1,500 cfs

Table 11. Designated Flood Flows for the Kings River

Stream	Reach	Flow (cfs)	Gage Location	Gage Height (Ft)
Kings River	Lemoore Weir to Island Weir	7,500	Downstream from Lemoore Weir	12.4
Kings River	Island Weir to Crescent Weir	5,000	Downstream from Island Weir	10.1
Kings River	Downstream from Crescent Weir	3,500	Downstream from Crescent Weir	10.0
Clarks Fork	All	2,000	Downstream from Army Weir	7.8
Crescent Bypass	All	500	(no gage)	–

THE FMFCD AND FRESNO-CLOVIS AREA

The FMFCD Service Plan adopted in 2004 describes in detail the regional and local storm drainage and flood control facilities for the Fresno-Clovis metropolitan area (FMFCD, 2004). The Service Plan includes 163 adopted or proposed drainage areas, each providing service to approximately one to two square miles. All but five of the developed drainage areas are served by a retention or detention facility. The FMFCD flood control facilities are intended to control, contain, and provide for the safe disposal of storm waters that flow onto the valley floor from the eastern streams. These streams are collectively referred to as the Fresno County Stream Group. Regional FMFCD flood control facilities maps were provided by FMFCD and added to the IRWMP GIS. Table 12 lists the FMFCD current regional flood control facilities.

Table 12. FMFCD Major Flood Control Facilities

Facility	Description
Big Dry Creek Dam and Reservoir	Located on Big Dry Creek; controls Big Dry and Dog creeks; built in 1948 and enlarged in 1993; gross pool capacity of 30,200 AF; controls up to approximately 230-year event flood flows.
Fancher Creek Dam and Reservoir	Located on Fancher Creek; controls Fancher and Hog creeks, and several unnamed tributaries to Redbank Creek; built in 1991; gross pool capacity of 9,700 AF; controls up to 200-year event flood flows.
Alluvial Drain Detention Basin/Basin 'BX'	Located east of Enterprise Canal on Alluvial Drain; controls flows from Alluvial Drain and an unnamed tributary; built in 1993; gross pool capacity of 385 AF; controls up to 200-year event flood flows. Proposed modifications to the basin will increase the capacity to 891 AF.
Redbank Creek Detention Basin	Located at the confluence of Mill Ditch and Redbank Creek; controls flows from Redbank Creek; built in 1990; gross pool capacity of 940 AF; controls up to 200-year event flood flows.
Pup Creek Detention Basin/Basin 74	Located west of the Enterprise Canal on Pup Creek; controls flows from Pup Creek and from an unnamed tributary; built in 1993; gross pool capacity of 630 AF; controls up to 200-year event flood flows. Proposed modifications to the basin will increase the capacity to 785 AF.
Redbank Creek Dam and Reservoir	Located north of the Enterprise Canal at the confluence of the major Redbank Creek tributaries; controls the flows of Redbank Creek; built in 1961; gross pool capacity of 1,200 AF; controls up to the 200-year event flood flows.
Fancher Creek Detention Basin	Located south of McKinley Avenue at the divide of Mill Ditch and Fancher Creek; controls the flows of Fancher Creek and Mud Creek watersheds; currently under construction; gross pool capacity will be approximately 1,891 AF; will control up to the 200-year event flood flows.
Big Dry Creek Detention Basin	Located south of Ashlan Avenue and East of Freeway 168 at the confluence of Big Dry Creek and the Gould Canal; facility shares capacity with Drainage Area "C," CSUF, and Caltrans; controls flows in big Dry Creek; currently under construction; gross pool capacity will be approximately 259.8 AF; will help manage flows in Big Dry Creek originating from rural streams or urban discharges.

The FMFCD is the local sponsor of the Corps' Redbank-Fancher Creeks Flood Control Project, which consists of five of the system's major facilities. Through its contract with the federal government, the FMFCD is responsible for construction cost sharing, land acquisition, operation, and maintenance of the Redbank-Fancher Creeks project. The FMFCD is also responsible for construction, operation, and maintenance of additional, non-federal flood control facilities required to control the stream group and for flood plain management.

All structural elements of the system were completed by January 1994. The Fancher Creek project is currently under construction and scheduled for completion in 2010. Fancher Creek

Detention Basin will provide direct benefits to both the FMFCD and the Fresno Irrigation. An interagency operations agreement will be developed to provide for the joint use of the basin.

Between the easterly boundary of the planned urban storm water drainage system and the FMFCDs eastern boundary, there are approximately 175 miles of streams and channels, many of which are severely obstructed. The FMFCD operates a rural streams program to preserve, restore, and maintain these channels, and to complete any additional facilities necessary to safely convey storm flows through the rural area and the downstream urban areas.

The local drainage program relates to the collection and safe disposal of storm water runoff generated within the urban and rural watersheds or "drainage areas." The FMFCD local storm water drainage system consists of storm drains, detention and retention basins, and pump stations.

FLOOD CONTROL IN THE INCORPORATED AREAS

Most of the incorporated cities in the IRWMP Region operate their own storm drainage and flood control system. The exceptions are the cities of Fresno and Clovis which are managed by the FMFCD. Many cities also rely on the larger levee systems maintained by KRCD and the irrigation districts for flood protection. The irrigation district canals also move water around and away from the cities. The local storm drainage and flood control systems for the incorporated cities within the IRWMP Region are described below. The local storm drainage system for the Cities of Clovis and Fresno were described above.

Dinuba

The City of Dinuba is located in the northern portion of Tulare County 12 miles east of SR 99 on county highway Avenue 416. The storm drainage and flood control system for Dinuba is composed of storm drain inlets, underground storm drains, ponding basins, and 18 storm drain pump stations. Stormwater flows into streets and enters storm drains through inlets located along streets. Storm drains convey water to ponding basins.

Fowler

The City of Fowler is located in central Fresno County along SR 99. The storm drainage and flood control system for the City of Fowler is comprised of storm drain inlets, underground storm drains, and 10 ponding basins. In general, stormwater in Fowler drains from east to west. Recently, storm drain inlets and storm drains were constructed along Merced Street. Stormwater flows into these storm drains and is conveyed to a ponding basin on 7th Street. Stormwater from the northern and southern sections of the city drains to two ponding basins on the west side of the city. The ponding basins are designed to collect stormwater by gravity. Stormwater collects in the basins until it percolates through the soil or evaporates into the air.

No open canals/ditches or pumps are used to convey stormwater in the city. No map of the Fowler storm drainage system was readily available.

Kerman

The City of Kerman is located in central Fresno County on SR 145. The storm drainage system for the City of Kerman is composed of nine drainage zones, seven ponding basins, underground storm drains, storm drain inlets, and a pump station. Stormwater flows into streets and enters inlets where it is conveyed to storm drains and ponding basins. Stormwater collects in ponding basins until it percolates through the soil or evaporates into the air. No canals or levees are used as part of the storm drainage and flood control system for Kerman. A map of the storm drainage system for Kern was reported to be available from Blair, Church, and Flynn Consulting Engineers.

