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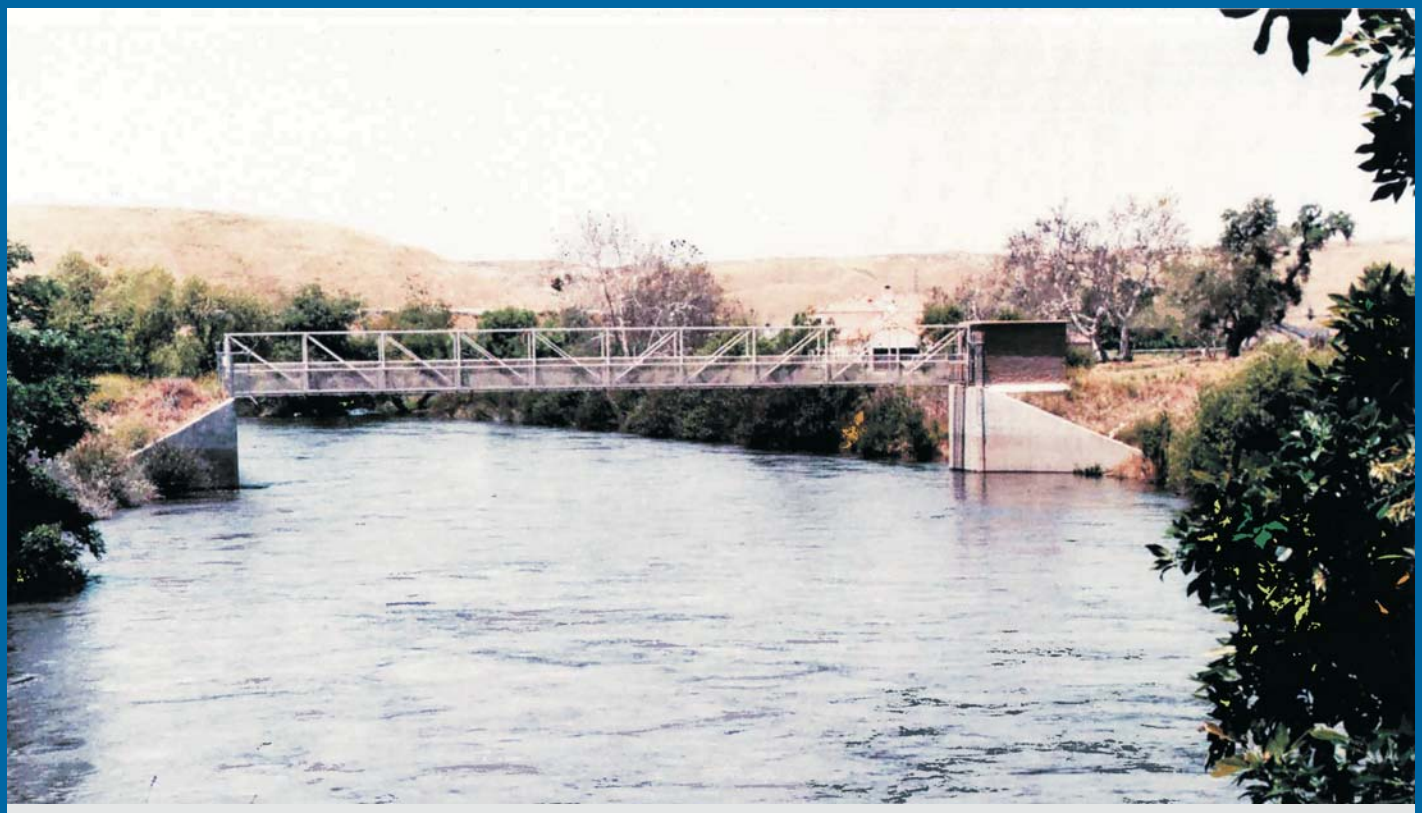
Kern
Delta
Water
District

Kern River Water Allocation Plan

September 2011



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Kern River Water Allocation Plan for Kern Delta Water District

Kern County, California

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1. INTRODUCTION

For more than 130 years, five canal systems have delivered a cost-effective, high quality water supply to support the agricultural economy on District lands south of the Kern River. These systems were first developed as canal companies, each with their own water right and service area, and were later consolidated. Facilities and water rights were subsequently acquired by Kern Delta Water District (KDWD, or District) to provide a public entity that secures and manages a diverse portfolio of water supplies conjunctively for the benefit of water users. As part of a recent court decision, KDWD has been forced to forfeit a portion of its water rights, decreasing its entitlement on the Kern River. This forfeiture coincides with increasing uncertainty on the reliability of imported supplies and declining groundwater levels beneath the District. As such, KDWD intends to use its full entitlement as altered by court decisions, preserving current water rights as affirmed by the courts and increasing overall supply during certain times. These events highlight the need to optimize Kern River water supplies and integrate this water effectively with other supplies for beneficial uses within the District.

KDWD is authorized by its enabling legislation to adopt a plan for water allocation "…in accordance with equitable criteria providing for the economical and efficient distribution and use of water within the district or available for use upon the lands within the district" (California Water Code § 35526). Such a plan may include a determination as to what portion of District water will be made available for surface delivery and what portion will be devoted to recharge of groundwater. Further, the plan may establish limited areas of the District for surface water delivery, the quantity that will be made available to each such service area, and the terms upon which such water service will be made available.

Consistent with such authorization, KDWD has developed this Kern River Water Allocation Plan (Plan) to optimize the use of water available to the District, provide operational flexibility, and maximize the beneficial use of its remaining Kern River water rights. This plan builds on previous plans for system improvements (KDWD, 1980) and water supply (Boyle, 2000; AECOM, 2008) and complements existing plans for use of other water sources including the KDWD's Groundwater Management Plan adopted in 1996 and the State Water Project (SWP) Water Allocation Plan, adopted in 1974 and recently amended in 2009.

1.1 BACKGROUND

Litigation over water rights and a series of court decisions have resulted in revised entitlements of Kern River water for KDWD. Specifically, a 1999 decision by Judge Conn and a 2005 decision by Judge Reed, both of the Tulare County Superior Court, and subsequent decisions of the Fifth District Court of Appeal (collectively referred to in this document as the "court decisions") found that the predecessors-in-interest of KDWD forfeited a portion of their water rights due to nonuse prior to the acquisition of those rights by KDWD. The court decisions established monthly maximum diversions (or caps) that were lower than previous caps for some months in four KDWD canal service areas. The court decisions simultaneously affirmed the remaining KDWD water rights ("Preserved Entitlements").

These recent restrictions reduce KDWD's long-term average Kern River water supply from about 251,775 acre-feet per year (AFY) to about 201,943 AFY, based on average river conditions recorded from 1997 through 2007. Historically, KDWD has not used the full extent of its entitlement due to timing differences between water availability and demand and/or constraints on conveying unused water among canal service areas. Adjusting historical use practices to comply with the new restrictions, it is estimated that KDWD would have diverted an average of 168,895 AFY, about six percent less than actual historical use. By using the full Preserved Entitlements

the District could add approximately 33,048 AFY to its water supply (201,943 AFY – 168,895 AFY as calculated for the 1997 through 2007 period = 33,048). Approximately 70 percent of this amount was not diverted historically. This water is referred to as "release water" in certain documents, indicating that this amount was released to junior water right holders, or allowed to flow past the KDWD diversion points.

To prevent additional forfeiture, and to support existing and future demands and beneficial uses within the District, KDWD intends to use the full amount of Kern River water available to its Preserved Entitlements, including any portion thereof formerly considered to be release water. This Plan provides for the management and allocation of Kern River water, including movement among canal service areas and exchange of SWP water or groundwater with river water to optimize water use and meet demands. The Plan also includes a determination as to what portion of the entitlement may be made available for groundwater recharge. The Plan seeks to achieve the economical and efficient distribution and use of the District's Kern River water rights within the District. The District believes that these goals can be met through modifications of current operations; no new canals or facilities are included in the Plan. Review of the Plan pursuant to the California Environmental Quality Act (CEQA) is being conducted concurrently with the development of the Plan.

1.2 Water Allocation Plan Objectives

The Kern River Water Allocation Plan has five main objectives:

- Meet existing underserved water demand within KDWD's service area
- Maintain sustainable groundwater resources and a sustainable water balance
- Provide equitable distribution of water among the historic utility service areas
- Serve the growing demand for water and emerging needs of customers in KDWD
- Maintain KDWD's water rights assets.

1.3 Study Methods and Time Period

In order to examine potential uses of Kern River water rights that consider the variable nature of the water supply though time, actual hydrologic conditions, as well as actual historical diversions, were used as a model for water availability. This model consists of a series of spreadsheets prepared by AECOM over the last two years that document KDWD historical uses of Kern River water and evaluate how and when additional water entitlements could be used (AECOM, 2008).

A Study Period for the spreadsheet model was selected to reflect average hydrologic conditions in terms of precipitation and river flows. The period needed to be sufficiently long to include wet and dry conditions, allowing evaluation of the range of flow conditions in the river. The focus was on recent time periods when data were judged to be relatively current. Using these criteria, an 11-year period from 1997 through 2007 was chosen for the analysis. During that period, average precipitation was within five percent of the long-term average annual precipitation at Bakersfield. This time period was also representative of average hydrologic conditions for the Kern River as reflected by the Annual River Index (100 percent of average) and the April – June River Index (97 percent of average) as reported in the Kern River Watermaster reports.

2. Kern River Water Rights

2.1 History of KDWD

In the late 1800s the Kern County Land Company formed and operated five canal companies (Buena Vista, Stine, Farmers, Kern Island, and Eastside) to provide Kern River water to developable lands lying south of the Kern River. These canal companies eventually became public utilities with defined service areas and, in the 1960s, were merged into a single entity known as the Kern Island Water Company. The historic public utility service areas are shown on Figure 1.

River flow conditions were highly variable and were insufficient to support the growing agricultural demands alone. Since about the 1920s, groundwater has been used to supplement the highly variable river water supplies, meet irrigation needs outside the utility delivery periods, and provide irrigation water to lands not receiving surface water supplies. Groundwater use increased over time with the continuation of agricultural development, leading to subsequent groundwater overdraft throughout the Kern River Fan by the 1960s (AECOM, 2009).

To provide additional water and mitigate groundwater declines, landowners formed the KDWD in December 1965. KDWD was formed for the express purposes of (1) contracting for imported State Water Project (SWP) water with the Kern County Water Agency (KCWA) and (2) protecting the existing Kern River water rights of the landowners within its boundaries. KDWD's SWP contract included a buildup schedule starting in 1973 and consisting of 10,700 AFY (4,500 AF of firm supply and 6,200 AF of surplus supply). In 1990, the schedule reached the maximum amount of 30,000 AFY, consisting of 25,500 AF of firm supply and 4,500 AF of surplus supply (AECOM, 2004). During the 1970s, KDWD negotiated an exchange of SWP rights for Kern River water rights with the Buena Vista Water Storage District (BVWSD). The Kern Island Water Company was contracted to deliver the SWP exchange water through the existing public utility canals to KDWD customers (AECOM, 2009). In 1994, KDWD's SWP supply was reduced to 25,500 AF of firm water (no surplus water) in accordance with the Monterey Agreement (Boyle, 2000).

In 1976 KDWD acquired the Kern River water rights (and related facilities) of the Kern Island Water Company. Tenneco West, Inc. (successor-in-interest to the Kern County Land Company) sold its Kern River water rights, Isabella storage rights, water transportation and distribution facilities, and other assets to the City of Bakersfield in 1976. Bakersfield, concurrently, sold that portion of said assets that served the Kern Island Water Company to KDWD. In January 1977, KDWD assumed control of these assets and facilities and began delivery of SWP water (via exchanges) and river water to landowners (City of Bakersfield, et. al, 1976).