Kingsburg

The City of Kingsburg is located in southern Fresno County near the border with Tulare County, just north of the Kings River. Much of the area surrounding the city is agricultural farmland. The City of Kingsburg operates the storm drainage system in the city. The storm drainage system consists of storm drain inlets, storm drains, two canals, two pump stations, and approximately 11 ponding basins. Stormwater flows into streets and enters underground storm drains via inlets. Storm drains convey water to canals on Greenwood and Bethel Avenues and one of approximately 11 ponding basins throughout the city. Although the City of Kingsburg is located near the Kings River, flooding from the river has not historically been a threat. A map of the storm drainage system for the City of Kingsburg is available from the city.

Orange Cove

The City of Orange Cove is located on the southern border of Fresno County along the Tulare County border just outside the IRWMP. It is included in this discussion because it is in the area to be modeled. The stormwater drainage system for Orange Cove is composed of underground storm drains, open ditches and collection basins. Stormwater flows into streets and enters inlets where it is conveyed to drains, open ditches, and one of three basins. Each basin is designed for a specific stormwater need. One basin is designed to serve a subdivision of 300 lots. The other two basins are designed to serve a 200-unit apartment complex and a 54-unit apartment complex. No map of the storm drainage system for Orange Cove was readily available.

Parlier

The City of Parlier is located in southern Fresno County, just east of SR 99 near the Kings River. The storm drainage system for Parlier is composed of 20 drainage zones, nine ponding basins, underground storm drains, and storm drain inlets. The ponding basins range in size from

approximately 1 to 2 acres. Stormwater is conveyed directly to basins by city streets. The basins are designed to fill with water by gravity. Stormwater collects in these basins until it percolates through the soil or evaporates into the air. The city's storm drainage system employs no canals or pumping facilities. A map of the storm drainage system for Parlier was reported to be available from Gierseh and Olson.

Reedley

The City of Reedley is located in southern Fresno County along the Kings River. The storm drainage and flood control system for the city of Reedley is composed of 12 drainage zones, three ponding basins, underground storm drains, storm drain inlets, a drainage ditch, and a pump station. Stormwater flows into city streets and enters storm drain inlets where it is conveyed to underground storm drains and the Button Willow Ditch on the east side of the city. Storm drains carry water to one of the city's three ponding basins. The Carnancho Park Ponding Basin is located at the northeast corner of North Avenue and Columbia Avenue. Another ponding basin is located at the end of Hemlock Avenue and Curtis Avenue. Both of these ponding basins are designed to fill with water by gravity. Stormwater collects in these basins until it percolates through the soil or evaporates into the air. A third ponding basin is located at the intersection of Washington Avenue and Caroline Avenue. Stormwater from this ponding basin is pumped to an irrigation canal. A map of the storm drainage system for Reedley is available from the city.

Sanger

The City of Sanger is located in central Fresno County. The storm drainage system for Sanger is composed of nine drainage zones, storm drain inlets, underground storm drains, three canals, six pump stations, seven ponding basins, and levees. Stormwater in Sanger flows into streets and enters storm drains through inlets along the street. Storm drains convey water to the Fowler Switch Canal, Lonetree Canal, and Centerville-Kingsburg Canal. Levees located along the Kings River Overflow Channel protects the city from high river flows. A map of the storm drainage system for Sanger was reported to be available from Yarnabe and Horn Engineering.

San Joaquin

The City of San Joaquin is located just outside of the IRWMP area to the west but is in the modeling area in western Fresno County, between SR 99 and Interstate 5. The storm drainage system for San Joaquin is composed of seven drainage zones, storm drain inlets, underground storm drains, pump stations, irrigation canals, and one ponding basin. Stormwater in San Joaquin flows into streets and enters storm drains through inlets located along Colorado, California, and Manning avenues. The storm drain located along California Avenue conveys water directly to a ponding basin in the northern portion of the city by gravity. The storm drain

located along Colorado Avenue conveys water to the northeastern portion of the city where it is pumped into an irrigation canal adjacent to Sutter Avenue. The storm drain located along Manning Avenue conveys water to the western portion of the city where it is pumped to an irrigation canal adjacent to Olive Road. Additional ponding basins and storm drains are planned in the future for San Joaquin. A map of the storm drainage system for San Joaquin is available from Yamabe and Horn Engineering.

Selma

The City of Selma is located in southern Fresno County adjacent to SR 99. The storm drainage and flood control system for Selma is composed of storm drain inlets, underground storm drains, four ponding basins, and pump stations. Stormwater in Selma flows into streets and enters storm drains through inlets located along streets. Storm drains convey water to ponding basins. A map of the storm drainage system for Selma is available from the city.

SAN JOAQUIN RIVER FLOOD CONTROL FACILITIES AND OPERATIONS

From Friant to Gravelly Ford, the San Joaquin River is part of the Designated Floodway Program administered by the State Reclamation Board. Land use restrictions and river management practices allow the river to meander, flood the overbanks, and remain in a relatively natural state. Downstream of Gravelly Ford, the river is confined by levees. The design capacity of the San Joaquin River from Friant Dam to Chowchilla Bypass is in excess of 8,000 cfs while the channel capacity downstream is reduced. The major San Joaquin River flow constraint is the reach near Mendota and Firebaugh. Beyond that point, San Joaquin River channel capacity continues to decrease for some distance due to lack of annual flooding and natural channel clearing since Friant Dam was constructed. Further downstream, the river channel has been deepened and widened by historic flows of the Merced River, Tuolumne River, and other tributaries.

In addition to releases from Friant Dam, two uncontrolled streams, Cottonwood Creek and Little Dry Creek, add significantly to the river flows below Friant during heavy precipitation. Historically, prior to the development of flood control system, large areas within the San Joaquin Valley were within the river's floodplain. As development has encroached into the floodplain, the river has been confined to a relatively narrow channel constrained by levees, which reduced the carrying capacity of the river. Most of the flow (as much as 5,500 cfs) from Friant Dam is diverted northward to the Chowchilla Bypass about 11 river miles upstream from Mendota Dam. Downstream of Chowchilla Bypass, the river is not confined by levees (within Fresno County) and generally carries no more than 2,500 cfs.

TULARE COUNTY UNINCORPORATED AREAS

Tulare County has summarized existing information regarding Tulare County's drainage facilities, specifically identifying communities that lack storm drain facilities or rely only on surface drainage (Tulare County, 2004). Tulare County is the lead agency in providing storm drain infrastructure within the unincorporated areas of the county. Many of the unincorporated small communities have no underground drainage infrastructure, leaving only surface drainage which is more subject to flooding, and/or have infrastructure that is not properly functioning due to little or nonexistent facility maintenance. The County also recognizes that surface draining also poses a potential threat to wildlife, farm animals, and groundwater supplies, as there is limited ability to treat the water before it flows into a basin, or other surface waters such as a creek, irrigation ditch, or river.

Storm water drainage infrastructure within unincorporated Tulare County is owned and managed by the Tulare County Resources Management Agency. Storm drain infrastructure improvements are generally constructed in conjunction with transportation improvement projects and site development projects. The largest storm drain system within Tulare County is the Cutler-Orosi system. Storm water is collected through a series of pipes and pump stations, the majority of which is transported and discharged into Sand Creek. A portion of the Cutler-Orosi storm water collection system connects to a state storm drain system that runs along SR 63. Tulare County is currently working with the RWQCB on the preparation of a Storm Water Management Plan. Storm drain infrastructure in smaller communities generally consists of underground and surface collection facilities that transport the water to local retention ponds and/or local streams. Generally, new subdivisions within the county are required to provide land for storm drain infrastructure purposes.

The flood carrying capacity in rivers and streams has decreased as trees, vegetation, and structures have increased along the Kings Rivers and other local drainage ways. Confined floodplains can result in significantly higher water elevations and higher flow rates during high runoff and flood events. Updated channel analyses have not been performed to determine the amount of obstruction posed by vegetation and development in the Kings River channels. As such, the background report acknowledges that the FEMA maps depicting the 100-year floodplain for the rivers probably do not reflect the true extent and risk of flooding hazards in Tulare County.

DOMESTIC WATER SERVICE PROVIDERS AND SYSTEMS

Domestic water service is provided by a wide mix of providers. Municipal utilities provide water to most of the larger cities with the exception of Selma which is served by California Water Service. Historically, all of the cities relied on groundwater. As a result of overdraft and groundwater quality issues, the Cities of Clovis and Fresno recently completed surface water

treatment plants to increase their conjunctive use programs and make use of available surface supplies and entitlements. Unincorporated communities in Fresno and Tulare Counties are served by CSDs, CSAs, or PUDs and rely almost exclusively on groundwater.

Information on public water systems was obtained through review of the city and county general plans, local GWMPs, available water supply master plans or capital facility plans, and through contacts with Fresno and Tulare LAFCOs, California Department of Health Services, or local public works departments. Water supply and systems data was not readily available for Orosi PUD, Caruthers CSD, City of Fowler, City of Kingsburg, Del Rey CSD, London CSD, Cutler PUD, Sultana CSD, Fresno County PWD, Easton CSD, City of San Joaquin, City of Mendota, and City of Kerman. The County general plans or other sources were relied on for information on these locations.

WATER PROVIDERS FOR INCORPORATED CITIES

Bakman Water Company

Bakman Water Company (Bakman) is a privately owned utility that has provided domestic water service to its Fresno service area since 1948. Bakman's service area covers 1,660 acres within the southeastern portion of the City of Fresno and parts of unincorporated Fresno County. Bakman provides service to 10,000 customers through 1,800 connections. It does not currently have any surface water allotment and supplies only pumped groundwater to its customers. In 2003, it pumped a total of 1,270 million gallons (MG) (3,900 AF) of groundwater to residential and commercial customers. Bakman currently has 10 active wells, three standby wells, and three inactive wells, in addition to the numerous private wells that are located in its service area. However, new developments are required to connect to the Bakman water system. Water quality concerns in Bakman include DBCP and nitrate contamination from food processing industries. Three wells have been classified as "standby wells" in accordance with the DHS standards. Blending and granular activated carbon (GAC) treatments are employed at other wells to reduce nitrate and DBCP concentrations. All wells are plumbed and wired to allow for emergency chlorination.

Clovis

The City of Clovis is located in eastern Fresno County, just east of the City of Fresno. Clovis was incorporated in 1912, covers an area of almost 20 square miles, and had a 2005 population of 86,215 persons. Clovis also provides domestic water service to the unincorporated community known as Tarpey Village with a population of 3,957.

In 2004, the city pumped approximately 7,500 MG (23,035 AF) from its 36 active wells. Other wells have been abandoned due to low yield, sanding, or contamination problems. Three wells are on standby status due to water quality issues with DBCP and high iron and manganese.

Some wells have GAC treatment. Pending regulations for currently unregulated contaminants, such as TCP or Radon, could impact some city wells in the future. Within the next few years, the city will construct four new wells within the developed areas of the city.

Until July 2004, the city's sole source of drinking water was the groundwater aquifer underlying the community. In 2004, Clovis constructed and placed in operation a 15-million gallon per day (MGD) capacity surface water treatment plant. The plant is providing treated surface water to the easterly portion of Clovis. Clovis currently has three sources of water available to it: groundwater, surface water, and exchange water. Other planned future water sources include reclaimed water and additional exchange water.

The City of Clovis lies almost entirely within the FID. The FID has an average annual entitlement of 454,000 AF from the Kings River, as well as 75,000 AF of Class II water from the Friant Division of the Central Valley Project. The city's allocation is proportional to the total acreage of the city. In an average year, the city's current entitlement from Kings River is 21,617 AF and 1,357 AF from the Class II CVP. A portion of the city's surface water is treated and used for municipal purposes and the balance is used to irrigate landscaping at parks, schools, and cemeteries and to recharge the groundwater. The city is not allowed to carry over any unused FID entitlement water from previous years. This could result in reduced groundwater recharge and increased groundwater pumping. However, it is estimated the city can acquire 9,000 AF of water annually from the Waldron Pond Banking Facility in the event of surface water shortages.

CSU Fresno

CSU Fresno serves a population of 22,000 with 550 total active connections and five fire hydrants. Six active and one standby wells provide the water supply. In 2004, the annual total groundwater produced amounted to 327.8 MG with the maximum day of 1.77 MG and the maximum month (July) of 55 MG.

Dinuba

The City of Dinuba is in northwestern portion of Tulare County, near the western foothills of the Sierra Nevada Mountain Range. Dinuba ranks fourth in population among the eight incorporated cities in Tulare County. The City of Dinuba's primary source of water is groundwater. Currently, there are seven active wells within the Dinuba city limits (none outside.) To increase its water supply, the City is completing construction in 2006 of two new wells with a combined capacity of 3.7 MGD and plans to construct one new well within the City of Dinuba limits every 5 years (2011, 2016, and 2021) for an approximate total pumping capacity of 1.1 MGD.