Currently, KDWD boundaries encompass approximately 129,000 acres, 90,000 of which contain irrigated agriculture (KDWD, 2009). The area includes 89,212 acres within the historical utility service areas and about 35,615 acres in non-service areas (also referred to as "state lands"). Figure 1 shows KDWD boundaries. Major state and federal roads and rights-of-way cover approximately 4,133 acres, leaving about 124,867 acres (typically rounded to 125,000 acres) available for development. These areas are summarized in the following table:

Table 1
In-District Areas
Kern Delta Water District

Land Description	Area (acres)
Service Areas	
Kern Island	40,359
Buena Vista	14,408
Stine	19,817
Farmers	9,789
Eastside	4,839
Service Area Total	89,212
Non-Service Areas	35,615
Rights-of-Way	4,133
Total	128,960

Reference: Boyle, 2000

2.2 KDWD Water Rights

Kern River flow in the San Joaquin Valley has been apportioned among many users over the years by court decisions and agreements. Diversions of river flow occur on a daily basis through a cooperative effort and are summarized in annual Kern River Watermaster reports (Kern River Watermaster, 2008). KDWD water rights were purchased from the City of Bakersfield in 1976, which were rights previously held by certain canal companies as part of the 1888 Miler-Haggin Agreement and adjudicated in the 1900 Shaw Decree (KDWD, 2009).

In accordance with the 1888 Miller-Haggin Agreement, two permanent stations were established for river flow measurement. The First Point of measurement lies upstream of all "First Point" diverters and record of daily discharge is used to allocate water to the various Kern River interests (First Point diverters, Second Point diverters, and Lower River diverters). Since construction of Isabella Reservoir in 1953, water allocation is based on a calculated number to account for diversion and storage in the reservoir (Kern County website, 2010; Boyle, September 1975). The Second Point of measurement is approximately 20 miles downstream, just upstream of the BVWSD diversion. Second Point flow measurements are used to check upgradient water use and entitlements with diversion rights downgradient of the Second Point (Boyle, September 1975).

The first appropriation of Kern River water occurred in 1869 with the 300 cubic feet per second (cfs) claimed by the Kern Island Irrigating Canal Company. Other Kern River diversion rights were claimed by the Buena Vista, Stine and Farmers canal companies. In the 1890s the Eastside Canal Company contracted with the Kern Island Irrigating Canal Company for a portion of its Kern River rights. By 1920, these canal companies were considered public utilities under the jurisdiction of the California Railroad Commission and, later, its successor, the California Public Utilities Commission (PUC). In the 1930s the Eastside Canal Company right was defined as 83/300th of the Kern Island Irrigating Canal Company diversion right between March 15 and August 16 (AECOM, January 2009). KDWD water rights are summarized in the table below.

Table 2
Water Rights
Kern Delta Water District

Service Area	Right (cfs)	River Stage (cfs)	Diversion Priority	Appropriation Date
Kern Island	300	0-300	1	12/1/1869
	56	3,106-3,162	26	
Buena Vista	80	330-410	4	7/19/1870
	90	2,416-2,526	22	
Stine	150	550-700	7	12/12/1872
Farmers	150	730-880	9	4/28/1873
Eastside	83/300th of Kern Island		-	6/30/1921

Ref: Kern Delta Water District website accessed November 9, 2010

These rights are referred to as Kern Island 1st, Kern Island 2nd, Buena Vista 1st, Buena Vista 2nd, Stine and Farmers. Kern River water is generally available to the Kern Island right since its allocation is the first 300 cfs of flow. River water available to the other three rights (Buena Vista, Stine and Farmers) can be quite variable from year to year. Historically, water diverted under each water right has been used exclusively within the historic utility service area served by such right.

The water rights listed in Table 2 are considered "paper entitlements," which means that they can be reduced based on the daily flow in the river (river stage), and also are referred to as "theoretical entitlements" (Vartabedian Appeal Opinion, 2007). These theoretical entitlements are reported in the Kern River Watermaster reports (Kern River Watermaster, 2008). Kern River water rights are allocated on a daily basis to First Point, Second Point, and Lower River users. KDWD, City of Bakersfield, and North Kern Water Storage District (NKWSD) are successors-in-interest to all First Point diverters. The Buena Vista Water Storage District (BVWSD) is successor-in-interest to all Second Point diverters. The KCWA is successor-in-interest to all Lower River diverters. Water allocated to a First Point diverter, but not used, can be used by another First Point diverter (referred to as *release water*). Allocated water not used by any First Point diverter can be used by the Second Point diverter (BVWSD) and allocated water not used by the Second Point diverter can be used by the Lower River diverter (KCWA) (BVWSD, 2007).

2.3 Recent Court Decisions

Litigation among First Point diverters started in 1995 in response, in part, to concerns that KDWD would improve facilities and water management and would use more water than used in the past by its predecessors. The case involved the determination of how Kern River water should be allocated among the First Point diverters (NKWSD v. KDWD, Tulare County Supreme Court Case No. 96-172919). A March 1999 ruling by Judge Conn found that KDWD did not use all of its entitled water over a 45-year period and the entitlement was reduced to that amount used on average during such 45-year period. On appeal, it was determined that this approach to determining forfeiture was improper. The appellate court held that the determination of forfeiture (and consequent determination of

preserved entitlements) must focus on a single, relevant five-year period (rather than a 45-year period) and with reference to maximum continuous use rather than averages (Vartabedian Appeal Opinion, 2007). The case was remanded for retrial in accordance with these principles. Following retrial, in February 2005, Judge Reed concluded that the relevant five-year period for examination of challenged rights was from 1972 through 1976 and that, during such five-year period, there was partial forfeiture of certain rights. The final determination, after appeal, is that forfeiture occurred in January, October, November, and December for the Kern Island 1st right and that junior rights suffered some forfeiture in January, August, September, October November and December (Vartabedian Appeal Opinion, 2007). KDWD water rights have always had maximum monthly volume caps and the judgments resulted in cap reductions in certain months as summarized below.

Table 3
Entitlement Caps Resulting from Court Decisions
Kern Delta Water District

Service Areas	January (acre-feet)	August (acre-feet)	September (acre-feet)	October (acre-feet)	November (acre-feet)	December (acre-feet)
Kern Island	8,493	-	-	6,989	3,375	2,050
Buena Vista	347	-	-	-	236	191
Stine	-	-	583	1,380	22	12
Farmers	-	610	268	-	-	207

Ref: KDWD, October 19, 2009

3. In-District Water Supply and Demand

3.1 Water Supply

KDWD balances three primary sources of water – Kern River water, groundwater, and imported water – to meet customer needs within the District. This Water Allocation Plan focuses on the delivery of Kern River water, but also considers the use of groundwater and imported water for conjunctive management of water supplies. A brief description of each water source is provided below.

Kern River Water

Since the 1870s, the agricultural community within KDWD has relied on Kern River water diversions as the main source of irrigation supply. In accordance with the then-current water rights, KDWD has provided an average of about 180,000 AFY for beneficial uses across the District. Supply from the river is highly variable due to flow conditions and has ranged from 130,982 AFY (2007) to 220,317 AFY (2005) since 1991.

To support a water supply study for the District, historical deliveries to KDWD customers were tabulated in a series of draft, linked tables for the 1991 through 2007 time period (AECOM, 2008). Todd Engineers selected a Study Period of 1997 through 2007 and made minor adjustments to the AECOM tables based on verification of data from Watermaster reports and internal spreadsheet formulas. A summary of the average annual entitlements for the Study Period is shown on Table 4; monthly tabulations are presented in Appendix A.

Due to the recent monthly cap reductions in some canal service areas, water use will be different than historic use. Water use between 1997 and 2007 with the cap restrictions was calculated and summarized in the middle part of

Table 4 (monthly tabulations in Appendix A). The right-hand side of Table 4 shows the amounts of water that were lost due to the reductions in monthly caps.

Table 4
Entitlements and Use, 1997-2007
Kern Delta Water District

Canal	Average Annual Entitlements and Use, 1997-2007 (acre-feet per year)							
	Actual Historical Entitlements and Use			Adjusted by Recent Court Decisions			Lost due to Recent Court Decisions	
	Average Entitlement	Average Use	Difference between Entitlement and Use	Adjusted Average Entitlement	Adjusted Average Use[1]	Difference between Adjusted Entitlement and Use	Lost Average Entitlement	Lost Average Use
Kern Island	197,513	136,668	60,845	156,223	131,962	24,261	41,290	4,706
Buena Vista	20,102	17,463	2,639	13,920	14,338	-418	6,182	3,125
Stine	18,804	13,849	4,955	17,253	12,344	4,909	1,551	1,505
Farmers	15,356	10,883	4,473	14,547	10,251	4,296	809	632
Total	251,775	178,863	72,912	201,943	168,895	33,048	49,832	9,968

1. Adjusted average use was more than adjusted entitlement for Buena Vista since Buena Vista diverted released Kern Island water

Ref: Summary of monthly AECOM tables (1991-2007) with Todd Engineers edits for 1997-2007

At times, water diversions can be greater than theoretical entitlements. Water available to junior right holders (Buena Vista, Stine and Farmers) can be greater if senior right holders do not divert all water available to them. Similarly, since water released from Lake Isabella reservoir storage does not count toward a diverter's river allocation (Vartabedian Appeal Opinion, 2007), all right holders may divert more than their daily entitlement by supplementing the same with storage releases.

GROUNDWATER

KDWD is located on the south side of the Kern River Alluvial Fan, which consists of a thick sequence of unconsolidated sediments that comprise the aquifers beneath the District. These aquifers are generally more coarse-grained in the northern portion of the District (closer to the Kern River) and transition to more fine-grained sediments in the south. In the southern-most portion of the District, surface soils and near-surface deposits consist of clay-rich sediments associated with the former Kern Lake bed that has been drained and used for agriculture since the late 1800s.

Groundwater is unconfined throughout most of the District with a water table occurring less than 100 feet to more than 200 feet below ground surface (KDWD, 2002). However, the low permeability sediments in the south impede surface water infiltration, and a perched or shallow groundwater table has been documented in that area (Boyle, 2001; KCWA, 2002).

Since 1989, KDWD has conducted a groundwater level monitoring program involving approximately 150 wells both within and outside District boundaries. The program includes semi-annual measurements, taken in Spring and Fall

when water levels were at seasonal highs and lows, respectively. Semi-annual measurements are supplemented with monthly measurements in about 30 key wells. The wells are either inactive agricultural wells or active wells that have been made available to the District for the monitoring program. For active wells, water level measurements are not taken while the pump is running and measurements are compared with inactive well data. Although construction details are limited, the levels appear to provide a reasonable representation of groundwater conditions throughout the District. The wells monitored in 2009 are shown on Figure 2.

Groundwater conditions for Fall 2009 are illustrated by the contours on Figure 2. As indicated by the contour map, groundwater elevations range from about 200 feet above mean sea level (msl) in the north-central portion of the District to below 100 feet msl in the south. In accordance with regional flow patterns, groundwater flows to the south-southwest beneath the District but is impacted locally by pumping wells and enhanced recharge beneath spreading basins and canals. Lower groundwater levels are observed beneath the eastern and western portions of the District, where surface water is less available and groundwater is pumped for irrigation. A groundwater high occurs generally beneath the Kern Island Service Area, likely due to a more reliable surface water supply and less reliance on groundwater. The central groundwater high and pumping depressions in the west and east are also observed on many of the historical water level contour maps (e.g., 1986) prepared by the California Department of Water Resources (DWR) (1986).

Landowners in both utility and non-utility areas within KDWD augment surface water supplies with groundwater and hundreds of wells have been drilled within the District boundary (KDWD, 2008). Wells within the District are used primarily for irrigation where surface water deliveries are limited. Groundwater is also used for non-irrigation agriculture, including dairies, and for municipal and industrial (M&I) uses. In addition, KDWD pumps a relatively small amount of groundwater from District-owned wells to supplement surface water deliveries. Total pumping amounts within the District are unknown, but have been estimated to exceed 176,000 AFY, especially in service areas with more limited Kern River diversion rights, such as Stine and Farmers service areas and the non-utility areas in the east (Boyle, 2001).

In 2001, Boyle constructed a groundwater model covering the KDWD service areas in order to evaluate a proposed groundwater banking project with Metropolitan Water District (Metropolitan) (Boyle, 2001). The groundwater flow model was calibrated to match water levels during the time period 1986 to 2000. The results of the analysis showed that water levels had declined over the study period, indicating a local imbalance of groundwater supply and demand. Based on groundwater modeling, that imbalance was estimated to be approximately 14,000 AFY (Boyle, 2001). This imbalance amount is consistent with other water balance analyses conducted by a manual accounting of inflows and outflows (Boyle, 2000).

Since that time, water levels have continued to decline. To examine water level trends and fluctuations beneath KDWD, Todd Engineers compiled depth to water measurements recorded by the District from 2001 through 2010. Approximately 70 hydrographs were constructed to examine spatial and temporal water level changes. This analysis indicated variable water level conditions across the District influenced by several factors including the amount of available data, proximity to a canal or pumping wells, and aquifer characteristics. Nonetheless, most of the hydrographs demonstrated an overall decline in water levels since 2001. Representative hydrographs illustrating the changes in groundwater elevations across the District are shown on Figure 3; locations of the wells used to construct the five hydrographs are highlighted on Figure 2.

Most of the data on the representative hydrographs (Figure 3) are seasonal measurements (Spring and Fall), supplemented by some monthly measurements in three wells for 2009 and 2010. In these three wells (the Buena Vista, Stine, and Non-utility wells), the seasonal influences of irrigation and pumping can be readily observed from

the fluctuations in the hydrographs over the last two years. Even though seasonal fluctuations are significant (up to 50 feet), an overall declining trend since 2001 can also be observed (especially when comparing Spring measurements). Water level declines are also evident on the Kern Island and Eastside hydrographs.

In general, the hydrographs on Figure 3 document an overall decline in water levels of between 25 feet and 55 feet across the District from Spring 2001 to Spring 2010 (a time period with precipitation at 89 percent of the long term average). Most of this decline has occurred between 2007 and 2009, when annual precipitation was significantly lower than the long-term average. The largest declines appear to occur in the Buena Vista and Stine service areas and the non-utility areas, likely due to increased groundwater pumping because of more limited surface water supply. Review of groundwater model results (1986-2000) and water level data since the model was completed indicate that water levels have exhibited an overall decline since 1986. A more integrated approach to use of surface water diversions as envisioned by this Water Allocation Plan is expected to mitigate these declining levels.

STATE WATER PROJECT WATER

In 1972, KDWD contracted with KCWA to receive 30,000 AFY of State Water Project (SWP) water (KDWD, 1974). The contract provided a schedule to build up to the total contracted amount by 1990. The contract included 25,500 AFY of firm supply plus 4,500 AFY of unregulated surplus water to be delivered during four winter months on an as-available basis. In 1994, the surplus water was eliminated as part of the Monterey Agreement, revising the District's SWP maximum amount to 25,500 AFY. The SWP water supply is used to balance the area's groundwater overdraft and provide supplemental surface water deliveries to the various portions of the District.

In the absence of a readily-available means to convey SWP water into the District, KDWD executed two exchange agreements with Buena Vista Water Storage District (BVWSD) to allow BVWSD to access KDWD's SWP allotment for an equal amount of BVWSD rights on the Kern River. This arrangement allowed for KDWD to divert its SWP allotment from the Kern River using existing facilities while BVWSD accessed the SWP water from the California Aqueduct directly. An additional agreement with Kern Island Water Company (then-owner of the service area canals) allowed for the conveyance of the SWP exchange water into the District via Kern Island's facilities (KDWD, 1974).

SWP water was allocated among the service areas in an SWP Allocation Plan, developed in 1974 and amended in 1981 and 2009 (KDWD, 1974, 1981, and 2009). Based on underserved irrigation demand from surface water, declining groundwater levels, existing facilities, and other factors, a firm supply of SWP exchange water was allocated to two zones of benefit: 1. Eastside Service Area and adjacent non-utility areas accessed by the Eastside Canal or Kern Island Central Canal and 2. Stine/Farmers service areas accessed by the Stine Canal. For any makeup or unused water, SWP exchange water would be made available for delivery to other lands accessed by the Stine Canal (1st priority) and the Farmers Canal (2nd priority). Other District lands requesting SWP exchange water would be served on a 3rd priority basis. Any remaining water would be percolated through the system of unlined canals with the Eastside Canal receiving the 4th priority, the Stine Canal receiving the 5th priority, and percolation elsewhere in the District as a final priority (KDWD, 1974).

Since the early 1990s, the availability of SWP water has declined. Recent restrictions by the courts have resulted in greater uncertainty for the future (AECOM, 2009). For the period 1997-2007, the District diverted an average of 17,761 AFY of SWP exchange water, less than 70 percent of the contract amount. Since 2007, court restrictions relating to movement of water through the Sacramento-San Joaquin Delta have greatly increased the uncertainty associated with long-term SWP supply. The District estimates that only 50 percent of its contract amount, on average, will be available. SWP water diverted to date has been insufficient to fully accomplish District goals of

preventing long-term declines in groundwater levels and increasing reliability of water supply to underserved areas of the District.

OTHER SOURCES

KDWD has the ability to secure high flow water from the Central Valley Project (CVP), when available. The District notes that the availability of this supply is limited and is typically only secured in about two out of ten years. Although historically CVP water has not contributed significantly to the District's supply, it will continue to be an occasional source of supplemental water, to be used, primarily, for groundwater recharge.

Certain lands within the District also receive treated effluent (recycled water) from the City of Bakersfield Wastewater Treatment Plants (WWTP) No. 2 and No. 3 (KDWD, 1996) and Lamont PUD WWTP. These lands, referred to as sewer farm lands, use recycled water for irrigation. In 2000, these lands covered approximately 6,000 acres and were estimated to use approximately 18,000 AFY of recycled water for irrigation (Boyle, 2000).

KDWD is a participant in the Pioneer Groundwater Recharge and Recovery Project (Pioneer Project), operated by KCWA. That project consists of more than 1,700 acres of spreading basins, the closest of which are located about one mile northwest of KDWD on the Kern River. The project owns or has rights to access more than 100 recovery wells under certain conditions. KDWD can recover banked water under the rules governing project operation (KCWA, 1996, Appendix C). Since 1997, the District has banked approximately 23,711 AF of water in the Pioneer Project.

3.2 FACILITIES

CANALS AND RESERVOIR STORAGE

KDWD owns and operates five canal systems, each serving historic public utility service areas with Kern River water rights (see Table 2 and Figure 1) (Boyle, 2000). Water accruing to a canal's Kern River water rights is diverted for use in the canal's historic public utility service area (Boyle, November 1975). From east to west the service areas are: Eastside, Kern Island, Farmers, Stine and Buena Vista. The gravity feed system consists of five main canals and relatively few laterals. There are about 150 miles of canals and pipelines with no drains (Nicholas, date unknown).

The canals are linked to regional facilities via the Kern River Canal and the Carrier Canal allowing them to deliver Kern River water, SWP water, and water from several local sources. Kern River Canal and the Carrier Canal conveyance capacities are shared with other users (KDWD, 2002). KDWD can divert Kern River water at three locations: the Rocky Point Weir, Stine-Farmers Weir, and the Kern River Canal Weir and Headgate. The Rocky Point Weir is the main diversion point and is 40 miles downstream of Lake Isabella. The Stine-Farmers and Kern River Canal weirs are about four and eight miles downstream, respectively, of the Rocky Point Weir and are used only in emergencies or when the Carrier Canal is under maintenance. KDWD has 49 percent ownership of the Carrier Canal which is half concrete lined and half unlined and delivers water to the Eastside, Kern Island and Stine Canals (and the Farmers Canal via the Stine and Kern Island Canals). The River Canal is lined, connected to the Kern River Canal and Headgate, and delivers water to the Buena Vista Canal.

The five canals have smaller laterals and ditches that interconnect some of the canal reaches. The Eastside Canal begins at the Carrier Canal, is unlined, 20 miles long, and runs along the eastern KDWD boundary. The last mile of the canal is a pipeline. The Kern Island Canal is the largest canal; it also begins at the Carrier Canal. The canal includes earthen canal, concrete lined canal and pipeline for the first four miles through urban areas. It then splits into the Central Branch Canal and Main Kern Island Canal. The Central Branch Canal is mainly unlined for 14 miles where it ends at the Rim Ditch. The unlined Main Kern Island Canal also ends at the Rim Ditch. The Stine Canal runs

for 12 miles through urban and agricultural areas and ends in a landowner reservoir. Most of it is unlined with the exception of short pipeline sections in the urban areas. Just north of the KDWD boundary, the Farmers Canal branches off the Stine Canal. It is unlined and 11 miles long. The Buena Vista Canal runs from the River Canal near the KDWD western boundary, is unlined, and 13 miles long (Boyle, November 1975).

An additional canal system is planned for construction in conjunction with the KDWD Water Banking and In-Lieu Water Supply Project (KDWD, 2002). In a 2002 Environmental Impact Report (EIR), a new north-south canal with connecting laterals in the eastern portion of the District was evaluated. The proposed canal is between the Eastside Canal and the Central Branch of the Kern Island Canal as shown on Figure 1. In addition to supporting a banking project with the Metropolitan Water District, the new canal can also be used by the District to supply water to lands adjacent to the canal that were previously not served by the District.

Canals are unlined, allowing some water to percolate through the bottom of the canal to groundwater. Seepage and percolation losses in the canals have been approximately 30 percent. Between 1997 and 2007, average annual deliveries to KDWD were 70 percent of diversions (123,213 AFY/175,819 AFY). Canal percolation is an important source of groundwater recharge and is considered part of the District's supply.

KDWD also has access to storage space in Isabella Reservoir. KDWD can store SWP exchange water using BVWSD's storage space with a carryover limit of 6,000 AFY that must be used prior to March 15 of the following year (Boyle, 2000). In addition, KDWD can store Kern River water accruing to its Kern River water rights. This storage is based on a rule curve that sets individual month-by-month storage limits. Maximum storage and carryover limits are shown in Table 5.