The groundwater quality in Dinuba is relatively high. Three major contaminants have the potential to impact groundwater supplies. First, like many other east side San Joaquin Valley communities, Dinuba has experienced DBCP contamination. Two wells have been retrofitted with GAC treatment systems and other existing and new well sites may require treatment to remove DBCP. Since affected wells can be treated, supply quantity is not affected by this contaminant. Second, two wells are out of service due to adjacent methyl tertiary-butyl ether (MTBE) contamination. This contaminant can reduce supply reliability if treatment cannot be afforded or temporarily affect supply while the treatment system is being designed or constructed. Third, high levels of nitrates can cause a well to go out of production, although none of the city's supplies are significantly threatened with nitrate contamination at this time. Other than these contaminants, Dinuba's groundwater supply is suitable for domestic use without treatment.

Kings River lies approximately five miles to the west of Dinuba. The city is within the AID so surface water transfer and exchange opportunities exist with the AID. A surface water treatment plant would be needed.

Single-family residential customers average 3.1 persons per connection with 212 gallons per day per capita water use in 2000. As urban growth replaces agricultural land uses, groundwater recharge and overdraft may become more of an issue for Dinuba.

Fowler

The City of Fowler provides domestic water service to a population of 4,600 with 1,111 general and residential, 122 commercial, 24 industrial, three irrigation (Ag & Residential), and 255 fire hydrants connections. In 2004, five active and one standby wells produced 524 MG with the maximum day of 1.4 MG and maximum month (September) of 51 MG.

Fresno

The City of Fresno was founded in 1885 and had a population in 2003 of 457,000. It remains one of the fastest growing cities in California. The City of Fresno provides domestic water service to customers within the city limits as well as in some unincorporated county islands. The total area of the city is 102.5 square miles, but the city only serves water to 87.2 square miles. The City of Fresno supplies water to residential, commercial, industrial, and landscape irrigation customers, but not to agricultural users. The City had 120,399 connections in 2005, 14% of which were metered. However, since all large water users are metered, 33% of total water deliveries are measured.

The City of Fresno's primary source of water is groundwater. Prior to 2004, the Fresno water system was one of the largest water systems in the United States relying on pumped groundwater as its sole source of potable water. The total water pumped from Fresno's

250 wells exceeded 54 billion gallons (166,000 AF) in 2003. The City currently has 32 active municipal wells that are treated for DBCP or TCE. Eight major contaminant plumes are present in Fresno. The inorganic plume contaminants include chloride, nitrate, arsenic, and chromium. The organic plume contaminants include petroleum hydrocarbons, MTBE, chlorinated volatile organic chemicals (VOCs), trichloropropane (TCP), DBCP, and other pesticides.

Two surface water supplies to the City of Fresno include more than 100,000 AF (average annual) from the Kings River through a contract with the FID, and 60,000 AF of CVP water from the Friant Unit obtained from the diversion and storage of San Joaquin River water behind Friant Dam. Since the mid-1960's surface water from these rivers has been imported to the City of Fresno via FID canals and placed into groundwater recharge basins. The City of Fresno currently diverts more than 40,000 AF of surface water annually to more than 70 basins for groundwater recharge. Surface water is also conveyed to the city's new 30-MGD surface water treatment plant that began operation in 2004.

Kerman

Located in central Fresno County, the City of Kerman occupies 2.5 square miles and has a surrounding area that is predominantly agricultural. Kerman was incorporated in 1946 and had a population of 8,551 in 2000. It is experiencing accelerated urban growth: by 2004, the population was 11,500. New development will increase water demand. As a result, Kerman is exploring surface water supplies, but currently does not have any surface water rights. Kerman is developing a groundwater recharge partnership with the FID. All of Kerman's water supplies are derived from groundwater with four active wells and one on standby. The city plans to construct two new wells in 2006. These improvements will enable Kerman to meet projected water demands in the next five years. Kerman serves urban water to residential (2,104), commercial (307), and industrial (7) connections. In 2004, Kerman pumped a total of 988 MG (3,030 AF) of groundwater. Groundwater is available to Kerman from the deep aquifer beneath the Corcoran Clay, and a shallow aquifer above the Corcoran Clay that sometimes has high levels of uranium.

Kingsburg

Located in the Fresno County, the City of Kingsburg covers 2.3 square miles and had a 2004 population of 11,049. The City of Kingsburg Public Works Division provides domestic water service to 3,164 residential and 233 commercial connections. The Division employs six non-treated wells with groundwater as its sole source of water.

Parlier

The City of Parlier provides domestic water service to a population 12,058 with 1,932 general and residential, 130 commercial, and 318 fire hydrants connections. The water is extracted

using five active and one standby wells. In addition there is one inactive well. The annual total groundwater produced in 2004 was 1.059 billion gallons.

Reedley

The City of Reedley depends entirely on groundwater pumping for its water supply. Reedley service area is 4.2 square miles and is located primarily on the east side of the Kings River, although some growth is occurring west of the Kings River. There have been varying increases and decreases in static water levels in Reedley wells over the past 25 years. However, the long-term trend is generally toward increasing depth to ground water. Currently, seven deep wells, ranging from 260 to 600 feet in depth, and one standby well provide water to Reedley. The system provides water to 4,766 non-metered residential and commercial services, 226 metered commercial/institutional services, and 30 metered industrial water users. Future water demand in the City of Reedley will be met with a combination of increased pumping capacity and treatment to keep existing wells on line, and conservation measures to moderate demand. The City of Reedley is not supplied surface water.

Sanger

The City of Sanger is located in Fresno County. Sanger had a year-2000population of 18,931. It occupies an area approximately 4.9 square miles (3,113 acres). The City of Sanger obtains its entire water supply from groundwater. Seven wells with an average depth of 235 feet have a combined annual production capacity of 11,560 AF. The current demand is, however, only 4,706 AF per year. Growth in Sanger did not increase significantly during the 1990s because the Sanger wastewater treatment plant was at capacity. With the expansion and improvements in the wastewater treatment plant in 1998, the city is now encouraging and promoting economic development. As a result, the Sanger commercial sector has increased 36.6 percent since 1995. The city has a small industrial sector primarily centered on food production and light manufacturing. The city provided services to 4,152 single-family residential, 29 multi-family residential, 295 commercial, 9 industrial, and 30 institutional and governmental connections in 2000. Total system per capita water use averages 220 gallons per capita per day. The City operates a water treatment plant that is designed to remove DBCB.

Selma

The Selma district is located in Fresno County approximately 20 miles southeast of the City of Fresno in the Tulare Lake hydrologic region. California Water Service Company is an investor-owned public utility providing water service to the Selma community since 1962. Groundwater is the sole source of water in the Selma district. The groundwater is extracted from the underlying aquifers of the Kings River fan using 13 active wells. Current design capacity for the operational wells is equivalent to 16.4 MGD. The groundwater wells operate in response to

real-time demand conditions because currently there are no surface storage structures. Four other wells are currently inactive or non-operational. The district has sufficient groundwater production capacity to supply the current annual average day and maximum day demand conditions; however, potential peak flow conditions could exceed the existing design capacity of the wells. The peak demand flow demand in 2001 was 10,650 GPM. The loss of the district's 1,000-GPM wells would leave the district short of supply during peak flow conditions. In 2001, the measured average day demand was 4.6 MGD with 894 gallons used per service and the measured maximum day demand was 9.9 MGD with 1,906 gallons used per service.