Table 5
Isabella Reservoir Storage Limits
Kern Delta Water District

Service Areas	Maximum Storage (acre-feet)	Carryover (acre-feet)
Kern Island	18,000	2,500
Buena Vista	11,000	1,500
Stine	9,000	1,500
Farmers	6,000	1,500
Total	44,000	7,000

Ref: Boyle, August 2000

RECHARGE BASINS

In order to regulate the fluctuation in water supplies to more reliably meet local demand, KDWD embarked on a banking program with Metropolitan Water District of Southern California (Metropolitan). This project involved the construction of District facilities including recharge basins and groundwater extraction wells. At project buildout there will be about 814 acres of recharge basins across the District to facilitate groundwater recharge (KDWD, 2002). To date, approximately 90 percent of the recharge basin land has been purchased (Figure 4) (KDWD, 2011) Basins have been constructed at six locations in Kern Island, Buena Vista, Stine, and Farmers service areas where significant groundwater declines have been recorded. Infiltration rates vary from basin to basin, but average about 0.35 feet per day (ft/day) (KDWD, 2002). Over the 814 acres of basins, this is equivalent to a monthly recharge

capacity of about 8,700 AF/month. Additional recharge capacity also exists along the canals used to convey water through the District. An examination of canal seepage losses during winter months (when recharge water is available and irrigation demand is relatively low) indicates that more than 4,000 AF/month could be recharged along the conveyance systems alone. The recharge capacity along the canals decreases when canals are full during the irrigation season.

Although these facilities were constructed to support the KDWD banking arrangement with Metropolitan, the District also operates these facilities for groundwater replenishment and storage for local benefits.

WELLS

As part of the banking project with Metropolitan, the District has constructed or purchased 18 wells to recover banked groundwater. About one-half of these wells were installed adjacent to two of the larger recharge basins with the remaining wells clustered in a wellfield in the northern portion of the District. KDWD can use these wells to recover banked water for Metropolitan or to pump groundwater for District use. Recovery well locations are included on Figure 4. A total of 32 wells are planned at project buildout (KDWD, 2002).

3.3 WATER DEMAND

Water demands within the District can be categorized as agricultural (including irrigation and non-irrigation) or municipal and industrial (M&I). In addition, declining water levels suggest the need for groundwater replenishment. As the responsible agency for groundwater management, KDWD has to address the sustainability of the groundwater basin, which can also be viewed as a demand within the District. These water demands are summarized below.

AGRICULTURE

Agricultural irrigation represents the largest demand in the District, both historically and currently. Although urbanization continues to increase in the area, Kern River diversions alone will likely remain insufficient for meeting future irrigation demands. These demands are currently met with groundwater and imported water that augment local surface water supplies. In view of the recent water rights restrictions associated with the court decisions, as well as the decline in reliability of the District's SWP supply, the ability to serve Kern River water in a more efficient manner has become critical for meeting future irrigation demand.

To estimate the ongoing irrigation demand, KDWD performs crop surveys within the District, typically during both the Spring and Summer growing seasons. The most recent published analysis of irrigation demand using the District crop surveys was conducted by Boyle Engineering for the KDWD 2000 Supplemental Water Supply Plan (Boyle, 2000). In that plan, a detailed assessment was conducted of the major crops, evapotranspiration use, and irrigation efficiency.

The 2000 Plan documented the highly variable irrigation efficiencies and applied water requirements throughout the District depending, in part, on local soil conditions. Sandy soils in the north have lower holding capacities and require higher irrigation rates than are needed for the clay-rich soils in the south. However, average applied water requirements by crop on a District-wide basis closely approximated the California Department of Water Resources (DWR) average applied water demand for most of the corresponding crops in Kern County (DWR, 2000).

Recent crop maps for the District were also available from Kern County in a Graphical Informational System (GIS) format that allows for analysis of permitted crop acreages. These acreages may be less accurate than those

tabulated by KDWD, because they often list multiple crops assigned to the same parcel when each crop is actually planted on only a portion of the parcel (referred to as multiple plantings by the County). Nonetheless, the totals appear generally consistent with other recent crop surveys. Moreover, they provide a systematic method of acreage analysis and applied water demand. The 2009 County crop map showing the primary crops in KDWD is provided on Figure 5. The map has been simplified with the combination of similar crop types and/or similar water demand factors. Categories of crops with a corresponding average applied water demand factor and estimated irrigation demand are summarized on the following table.

Table 6
Estimated 2009 Irrigation Demand
Kern Delta Water District

KDWD Crops in 2009 [1]	Approximate Acreage[1] (acres)	Applied Water Demand[2] (AF/acre)	Estimated Irrigation Demand (AFY)
Alfalfa	29,931	5.07	151,750
Grains/Field (wheat, oats, sorghum)	26,204	2.47	64,724
Corn	11,053	3.28	36,254
Cotton	11,056	3.28	36,264
Vines (table, raisin, and wine grapes)	5,009	2.76	13,825
Tomatoes (process)	3,739	3.19	11,927
Almonds/pistachios	1,758	4.40	7,735
Onions and garlic	1,392	3.84	5,345
Misc. Vegetable/other	9,414	2.18	20,523
TOTAL	99,556	Average 3.49	348,347

[1] 2009 Kern County Crop Map
[2] DWR, 2000

The applied water demand factors provided on the table incorporate average efficiencies for the County and may not be appropriate on a parcel-by-parcel basis within the District. However, application of these average factors results in similar irrigation demands as those previously estimated (Boyle, 2001), and are judged sufficient for planning purposes.

As shown on the table, the total irrigation demand for 2009 in KDWD was approximately 350,000 AFY. Alfalfa, grains and field crops (mainly wheat, oats, and sorghum), corn, and cotton account for about 79 percent of the total irrigated acreage and about 83 percent of the estimated irrigation demand. Compared to a KDWD crop survey conducted in 1996, the most significant changes in crop patterns include an increase of about 67 percent in planted acres for alfalfa and a decrease of approximately 30 percent in acres of cotton. Although this 2009 analysis accounts for some of the multiple plantings on the same parcel, it does not include a full accounting of double-cropping. As such, the actual estimated irrigation demand is expected to be higher than shown above.

Typically, landowners in the District have used fallowing to manage limited water supplies in dry years (Boyle, 2000). Fallowed land is agricultural land taken in and out of production for short periods of time as part of on-going agricultural operations. Although there are several reasons that land may be fallowed at any given time, irrigation water availability is part of the decision. Historically, the amount of fallowed land has been estimated at

about 18 to 20 percent of the total agricultural lands in the District (KDWD, 2002). In 2008, approximately 22,267 acres of District land were fallowed (AECOM, 2008).

URBAN

Municipal and industrial (M&I) water demand is expected to increase with increasing urbanization in the District. The amount of urbanization within KDWD boundaries has increased significantly over the decades since the Kern River water rights were acquired by the District in 1976. At the request of KDWD, AECOM conducted a comparative survey of urban lands for 1975 and 2010. That survey showed that urban lands within the KDWD boundary have increased from less than one percent (about 949 acres) in 1975 to more than 13 percent (16,880 acres) currently (AECOM, 2010).

Urbanized lands are mostly located within the Bakersfield city limits or the City's sphere of influence, which overlies a portion of KDWD (Figure 6). A small portion of the urban lands (less than one percent) also lie within the Greenfield County Water District (CWD) in the Kern Island Service Area and Lamont Public Utilities District (PUD) in the Eastside Service Area.

Most of the M&I water is pumped from the groundwater basin beneath KDWD and served to about 66 percent of the urban lands in the District (about 11,082 acres out of 16,880 acres). In addition, Greenfield CWD and Lamont PUD also rely on underlying groundwater for their M&I water. Greenfield CWD purchases water from KDWD to recharge groundwater to ensure reliability of its supply. As such, KDWD provides groundwater management for much of the M&I water supply and serves as an M&I wholesaler for groundwater replenishment.

The City provides M&I water to about 28 percent of the urbanized area (4,775 acres). In an agreement with the City, KDWD has an obligation to serve water to those lands that have received KDWD water deliveries in the past (prior to urbanization) including a portion of the 4,775 acres if needed. This responsibility is linked to the average amount of water that KDWD has delivered historically to a certain area.

Based on this agreement, urbanized lands historically served by the District but currently served by the City represent a potential un-met demand for KDWD. The urbanized lands within the Greenfield CWD and Lamont PUD also represent a potential demand for the District for either wholesale water delivery or the sale of water for groundwater recharge. To estimate KDWD M&I demand, an average delivery rate based on historical rates provided by the District was applied to the urbanized lands within the District that are currently being served by others as summarized in Table 7. Per the agreement with the City, most or all of these water demands may be supplied by KDWD in addition to the 11,082 acres for which M&I water is supplied from the District's underlying groundwater basin. Also included on Table 7 is an historical delivery estimate (average deliveries from 1997 – 2007 in AF/acre), provided by the District in order to estimate the potential M&I demand associated with these lands.

Table 7
Urbanized Lands Historically Served by KDWD[1]

Urbanized Lands	Net Acres	Estimated Historical Delivery Rate (AF/acre)	Potential KDWD M&I Demand (AFY)
Buena Vista	706	0.9	636
Stine	1,095	0.6	657
Farmers	554	1.3	720
Kern Island	807	2.7	2,179
Greenfield CWD	595	2.5	1,488
Lamont PUD	273	2.2	601
TOTAL	4,030	-	6,281

[1] Includes the urbanized lands currently served by the City of Bakersfield, Greenfield CWD, and Lamont PUD.
Reference: AECOM, 2010 and District estimate of net acres.

GROUNDWATER REPLENISHMENT

As discussed previously, water levels have exhibited an overall long-term decline beneath the District. A banking agreement with Metropolitan has allowed for the construction of spreading basins throughout the District, but these banking operations have not fully mitigated the overall decline in water levels to date. These declines result in increased lift costs for well owners and may result in water levels falling below shallow well pumps. The agreement limits the amount Metropolitan can recharge or recover in any given year to 50,000 AFY (other restrictions also apply) and allows the District to use the facilities for local groundwater replenishment. Providing additional surface water deliveries for in-lieu pumping as well as increasing recharge at the existing spreading basins will support the District's goal of bringing the local groundwater resources into balance.

When excess supplies are available in any given year, KDWD also has the opportunity to bank water in the Pioneer Project operated by KCWA. This project, located northwest of KDWD, consists of approximately 1,700 acres of recharge basins with up to about 30,000 AF/month of recharge capacity (KCWA, 1996). As a project member, KDWD can use up to 50 percent of the capacity of the Pioneer Project for groundwater banking (and subsequent recovery) and up to 100 percent for overdraft correction (no recovery). Groundwater banking allows for modulation of the irregular surface water flows for a more reliable water supply.

4. PLAN COMPONENTS AND SEQUENCING

This Draft Water Allocation Plan allocates Kern River water accruing to KDWD's Preserved Entitlements through a series of prioritized management actions. The Plan focuses on the delivery of Kern River water, but also considers the use of groundwater and imported water for conjunctive management of water supplies. Kern River entitlements were calculated to average about 201,943 AFY based on average river conditions between 1997 and 2007 (Table 4 and Appendix A). Assuming the same hydrology and the same use patterns, but recognizing the new restrictions imposed by the court decisions, KDWD would have used an average of 168,895 AFY during this time frame, i.e., KDWD would have released an average of 33,048 AFY. The Plan demonstrates beneficial uses for the full amount of Preserved Entitlements, including the 33,048 AFY of potential release water.

To evaluate the impact of management actions that allocate water diversions and to demonstrate that priorities in the Plan are feasible, a detailed monthly assessment of management actions has been conducted based on actual hydrologic conditions from 1997 through 2007. Linked data tables prepared by AECOM (2008) and modified by Todd Engineers are used for this assessment and are presented in Appendix B. Management Actions for Kern River water allocation are summarized in the table below and discussed in the following sections. Corresponding data tables in Appendices A and B are noted in the last column of Table 8 for reference.

Table 8
Kern Delta Water District
Allocation of Kern River Water

Priority	Management Action	Average[1] (acre-feet/year)	Basis/Comments
1	Deliver Water for Irrigation within Service Areas According to Service Area Water Rights	168,895	Utilization with monthly court decisions caps (Table A-1)
2	Deliver Available Water for Irrigation within District	10,488	Replace Kern Island and Eastside SWP water and make up Buena Vista losses due to caps (Tables B-1 and B-2)
3	Meet In-District M&I Demands	6,281	Maximum of 1,456 AF/month (Table B-3)
4	Perform In-District Groundwater Recharge	15,281	12,700 AF/month capacity Oct-Apr and 8,700 AF/month May-Sep (Table B-4)
5	Store Water in Pioneer Project	226	750 AF/month capacity (Table B-5)
6	Other Uses (including meeting additional surface demands, groundwater recharge, and transfers to out-of-district agencies)	772	Water available only in wet years (Table B-6)
Average Annual Adjusted Entitlement		**201,943**	**Entitlements with Monthly Caps (Table A-1)**

1. Averages based on 1997-2007 time period; amounts vary significantly on both a monthly and annual basis.

Management actions in Table 8 are described in the following sections.

4.1 Irrigation Deliveries Within Each Service Area

KDWD's first priority management action is to continue to supply river water to the five historical public utility service areas, consistent with historical practice, and to meet all demands within each service area within its specific Preserved Entitlement (Table A-1, bottom, Appendix A). Under this action, Kern Island and Eastside service area diversions would average 156,223 AFY, an annual average of 17,253 AFY would be allocated to the Stine

Service Area, 14,547 AFY would be for the Farmers Service Area, and 13,920 AFY would be allocated to the Buena Vista Service Area as listed on data tables in Appendix A (base entitlements on Table A-1).

Data tables in Appendix A provide both actual historical conditions of entitlements and water utilization (tables on the top of the pages) as well as historical conditions restricted by the recent court decisions (tables on the bottom of the pages). For this management action, the use numbers represent conditions under the new restrictions – these can be found on the bottom set of tables. Table A-1 is an annual summary and Tables A-2 through A-5 are monthly summaries for each service area. The tables include volumes of base entitlements, entitlement use, and diversions and deliveries for each service area. "Base" refers to the District's river entitlements based on average river conditions between 1997 and 2007. Entitlement use (designated as '+ or –' in the tables) represents the amount of water rights the District is taking while the diversion (Div) column could include water transferred in or out of storage, water to Bakersfield, Carrier Canal losses, and others. Percolation losses reduce the actual delivery amounts (Del columns). Actual historical data in Appendix A tables were derived from the Watermaster reports (e.g., Watermaster, 2008) and similar formats are retained for quick reference.

4.2 Irrigation Deliveries within the District

The second priority management action for river water allocation is to meet irrigation demands within the District. Historical practice has been to deliver water to each historic public utility service area commensurate with its corresponding water right. Under this Plan, the District will move available surface water within the District, as feasible with existing facilities, to provide water to underserved areas within the District. Water not used to fulfill Priority 1 would be used to fulfill unmet irrigation demands in the District. Several options for allocating water under this priority were examined by AECOM with a series of linked tables provided in Appendix B. Two specific options discussed below are summarized on Tables B-1 and B-2.

One option for Priority 2 river water could involve delivery to eastern areas, thereby freeing up some SWP water for additional use in this area or elsewhere in the District. Eastside and Kern Island used an average of 11,131 AFY of SWP water between 1997 and 2007. As indicated from the AECOM analysis, about 9,894 AFY of SWP water could be replaced with Kern River water, using available water on a monthly basis (Table B-1). As SWP water has become less reliable and more costly in recent years, this priority could provide a more stable and affordable water supply for the underserved eastern areas.

Priority 2 may also include delivery of water to previously-unserved lands adjacent to a new canal planned for construction between the Eastside and Central Branch canals as part of the Water Banking and In-Lieu Water Supply Project (Figure 1). Water delivery via this canal is not quantified in the tables but it is anticipated to occur in wet months when excess river water is available and/or when additional SWP water is available. This water would go to lands previously not served by the District and, consequently, would replace pumpage of groundwater.

An additional option for Priority 2 water is the provision of additional water to the Buena Vista Service Area. This action would replace some of the water for which demand is known to exist but which demand cannot be met due to more restrictive monthly caps (Table 4). As a result of the recent court decisions, Buena Vista Service Area lost an average of 3,125 AFY due to these caps, Stine lost 1,505 AFY, and Farmers lost 632 AFY. The monthly analysis of this option by AECOM indicates that insufficient water is available when needed to replace the full amount lost to Buena Vista Service Area. However, an approximate average of 593 AFY of river water appears to be available for this option after the SWP replacement option occurs (Table B-2). While not documented in the Appendix B tables, available river water could also be used to replace lost water in the Farmers and Stine service areas, although the available amounts are likely small.

4.3 Municipal and Industrial Use

The Priority 3 management action allows for satisfaction of M&I demands within KDWD. These demands, estimated at 6,281 AFY (Table 7) include obligations with the City of Bakersfield for providing a similar amount of water for urban lands that was historically served by the District (prior to urbanization). While M&I use has been given third priority in this Plan, KDWD can meet M&I obligations through groundwater pumping when surface water is not available. However, given the need to mitigate groundwater declines, available surface water would better serve District goals. Table B-3 shows the monthly distribution of water availability for direct M&I use or recharge for later recovery. The maximum monthly delivery needed for this demand under Study Period conditions would be 1,456 AF; review of Table B-3 shows that in most years, this would occur from January through April. This amount could be increased if the City could use additional water during wet months when more is available.

4.4 In-District Groundwater Recharge

After surface irrigation and M&I demands have been met, the Priority 4 management action would be to recharge available surface water within the District recharge facilities. The recharge basins (Figure 4) are assumed to have a capacity of 8,700 AF per month (KDWD, 2002) with an additional recharge of about 4,000 AF per month occurring along unlined canals when water is diverted for groundwater replenishment in winter months. This canal recharge is consistent with observed seepage loss documented along the canal system and is assumed to occur only between October and April when there is less water running in the canals. This assumption eliminates competition for facilities during the irrigation season, and recognizes that recharge (seepage loss) has been observed to be less when the canals are full. An average annual amount of 15,281 AFY could be recharged to groundwater (Table B-4).

4.5 Pioneer Project Groundwater Recharge

The Priority 5 management action involves the use of out-of-District banking opportunities to recharge unused water for later recovery. As described previously, KDWD is a participant in the Pioneer Project, operated by KCWA. During some wet months, unused entitlement water may be available for out-of-District banking, even after higher priority uses are met. The AECOM analysis caps the monthly recharge amount at 750 AF/month and indicates that recharge in the Pioneer Project would average approximately 226 AFY (Table B-5).

4.6 Other Uses/Transfer to Out-of-District Agencies

Sequential implementation of the first five priority management actions can account for almost all of the available river water in most months of most years (more than 99 percent of the Post-Reed decision adjusted entitlement). Nonetheless, some water remains during the wettest months and other beneficial uses for river water could be supplied after these five priorities are implemented. According to the AECOM analysis, there may be undiverted river water entitlements available only in a few wet months over an 11-year period (Table B-6). As indicated in the analysis, diverted river water was estimated to occur in only 3 of the 132 months of the Study Period. However, volumes of available water were as high as 5,039 AF in one month (January 1997). This water could be used to meet additional District demands not accounted for in other priorities. For example, fallowed lands may offer additional capacity for groundwater recharge if permeable uncultivated land can be accessed when excess water is available. Additional recharge capacity for groundwater replenishment also exists outside of the District in other banking programs along the Kern River.

If agencies outside of the District can use the additional water during these atypical months, KDWD could also arrange for a transfer or sale of the entitlement water after other priorities have been met. Water could be used for transfers to out-of-District agencies and/or Kern County banking projects on behalf of others.

4.7 Coordination with Other Plans

Since the District's first deliveries of Kern River and supplemental water, water supply and allocation plans have been developed and adopted by the KDWD Board of Directors. Water supply plans that focus on Kern River water were developed in 1979, updated in 2000, with additional updates to data tables in 2008. This Plan builds on these documents and data and coordinates with other plans and programs for allocation of supplemental water supplies in the District, including the Groundwater Management Plan, SWP Water Allocation Plan, and the Groundwater Banking Agreement with Metropolitan Water District. A brief summary of these plans and coordinating concepts are provided below.

Groundwater Management Plan

In 1996, KDWD adopted a Groundwater Management Plan (GWMP) to formalize existing groundwater programs and to enhance local management for the preservation of the groundwater resource. A major element of the GWMP involved enhancement of groundwater recharge through unlined conveyance canals and construction of additional off-canal recharge facilities. Since the adoption of the GWMP, the District has added approximately 434 net acres of spreading basins in connection with the Metropolitan banking agreement, but also for in-District groundwater replenishment. The GWMP also recognized the benefits of in-lieu pumping when surface water supplies were sufficiently available to replace groundwater pumping. These strategies remain in place today and have been enhanced over time.

The District is in the process of updating its GWMP, a draft of which has been provided to the Board and reviewed for this document. The amended GWMP describes measures that enhance the scope and effectiveness of the groundwater monitoring program, addresses recent issues highlighted by the 2003 Water Code Section 10750 amendments and the recent California Water Plan, and provides a more comprehensive description of KDWD's management activities. This Water Allocation Plan is consistent with the goals and content of the amended draft GWMP and supports that document through in-lieu pumping, enhanced groundwater recharge from canal seepage losses, off-canal spreading basins, and out-of-District banking operations.

SWP Water Allocation Plan

SWP water was allocated among the service areas based on surface water demand and availability, groundwater overdraft and depth to water, facilities, and other factors (KDWD, 1974). The analysis of project benefits and priority zones are provided in KDWD's SWP Allocation Plan, developed in 1974 and amended in 1981 and 2009 (KDWD, 1974, 1981, and 2009). These plans allocate a firm supply of SWP exchange water (allocated as percentages of the annual available SWP supply) to two zones of benefit: 1. Eastside Service Area and adjacent non-utility areas accessed by the Eastside Canal or Kern Island Central Canal and 2. Stine/Farmers service areas accessed by the Stine Canal. For any makeup or unused water, SWP exchange water would be made available for delivery to other lands accessed by the Stine Canal (1st priority) and the Farmers Canal (2nd priority). Other District lands requesting SWP exchange water would be served on a 3rd priority basis. Any remaining water would be percolated through the system of unlined canals with the Eastside Canal receiving the 4th priority, the Stine Canal receiving the 5th priority, and percolation elsewhere in the District as a final priority (KDWD, 1974).

Plan amendments provided additional provisions for allocation within the zones of benefit. For SWP exchange water allocated to the utility and non-utility areas in the west (Buena Vista, Stine, and Farmers), the long-term deliveries of SWP exchange water would be equal to the long-term deliveries of utility water in terms of AF/acre (Boyle, 2004). The 2009 amendments allowed KDWD the option to sell up to 2,000 AFY of SWP water during years when SWP allocations were 50 percent or less to assist with financing of SWP water.

SWP water has become less reliable in recent years and available water has generally declined. The District's full contract amount was only available in one year of the 11-year period from 1997-2007. Since 2007, court restrictions have added greater uncertainty to the future of this supplemental supply. The District estimates that only about 50 percent of its contract amount (about 12,750 AFY) will be available in the future. With this shortfall in supplemental supply, efficient use of Kern River water becomes significantly more important. Since SWP water has been insufficient to mitigate groundwater declines and provide surface water to underserved areas of the District, the additional Kern River diversion during certain time periods will be available to replace the reliance on SWP water on the non-utility lands adjacent to the Kern Island Service Area.