The quality of the groundwater produced by the district's active wells can vary depending on location. DBCP and nitrates are a concern. Water produced from several wells contained concentrations that exceeded the MCL. However, in all cases these wells were either taken out of service or treatment facilities were installed to remove the contaminant. Contaminant migration of DBCP could force closure of other wells.

In 2001, there were 4,553 (88%) single-family residential, 41 (0.8%) multi-family residential, and 468 (9.0%) commercial services, 0.4% industrial, 1.7% government and 0.1% other connection classes. Approximately 61% of the single-family residential services in the Selma District are unmetered. Water use was 308 gallons per-capita per day in 2001.

UNINCORPORATED AREAS

Areas of residential development exist throughout the unincorporated areas of the IRWMP Region. Domestic users in the areas of development concentration that are not served by public entities, rely on individual wells or are provided water by small mutual water companies or private community water systems regulated by local Environmental Health departments. This includes the area in and around Raisin City in Fresno County. The public water systems in the unincorporated IRWMP Region are discussed below.

Cutler Public Utility District

Located approximately 1.2 miles south of the community of Orosi in northern Tulare County, the unincorporated community of Cutler had a year-2000 population of 4,491 and covers an area of approximately 0.76 square miles. The Cutler Public Utility District (CPUD) provides domestic water service to Cutler. Two underground wells with a combined maximum efficiency of approximately 1.4–1.5 MGD supply water to Cutler. There are currently 1,032 connections to the water system, including three industrial packing houses and one box plant. With an estimated 13 to 15 metered connections in newer homes, the Cutler water system is, for the most part, is unmetered. Hence, no current water demand data is available. In addition to the two wells described above, a new well is currently being drilled. The district has plans to bring another well, currently out of service due to high nitrate levels, back online by mixing the water pumped from each individual well into a blending tank to reduce the overall

amount of nitrates to an acceptable level. These projects will help to significantly increase Cutler's maximum water production.

Del Rey

The Del Rey CSD is in Fresno County and provides domestic water service to a population of 1,000 with 266 general and residential, 16 commercial, and 8 industrial connections, in addition to 45 fire hydrants. There are 278 flat rate and 12 metered connections. Del Rey's water supply is extracted from two active and two standby wells. In 2004, the total pumped groundwater amounted to 198 MG with the maximum day of 0.84 MG and maximum month (June) of 25.2 MG.

East Orosi Community Services District (EOCSD)

Located in the northern Tulare County, the unincorporated community of East Orosi covers an area of approximately 0.25 square miles and had a year-2000population of 426 persons. The East Orosi Community Services District (EOCSD) provides domestic water service to East Orosi. The EOCSD currently supports 106 residential and two commercial (the church and the local store) connections. Currently, the water system is at or near maximum capacity, and it is unlikely the EOCSD can support additional connections to its system without further planning. Developers would likely be solely responsible for all infrastructure improvements necessary to support their development, as the EOCSD would not likely be able to finance the infrastructure.

London Community Services District (LCSD)

Located approximately 17 miles north of Visalia in northwestern Tulare County, the unincorporated community of London had a year-2000 population of 1,848 covering an area approximately 0.63 square miles. The London Community Services District (LCSD) provides domestic water service to London residents. The LCSD owns and operates three wells that supply water to residents. The LCSD does not treat its water as it currently meets county and state health department water quality regulations. The LCSD's water is un-metered and there is no information available on residential, commercial, and industrial connections at this time. Since the majority of the LCSD's water distribution system (pipeline system) was initially constructed in the early 1950s, many of the water lines are approaching their useful life and will need replacement or improvements in the near future.

The LCSD's ability to provide water to support future developments appears to be limited by financial resources. The current condition of the infrastructure is also a limiting factor. Although the LCSD is confident that its current water supply from three wells could support additional development, the availability of the infrastructure to deliver the water is limited. Hence, the responsibility of constructing additional infrastructure would currently fall on the developer.

Malaga County Water District

Malaga County Water District covers 2.3 square miles just south of the City of Fresno. Malaga has provided water service since 1965 and currently is serving a residential population of about 1,300 with 224 residential and 220 industrial/commercial connections. Malaga depends entirely upon groundwater to meet its water needs. It has three active wells and two wells that have been removed from service because of a variety of contamination problems, including nitrates and DBCP. In 2003, the district wells produced 602 MG (1,848 AF). However, no pumping data exist for the many private wells in the area.

Orosi Public Utility District (OPUD)

Located approximately 2.0 miles north of the community of Cutler in northern Tulare County, Orosi had a year-2000 population of 7,318 covering an area approximately 2.45 square miles. The Orosi Public Utility District (OPUD) operates domestic water service to Orosi. Four active underground water wells located throughout the community, with a combined maximum pumping efficiency of 4.2 MGD, provide supply water to residents. The groundwater is automatically chlorinated, but not treated. There are currently 1,788 total connections to the system, including 1,639 general and residential, 132 commercial, and three agricultural and residential, as well as 14 inactive connections and 164 fire hydrants. All connections were metered as of January 1, 2005.

In addition, there are two wells that are currently not in service due to high nitrate levels and the OPUD plans to construct a new well to increase system capacity. No new connections to the system are being issued primarily because of wastewater treatment capacity shortfalls. Although wastewater treatment is the primary factor limiting growth within the community at this time, additional water supply will also be necessary to accommodate growth since the OPUD described its current additional system capacity as "marginal."

Pinedale County Water District

Pinedale County Water District was formed in 1954 and covers 1.7 square miles with a population of 8,495 persons. Pinedale has five active wells, but typically only needs to operate three wells to meet its current water demand. Some wells have been abandoned due to TCE contamination. No treatment or chlorination is performed on any pumped groundwater. Pinedale monitors groundwater quality according to DHS requirements but does not monitor groundwater levels. The district provides water to approximately 2,400 residential and 550 commercial customers. In 2004, it produced 903 MG of groundwater with the maximum month of 116 MG in July. Water demand is expected to increase as the undeveloped areas in Pinedale become occupied.

Sultana Community Services District (SCSD)

Located approximately mid-way between the City of Dinuba and the community of Orosi in northwestern Tulare County, the unincorporated community of Sultana had a year-2000 population of 507. The Sultana Community Services District (SCSD) provides domestic water service to Sultana. The SCSD has not provided specific water infrastructure information necessary for a comprehensive description of its current domestic water infrastructure state.