COORDINATION WITH METROPOLITAN WATER DISTRICT BANKING PROJECT

Since the 2003 banking agreement with Metropolitan, the project has provided approximately 40,000 AF for direct and in-lieu recharge. As of 2008, Metropolitan's account balance was 22,888 AF available for recovery. The maximum capacity of the recharge or recovery operations has not been used to date. According to the terms of the banking agreement, KDWD can either accept water for banking or provide the Metropolitan account with a credit. This allows the District flexibility in when and how to best use the recharge basin capacity including ongoing District recharge operations.

5. PLAN IMPLEMENTATION PROCESS

This Plan is being prepared under the District's responsibilities in the California Water Code. As provided in Water Code Section 35526, the District may "by resolution adopt a plan for water allocation which may include a determination as to what portion of district water will be made available for surface delivery and what portion will be devoted to recharge of ground water, may establish limited areas of the district as the areas in which surface delivery of water service will be made available, the quantity which will be made available to each such surface water service area, and the terms upon which such water service will be made available." This process includes a public hearing and adoption of the Plan by the KDWD Board of Directors.

5.1 BOARD ADOPTION

The KDWD Board of Directors will consider the Draft Plan for adoption at an upcoming Board meeting. The meeting will be publicly-noticed in accordance with Water Code sections described above.

5.2 CEQA PROCESS

Adoption and implementation of the Plan is considered to be a project subject to CEQA review. The CEQA review process will be conducted in parallel with Plan development. The CEQA review will evaluate potential environmental impacts of the proposed management actions focusing on the beneficial use of the Preserved Entitlements as well as potential impacts on others.

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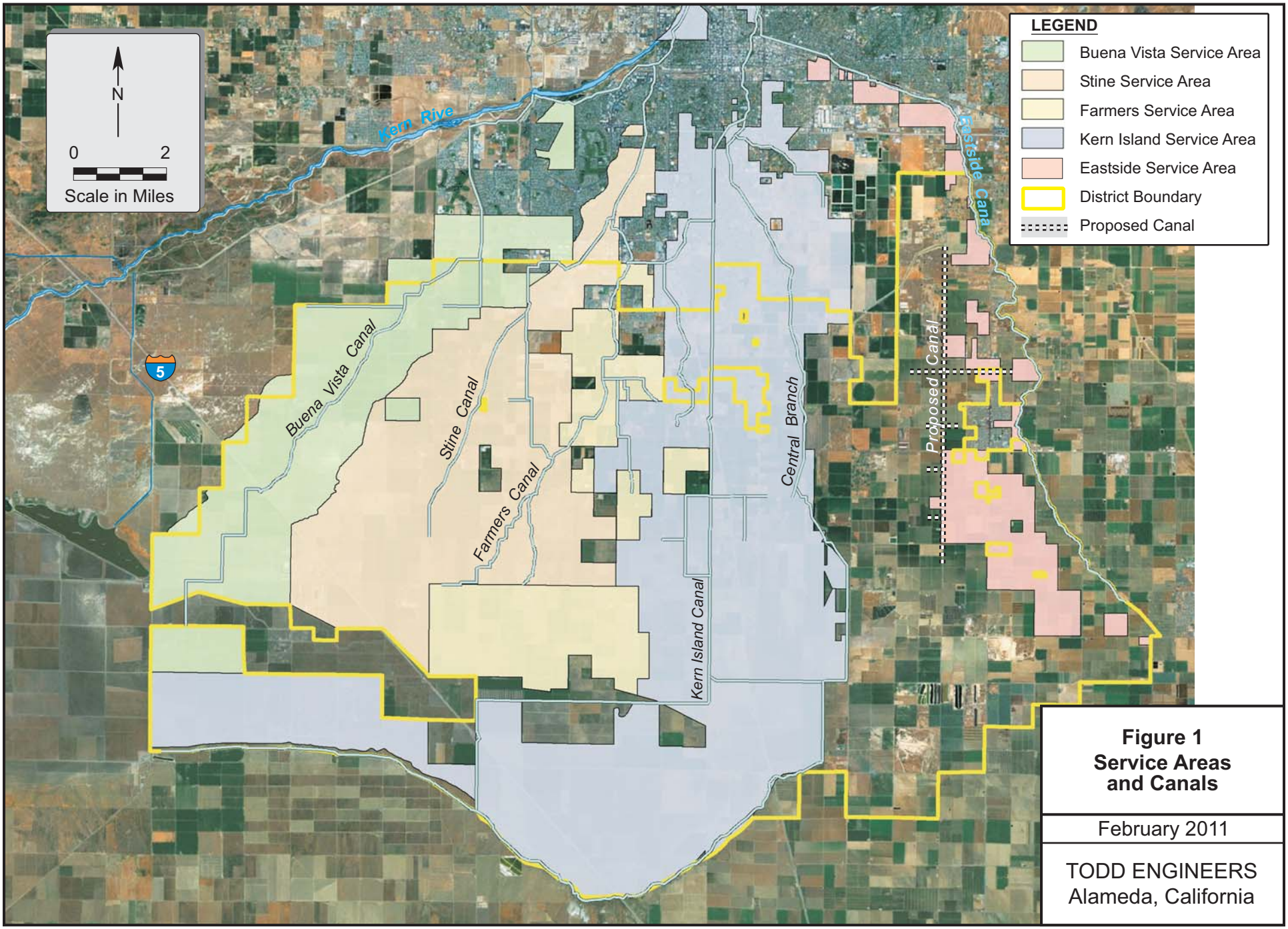

Figure 1
Service Areas and Canals

February 2011

TODD ENGINEERS
Alameda, California

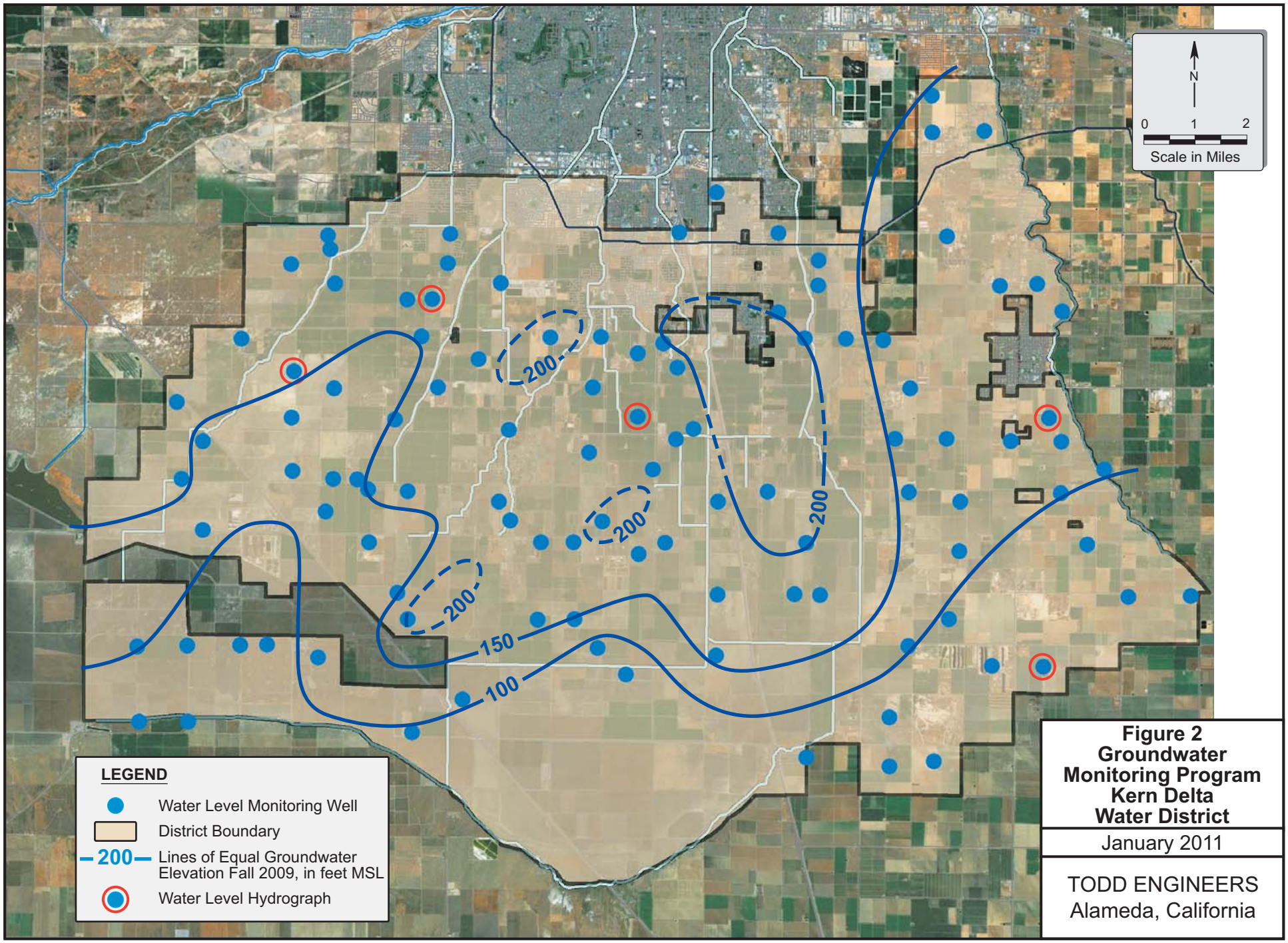

Figure 2
Groundwater Monitoring Program
Kern Delta Water District

January 2011

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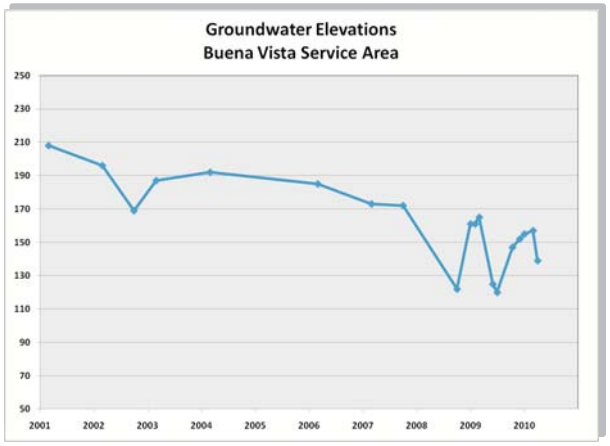
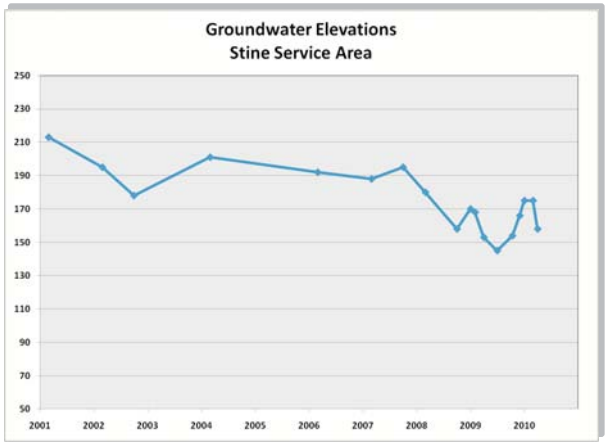
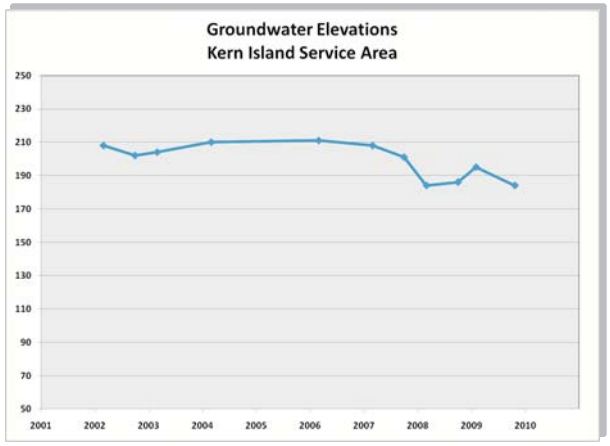
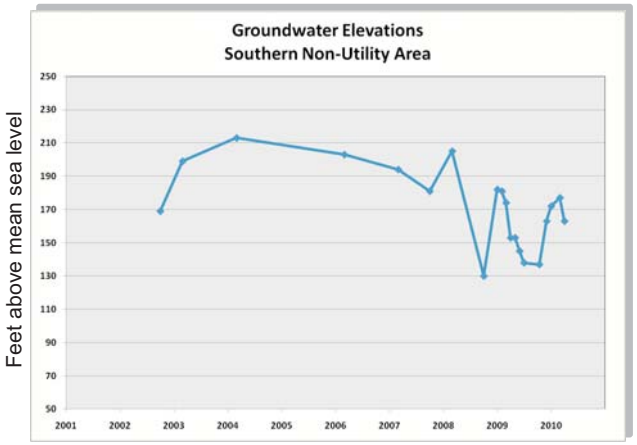
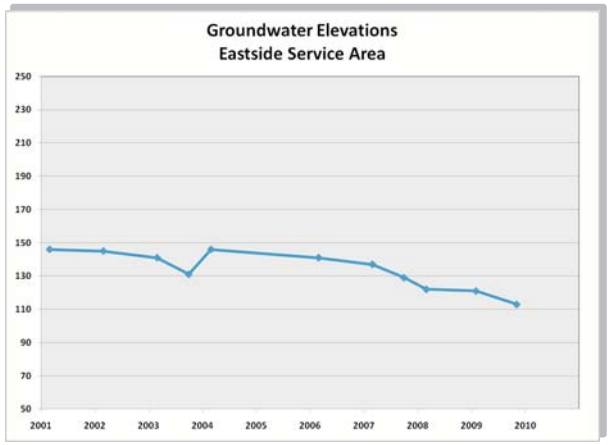
Alameda, California











January 2011	**Figure 3**
TODD ENGINEERS Alameda, California	**Hydrographs from Selected Wells 2001 - 2010**