WASTEWATER COLLECTION, TREATMENT, DISPOSAL

Wastewater collection, treatment, and disposal are regulated by the Central Valley California RWQCB. Local government and special districts own and operate collection systems (sewers) and wastewater treatment plants. All of the entities that treat and discharge wastewater obtain permits from the RWQCB to discharge treated plant effluent and dispose of biosolids (sludge). Residents in rural areas that are not served by sewers most often use on-site septic systems. Industries are required to provide pre- treatment of their waste prior to discharge to a publicly owned treatment works or they must obtain separate discharge permits from the RWQCB if they are operating independent facilities. The objective of such permits is to preserve surface and groundwater quality for beneficial use and to protect the public health. With the exception of Reedly, which has an NPDES permit, none of the plants discharge directly to surface water.

There are 362 permitted dischargers in Fresno County. More than 70% of all discharges are classified as municipal discharges, which are mostly domestic waste, and 90% of municipal flows are generated within corporate city limits. Similar statistics were not readily available for Tulare County. Most non-municipal waste is derived from agricultural-based industries, primarily food processing and packing.

INCORPORATED AREAS

All incorporated areas within Fresno County and Tulare County are served by local wastewater collection and treatment facilities. The majority of treated wastewater is domestic (household type) waste with a small amount (estimated at 0–11% depending on the city) coming from industrial discharges. Most treatment plants provide secondary treatment, but some smaller cities still have primary treatment facilities. Other cities in the county generally have adequate capacity for the foreseeable future. The Fresno County General Plan Background Report (Fresno County, 2000) provided a summary of treatment facilities and identified sources of available sewer collection system maps. A baseline conditions report has been produced by Tulare County as part of the general plan update program (Tulare County, 2004). The description of existing wastewater collection, treatment and disposal facilities is provided in this section. There are no metropolitan areas in the Kings County part of the IRWMP Region.

Fresno-Clovis

The Fresno-Clovis Regional Wastewater Treatment Plant provides wastewater treatment for these two cities based on a cooperative agreement between them. Each city owns and operates its own collection system feeding the jointly owned facility. The City of Fresno operates this plant, which is approximately 7 miles west of SR 99 on West Jensen Avenue, southwest of the city of Fresno, and about 16 miles by trunk sewer to the city of Clovis. Clovis has four trunk sewers—the Fowler Trunk, Peach Trunk, Sierra Trunk and the Herndon Trunk—with a combined average current flow of 7.02 MGD.

The plant design capacity is 80 MGD with the total amount of wastewater treated at the plant averaging about 70.3 MGD. Of that, on a yearly basis, approximately 23.2 MGD (26,000 AF) was reclaimed and reused downstream of the wastewater treatment plant in 2005.

Approximately 89% of the plant influent is municipal waste and 11% industrial waste. The plant provides secondary level of treatment with biological removal of organic material, but no disinfection or filtration processes. Ten percent of the plant effluent is used for irrigation and the remaining 90% is diverted to percolation/evaporation basins. Percolation ponds achieve some level of nutrient reduction and disinfection by filtering effluent through soil. The soil-filtered effluent is reclaimed by pumping wells at the perimeter of the reclamation area. Pumped groundwater from below the percolation ponds is then discharged to Dry Creek and FID irrigation canals where it can be used to irrigate non-food crops. Pursuant to the agreement between the cities and the FID, the FID exchanges one acre-foot of surface water for every two acre-feet of water pumped and put into the canals. Because Clovis contributes a percentage of the flow to the plant, Clovis is entitled to a proportionate share of any exchanged water. Approximately 26,000 AFY is currently being pumped from the reclamation wells.

The City of Fresno has been paying to have biosolids hauled away for compost, but recently completed facilities will provide greater flexibility in operations, so the City is currently exploring less costly alternatives, including land spreading.

City of Clovis

Following the adoption of the 1993 General Plan and approval of the Wastewater Master Plan in 1996, the City of Clovis has been evaluating various means of providing sewer service to new development areas. In 2001, the Clovis City Council approved a sewage system master plan for the City of Clovis that requires the construction of a Sewage Treatment – Water Re-use Facility to treat the effluent generated by the proposed growth areas. The Sewage Treatment – Water Re-use Facility is to treat the effluent generated by the new growth areas to a level such that the water can be reclaimed for use within the city. The plant will produce Title 22 disinfected tertiary treated water with unrestricted use. The process results in very clean water and produces no toxic byproducts and no odor to adjacent properties. The recycled water could be

used for agricultural and landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and water features. The FID has indicated that it can use the recycled water to distribute to agricultural customers downstream from Clovis. In addition, the CSU Fresno, which grows a variety of crops and is located just west of Clovis, has expressed interest in utilizing the water.

In 2002, Clovis City Council approved site selection criteria used to identify the preferred site and alternatives. In 2003, Clovis City Council approved a preferred site to locate the proposed facility; selection of an engineering consultant to assist with the process, and selected consultant to prepare an Environmental Impact Report (EIR). In 2005, the EIR was certified and the City acquired approximately 16 acres of property north of Ashlan Avenue and west of McCall Avenue. City staff has been authorized to enter into negotiations with the preferred vendor regarding terms and conditions for the design, build, and operation of the proposed facility (Clovis, 2006).

The plant scheduled to be operational in 2009 will, in its initial phase, receive its influent from diverted flow from the Fowler Trunk Sewer currently treated at the joint Fresno-Clovis Regional treatment center, as well as from the Southeast Area comprising a total average daily flow of 2.8 MGD. Ultimately, the plant will expand its capacity to 8.4 MGD.

Kerman

The City of Kerman has a 1.2-MGD secondary treatment facility located approximately half a mile southeast of town near Del Norte and Church Avenues. The service area is coincident with the City limits, and except for a pump station serving one small area, the system is entirely gravity flow. Currently (1997), the City is adequately serviced, although additional capacity may be required in the collection system to provide for future development. All flow into the treatment plant is domestic type and average flow is 0.77 MGD, which is well within the capability of the existing treatment facility. All the plant effluent is directed to on-site percolation and evaporation ponds. Biosolids are occasionally dredged from the ponds and stockpiled on site.

Parlier

The City of Parlier has a 2-MGD secondary treatment plant located southwest of town off Betliel Road, half a mile south of Manning Avenue. The service area is coincident with the City limits, but may extend to areas within its SOI to accommodate development. There are two pump stations in the system. One is on the east side and pumps about 60% of the flow from that area to a gravity line. The other is a larger pump station that pumps the combined flow in a 16-inch force main about one and a half miles out to the treatment plant. Current average flow is 0.8 MGD and is about 98% domestic, and 2% industrial from local packing plants. Plant effluent may go to temporary holding ponds on site, but eventually all effluent is used for irrigation.

The plant has a biosolids removal system with dewatering beds and a commercial dealer removes it for land spreading. The City is currently pursuing increasing the local industrial and commercial base; the existing treatment plant is adequate to accept increased flows from these sources.

Reedley

The City of Reedley's wastewater treatment plant is located in the southwest area of town, and provides secondary treatment. The service area is coincident with the City limits. Annual average treated effluent flow to the plant is approximately 2.45 MGD, most of which is domestic waste with a small portion used for landscape irrigation within the plant area and an increase of about 20% during fruit-packing season. Current plant capacity is estimated to be 3.0 MGD and is to be expanded to 4.0 MGD by 2010. The City has investigated the feasibility of wastewater reclamation to comply with the Central Valley Region RWQCB's Order No. 95-110. It was determined that reclamation was not economical. Disposal operations are being effected by high groundwater levels.

A plant facilities master plan is to be completed in 2005–2006 fiscal year to determine timing, costs, and facilities to increase capacity to meet 5.0 MGD build-out level of demand, and effluent reclamation will be further considered during the master plan update. The City has a program for industrial user permitting. All plant effluent is diverted to percolation/evaporation ponds. Biosolids are dewatered, spread in drying beds, and disposed of by land application to orchards and given to local farmers.

Sanger

The City of Sanger wastewater treatment plant consists of a domestic and an industrial wastewater treatment plant. These two plants run in parallel and are located on the same site southeast of the City along Collins Creek, a tributary to the Kings River. Since its original construction in 1947, the plant has undergone three major upgrades and expansions. The last upgrade in 1998 expanded the domestic wastewater treatment plant capacity to 3.0 MGD with a peak hourly flow of 10.5 MGD. Sodium hypochlorite is used to disinfect the effluent discharge before it is pumped to a site three miles south of the plant. This site known as the Lincoln Ponds consists of a series of six rapid infiltration ponds. There are approximately 54 acres of rapid infiltration and evaporation ponds.

The industrial facility for industrial waste from a nearby agricultural/food processing plant, was also expanded in 1998 and was re-rated from 1.5 MGD to 1.3 MGD. The average annual daily flow between 1999 and August 2005 was 0.21 MGD. The effluent from the industrial plant is stored on site and used to irrigate 140 acres of City-owned land adjacent to the wastewater treatment plant depending on the contract farmer's irrigation demands and availability of treated effluent. The aerated treatment train consists of a fully mechanically aerated treatment

pond, an aerated storage pond, three non-aerated storage ponds, and six pump stations to drain the ponds.

Selma-Kingsburg-Fowler

The Selma-Kingsburg-Fowler County Sanitation District comprises the Cities of Selma, Kingsburg, and Fowler as well as the unincorporated areas along the corridor between the cities. The District owns and operates the wastewater treatment facility located west of Kingsburg off Conejo Avenue, as well as all sewer collection systems within its jurisdiction and the main interceptor running the length of the corridor from Fowler to the plant. Most flow to the plant is domestic waste; however, there is also a significant seasonal food processing industry and a small amount of conventional industry. This Extended Aeration Activated Sludge facility is a secondary treatment plant with a current (and planned) capacity of 8.0 MGD. Plant effluent is discharged to five evaporation/percolation ponds in 104 acres with a very small amount used for irrigation. Biosolids are dried, stockpiled, and sold to a local farmer. There is no general recycled water use. Considerable excess capacity exists since the average annual flow to the plant is only 3.1 MGD.

Dinuba

The City of Dinuba Wastewater Reclamation Facility, a Grade II activated sludge plant, serves a population of approximately 15,500 people. Since its construction in 1921, it has undergone three major renovations and expansions, with a current rated capacity of 3.14 MGD (dry weather flow.) Approximately 60% of the flow to the plant is from domestic water sources, with the remaining 40% is from commercial and industrial sources. Two large industrial customers recently installed pretreatment systems, which would not impact the flow but reduced the loadings to the plant.

With the exception of 100 residential septic systems in recently annexed areas, the City of Dinuba collects and treats all wastewater generated in the city. This collection system contains approximately 60 miles of sewer mains and nine lift stations. The current volume of wastewater treated in the Dinuba service area is about 2.2 MGD dry weather flow and is expected to increase to 3.56 MGD by 2025.

The effluent discharge is sent to disposal ponds for groundwater recharge and evaporation. Biosolids are dried and sent off-site to land application. Approximately 400-acre ft/yr in 100 acres of ponds (0.35 MGD) typically is evaporated and another 1.6 MGD is used for groundwater recharge. Evaporation ponds using primary or better treatment levels are expected to process a constant volume of 0.35 MGD through 2025. The increased demand for more efficient wastewater treatment is going to be met through water recycling for landscaping and groundwater recharge using secondary or better treatment levels. Dinuba is evaluating feasibility studies for building a treatment facility to produce recycled water for irrigation of a

municipal golf course. The City also plans to promote recycled water use by requiring it for large landscaping or new projects, subsidizing the cost or giving discounts compared to potable water, providing regulatory relief to the extent possible, and by regional planning and public education.

UNINCORPORATED COMMUNITIES

Unincorporated communities use community service or special districts to provide sewage and wastewater collection and treatment. Fresno County owns and operates nine sewage and wastewater treatment facilities on behalf of water works districts (WWDs) and CSAs. Tulare County unincorporated areas are served by a number of districts as discussed below. The RWQCB actively encourages consolidation of services and increased reclamation of treated effluent as the most economical methods to achieve water quality objectives in the area.

Most treatment facilities currently use evaporation/percolation ponds for effluent disposal. The RWQCB recognizes this as a viable interim disposal solution, but remediation of treated effluent for irrigation purposes is preferred in order to reduce impacts to groundwater and salts accumulation. Tertiary treatment will likely be required to achieve the reclamation goals, but presently few communities are capable of providing advance levels of treatment.

Industries, mostly food processing plants, also treat wastewater treatment and discharge in unincorporated areas of the county. The RWQCB issues discharge permits to industrial facilities.

Many rural landowners use private on-site septic systems for wastewater treatment and disposal. Over the past few years, an average of approximately 500 permits for new individual septic systems have been issued annually in the unincorporated portions of Fresno County, though it is not known how many are issued specifically in the IRWMP Region. Similar information for Tulare County was not obtained.

Fresno County's Mandatory Sewer Connection Ordinance requires connection to public sewer systems, where they are available, precluding the issuance of permits for installation individual septic systems in such cases. In areas where public systems become available where they did not previously exist, structures sewed by individual septic systems must be connected to the public system within three years or sooner if the existing facilities pose a health risk. In the event that required connections are not made within the required three-year period, the County may cause such a connection to be made, with the cost of the connection assessed to the landowner.

Urban areas served by on-site septic systems have had problems with accumulation of nitrates in groundwater (e.g., the Calwa area in southeast Fresno-Clovis Metropolitan Area); however, these problems have been ameliorated when these areas are connected to a sewer utility. In

addition, the Sunnyside unincorporated island in southeast Fresno, which was historically developed with seepage pits, is planned to be connected to the local sewer system.

Cutler-Orosi Joint Powers Wastewater Authority Facilities

The Cutler-Orosi Joint Power Wastewater Authority (JPWA) was formed in 1980 for the purpose of operating a wastewater treatment and disposal facility by the Joint Wastewater Treatment and Disposal Facilities Agreement. The JPWA is responsible for wastewater treatment for the communities of Cutler, Orosi, East Orosi, Sultana, Yettem, and Seville, all of which, except Yettem, are within the Tulare County area of the IRWMP Region. The contributing wastewater districts are the Orosi PUD, the Cutler PUD, the Sultana CSD, the East Orosi CSD, and Yettem and Seville Zone of Benefits. The Cutler-Orosi JPWA Wastewater Treatment Facility (WWTF) is located approximately a half mile west of the Cutler community, near the intersection of Avenue 408 and Road 120.

This extended aeration secondary treatment facility has a current (and planned) capacity of 2.0 MGD, using approximately 120 acres for land application and two storage ponds. Water is recycled for agriculture. There are currently 1,788 total connections to the Cutler-Orosi JPWA sewer system, including 1,639 general and residential connections, 132 commercial connections, three agricultural and residential connections, and 14 inactive connections. Currently, the District is not allowing additional connections to the sewer system until the facility can be improved to increase its capacity. Under the terms of the JPWA Agreement, which expires in March 2010, the CPUD owns 50% of the property and 40% of the plant and equipment. The OPUD owns 50% of the property and 60% of the plant and equipment. All members are charged for their shares of the costs of the JPWA based upon the prorated share of flows into the facility.

The EOCSD provides sewer collection service to its residents. The wastewater is transported to the Cutler-Orosi WWTF through a series of collection pipes and pump stations. The EOCSD is currently having a sewer system study prepared to determine the feasibility of re-plumbing the hookups to the system. Prior to the installation of a sanitary sewer collection system, District residents were on septic systems. EOCSD has a contract with the Cutler-Orosi JPWA for treatment of wastewater. Since the Cutler-Orosi WWTF is currently at maximum capacity, EOCSD is not allowing any new hookups to its wastewater collection system. Without increased treatment capacity, the District's ability to supporting future growth is limited. The District also indicated that currently it cannot afford to increase its treatment capacity. Another factor limiting East Orosi's sewer capacity is distance from the treatment facility and capacity of conveyance to the plant.

The SCSD provides sanitary sewer collection service to its residents in addition to domestic water service. Wastewater from the SCSD is treated at the Cutler-Orosi WWTF. Sultana's ability to expand its current sewer collection system is limited by the capacity of the Cutler-

Orosi WWTF, including the SCSD's financial limitations of purchasing additional contract capacity at the facility.

London Community Services District Facilities (LCSD)

In addition to domestic water service, the LCSD also provides sanitary sewer collection and treatment services to its residents. The LCSD's wastewater treatment facility is located southeast of the community, at the southeast corner of the Avenue 376 and Road 60 intersection.

Based upon information contained in RWQCB Waste Discharge Requirements for the facility (Order No. 96-172), the LCSD's WWTF treats domestic wastewater with reportedly no industrial contribution. Treatment is provided by two aerated lagoons (Hinde system) and is disposed of by several evaporation/percolation ponds. The current monthly average discharge at the WWTF is about 0.36 MGD, but for some months the average discharge has been about 0.42 MGD. The district has historically had capacity problems. An engineering investigation report in 1993 revealed that the maximum capacity of the facility was limited by effluent disposal capacities of 0.31 MGD in the summer and 0.22 MGD in winter. As a result of the report, two additional disposal ponds were constructed north of the facility and the air diffusion system was rebuilt. At present, the facility consists of two aerated lagoons and seven percolation and evaporation ponds. The LCSD also proposed to reclaim treated wastewater by irrigating approximately 13.1 acres of LCSD-owned peach orchards immediately adjacent to the plant. Approximately 71,000 GPD of treated wastewater is used for irrigation during the summer, and approximately 18,000 GPD is reused for irrigation during the winter.

The LCSD's ability to provide additional sewer infrastructure to support future customers is limited by current prescribed treatment plant capacities outlined in Waste Discharge Order No. 96-172. Until the LCSD complies with the requirements of the order, including the submittal of an engineering report verifying maximum treatment capacities, it cannot support additional connections to the community sewer system.

County Service Area No. 1 Facilities

County Service Area No. 1 (CSA 1) provides domestic water service and sanitary sewer service to residents in the unincorporated areas of Tulare County that are not part of an independent special district. The sewer infrastructure of CSA 1 is divided into zones of benefit for rate structuring and functional purposes. Table 13 lists the communities and zones of benefit within CSA 1, also indicating the current usage (average dry weather flow) and treatment capacity of the individual city or contract capacity in the Cutler-Orosi JPWA. These assessment zones have been established to maintain and build sanitary sewer infrastructure. The facilities in CSA 1 service a population of approximately 3,300 residents.

Table 13. County Service Area #1 Zones of Benefit Sewer Infrastructure

Zone of Benefit	Treatment Facility	Current (GPD)	Treatment Capacity (GPD)	Contracted Capacity (GPD)
El Rancho	City of Lindsay	12,000	N/A	12,000
Delft Colony	Delft Colony	36,000	57,200	N/A
Seville	Cutler-Orosi	34,000	N/A	50,000
Tonyville	City of Lindsay	28,000	N/A	60,000
Tooleville	Tooleville	28,000	35,000	N/A
Traver	Traver	70,000	88,000	N/A
Yettem	Cutler-Orosi	15,000	N/A	42,000

Seville is an unincorporated community of approximately 1,000 persons located southeast of Cutler. The Seville zone of benefit is an island within the Yettem zone of benefit, and is generally bounded by SR 201 to the north, Inyo Avenue to the south, Road 152 to the west, Road 156, and an irrigation canal to the east. The Seville sewer system is a collection system only that transports an average dry weather flow of approximately 34,000 GPD to the Cutler-Orosi WWTF. The Cutler-Orosi JPWA is contracted with Tulare County to treat a maximum flow of approximately 50,000 GPD from the Seville zone of benefit.

The Yettem zone of benefit covers a wide area southeast of Cutler. Through the CSA 1, Yettem contracts with the Cutler-Orosi WWTF capacity. The Yettem zone of benefit is generally bounded by Avenue 400 to the north, Avenue 376 to the south, Loper Ditch to the west, and Road 162/Friant Kern Canal to the east. The Yettem sewer system is a collection system only, which transports an average dry weather flow of approximately 15,000 GPD to the Cutler-Orosi WWTF. The Cutler-Orosi JPWA has a contract with Tulare County to treat a maximum flow of approximately 42,000 GPD from the Yettem zone of benefit.

Caruthers, Del Rey, Easton, Raisin City

These small communities rely on individual septic systems for wastewater disposal.

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