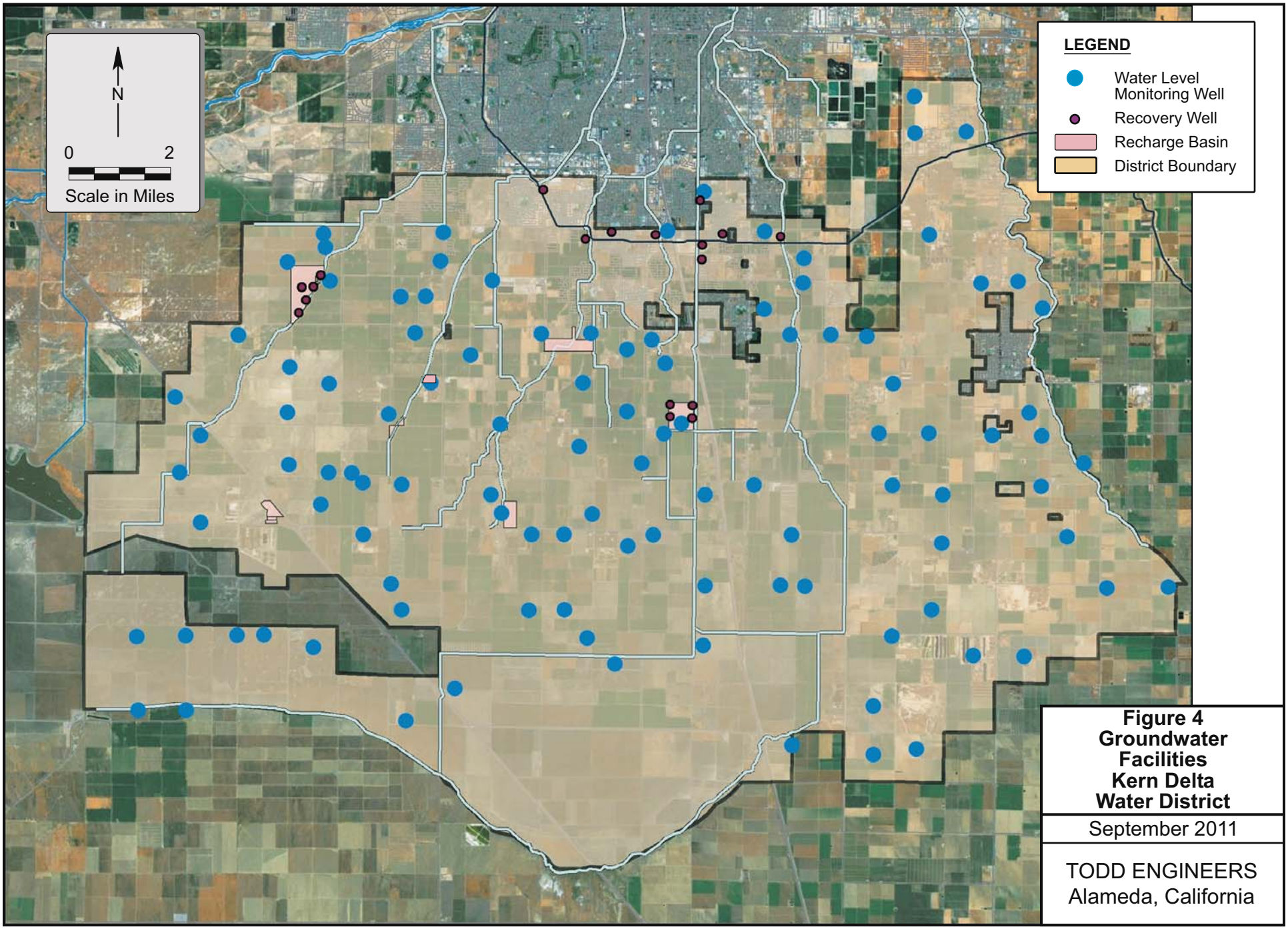


Figure 4
Groundwater Facilities
Kern Delta Water District

September 2011

TODD ENGINEERS
Alameda, California

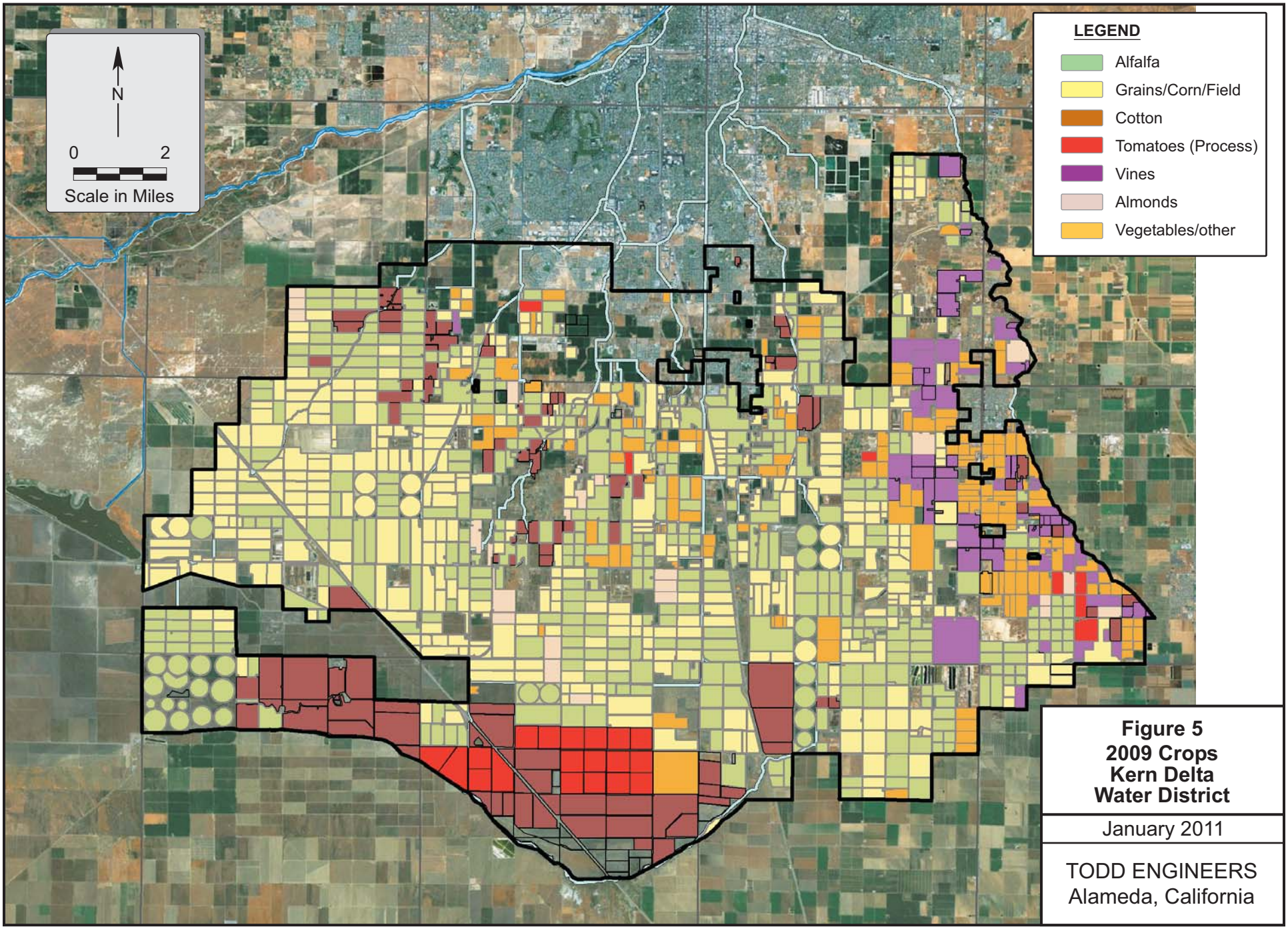


Figure 5
2009 Crops
Kern Delta
Water District

January 2011

TODD ENGINEERS
Alameda, California

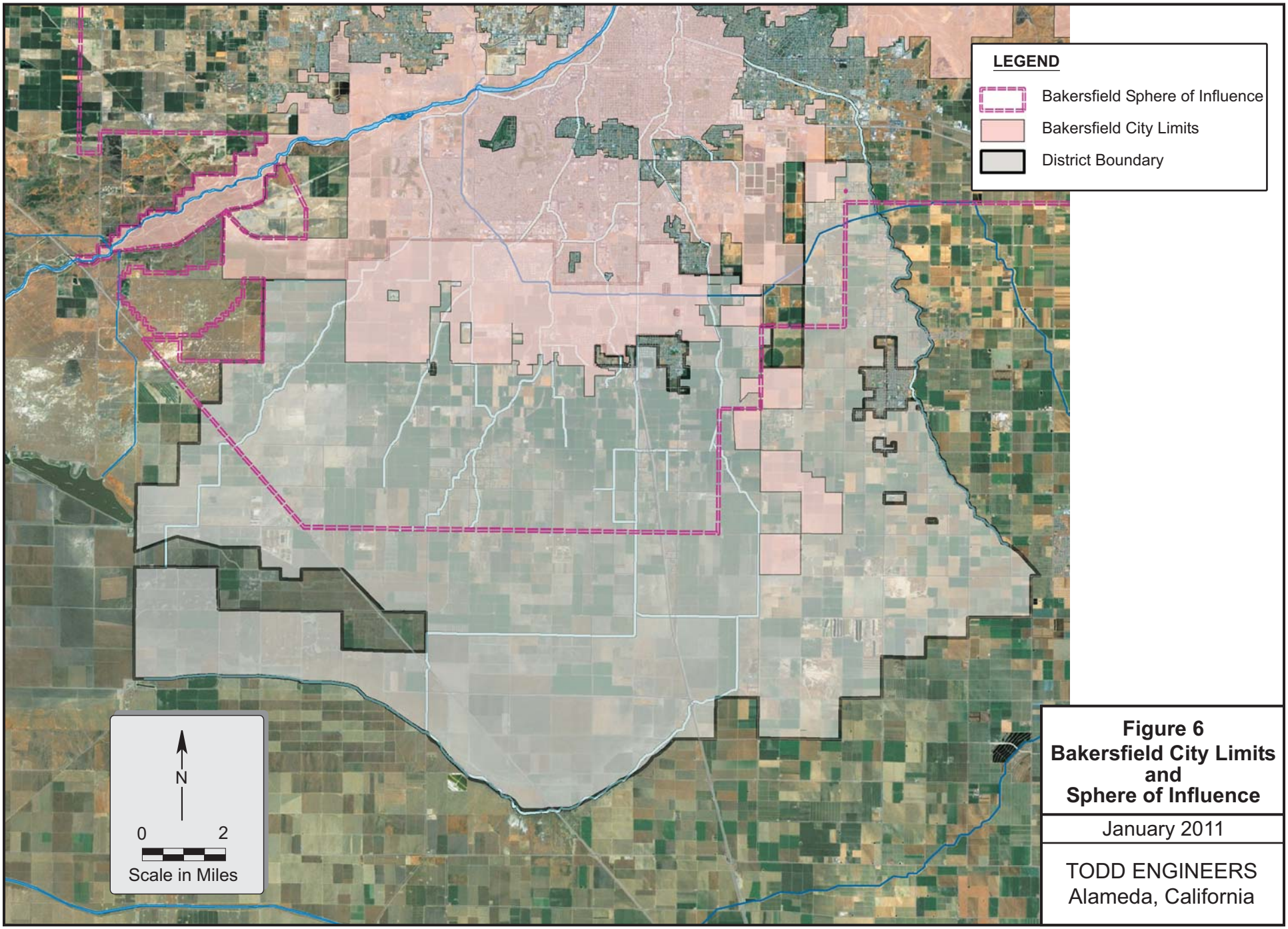


Figure 6
Bakersfield City Limits and Sphere of Influence

January 2011

TODD ENGINEERS
Alameda, California

Appendix A

Monthly Entitlements, 1997-2007

Table A-1
Kern Delta Water District
Kern River Water Rights

Historic Entitlements and Utilization (AFY)

Calendar Year	Annual River Index	Apr-Jul River Index	Kern Island 1st and 2nd								Buena Vista 1st and 2nd				Stine				Farmers				All Kern Delta Rights			
			Entitlement		KI		ES		KI & ES		Entitlement		BV		Entitlement		Stine		Entitlement		Farmers		Entitlement		Total	
			Base	+ or -	Div	Del	Div	Del	Div	Del	Base	+ or -	Div	Del	Base	+ or -	Div	Del	Base	+ or -	Div	Del	Base	+ or -	Div	Del
1997	162	122	224,820	152,815	145,756	106,042	10,124	8,721	155,880	114,763	36,754	23,626	26,406	17,925	32,205	23,206	24,641	12,315	31,045	18,514	19,934	12,842	324,824	218,161	226,861	157,845
1998	236	244	222,772	111,301	102,744	72,555	7,297	6,418	110,041	78,973	45,390	20,856	19,873	14,115	42,475	21,241	20,573	10,602	32,813	16,483	15,956	10,719	343,450	169,881	166,443	114,409
1999	60	54	188,882	137,758	127,279	89,307	8,847	7,539	136,126	96,846	12,986	14,946	12,673	7,125	16,211	10,652	11,382	5,857	9,537	8,024	9,039	5,756	227,616	171,380	169,220	115,584
2000	66	66	185,108	144,929	133,685	94,862	9,611	8,670	143,296	103,532	10,096	11,723	10,638	7,853	14,076	11,226	10,437	5,903	11,162	9,801	9,350	6,824	220,442	177,679	173,721	124,112
2001	54	54	177,477	129,241	118,107	79,397	9,493	7,830	127,600	87,227	5,977	14,226	11,120	6,458	7,793	7,020	5,634	3,461	7,518	6,385	5,041	3,224	198,765	156,872	149,395	100,370
2002	58	46	185,575	132,558	120,939	82,373	10,112	7,824	131,051	90,197	16,441	12,481	8,948	5,193	11,479	7,168	6,469	3,420	8,985	7,191	6,345	3,955	222,480	159,398	152,813	102,765
2003	71	70	195,947	141,939	131,141	92,629	8,935	6,727	140,076	99,356	16,276	19,211	16,604	9,652	12,268	11,492	11,811	4,718	9,938	9,737	10,510	6,450	234,429	182,379	179,001	120,176
2004	56	48	187,758	137,807	126,653	93,034	9,034	7,288	135,687	100,322	10,333	11,104	9,120	5,655	9,375	9,508	9,547	3,793	8,774	8,786	8,503	5,803	216,240	167,205	162,857	115,573
2005	159	169	220,306	144,285	133,619	98,986	9,299	7,801	142,918	106,787	37,972	27,856	26,683	20,079	34,532	28,139	25,718	14,086	29,306	19,958	17,883	11,917	322,116	220,238	213,202	152,869
2006	147	170	218,257	147,733	137,473	104,788	9,110	8,186	146,583	112,974	25,215	30,017	27,427	21,305	24,939	21,706	20,770	13,747	18,814	13,861	13,355	9,951	287,225	213,317	208,135	157,977
2007	35	26	165,740	122,983	114,292	80,930	8,043	6,741	122,335	87,671	3,686	6,044	5,545	3,283	1,488	984	2,356	1,116	1,020	971	2,128	1,594	171,934	130,982	132,364	93,664
Avg	**100**	**97**	**197,513**	**136,668**	**126,517**	**90,446**	**9,082**	**7,613**	**135,599**	**98,059**	**20,102**	**17,463**	**15,912**	**10,786**	**18,804**	**13,849**	**13,576**	**7,183**	**15,356**	**10,883**	**10,731**	**7,185**	**251,775**	**178,863**	**175,819**	**123,213**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process (AFY)

Calendar Year	Annual River Index	Apr-Jul River Index	Kern Island 1st and 2nd								Buena Vista 1st and 2nd				Stine				Farmers				All Kern Delta Rights			
			Entitlement		KI		ES		KI & ES		Entitlement		BV		Entitlement		Stine		Entitlement		Farmers		Entitlement		Total	
			Base	+ or -	Div	Del	Div	Del	Div	Del	Base	+ or -	Div	Del	Base	+ or -	Div	Del	Base	+ or -	b	Del	Base	+ or -	Div	Del
1997	162	122	166,670	149,758	142,889	104,824	10,124	8,721	153,013	113,545	20,657	22,763	25,593	18,135	31,319	21,700	23,217	11,657	31,019	17,666	16,971	10,491	249,665	211,887	218,794	153,828
1998	236	244	170,490	107,909	99,379	70,595	7,297	6,418	106,676	77,013	32,185	19,925	19,093	13,761	33,631	18,994	18,396	9,522	25,834	14,522	11,663	7,562	262,140	161,350	155,828	107,858
1999	60	54	156,291	133,754	123,343	87,954	8,847	7,539	132,190	95,493	8,650	10,118	10,396	6,491	16,211	10,652	10,847	5,591	9,537	8,024	6,412	4,422	190,689	162,548	159,845	111,997
2000	66	66	154,312	137,070	125,867	89,526	9,611	8,670	135,478	98,196	9,529	9,674	10,158	7,615	14,076	10,978	10,437	5,903	11,162	9,801	8,136	5,934	189,079	167,523	164,209	117,648
2001	54	54	145,088	123,374	112,707	76,870	9,493	7,830	122,200	84,700	5,242	7,401	8,358	4,986	6,667	5,786	5,668	3,461	6,856	5,749	4,434	2,762	163,853	142,310	140,660	95,909
2002	58	46	143,533	126,393	115,950	78,549	10,112	7,824	126,062	86,373	6,032	6,775	6,513	4,266	6,872	4,898	5,785	3,420	8,797	7,297	6,471	3,955	165,234	145,363	144,831	98,014
2003	71	70	160,361	135,769	125,086	87,655	8,935	6,727	134,021	94,382	11,607	16,859	15,723	9,667	11,939	10,995	11,823	4,718	9,931	9,760	9,011	5,857	193,838	173,383	170,578	114,624
2004	56	48	148,655	131,588	120,460	88,204	9,034	7,288	129,494	95,492	7,892	8,393	8,881	5,655	9,375	9,508	9,547	3,793	8,774	8,744	7,886	5,389	174,696	158,233	155,808	110,329
2005	159	169	167,605	140,616	130,025	96,537	9,299	7,801	139,324	104,338	27,603	27,485	26,666	20,079	33,265	22,804	21,233	12,608	28,272	17,802	13,393	8,946	256,745	208,707	200,616	145,971
2006	147	170	167,801	142,366	132,162	100,899	9,110	8,186	141,272	109,085	20,364	24,894	23,696	19,029	24,939	18,496	19,012	13,079	18,814	12,636	9,741	7,258	231,918	198,392	193,721	148,451
2007	35	26	137,652	122,983	112,996	79,297	8,043	6,741	121,039	86,038	3,357	3,431	4,629	2,562	1,488	972	2,356	1,116	1,020	764	2,128	1,594	143,517	128,150	130,152	91,310
Avg	**100**	**97**	**156,223**	**131,962**	**121,897**	**87,355**	**9,082**	**7,613**	**130,979**	**94,969**	**13,920**	**14,338**	**14,519**	**10,204**	**17,253**	**12,344**	**12,575**	**6,806**	**14,547**	**10,251**	**8,750**	**5,834**	**201,943**	**168,895**	**166,822**	**117,813**

Table A-2
Kern Island/Eastside Canals

Historic Entitlements and Utilization

Calendar	January (AF per month)						February (AF per month)						March (AF per month)						April (AF per month)						May (AF per month)					
Year	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.
1997	24,561	5,792	5,786	3,071	0	0	16,661	16,661	8,622	5,100	0	0	18,315	17,336	16,464	12,597	723	648	17,909	16,506	14,642	10,807	1,663	1,357	20,055	20,055	19,382	15,189	2,313	1,949
1998	18,446	9,493	9,403	6,619	0	0	18,369	13,835	1,315	787	0	0	18,373	3,817	3,547	1,394	167	121	18,307	4,389	3,707	1,434	551	331	19,821	11,574	7,290	4,500	1,123	1,080
1999	18,446	6,039	5,986	4,248	0	0	16,661	12,124	4,878	2,835	0	0	18,032	11,489	10,292	6,848	573	442	17,851	12,979	9,568	6,625	1,188	1,038	18,446	17,550	11,258	7,665	1,958	1,722
2000	15,346	9,167	8,996	6,187	0	0	17,256	9,908	7,114	4,749	0	0	18,119	11,865	9,644	6,441	1,083	863	17,851	17,308	11,493	7,955	1,264	1,051	18,446	18,446	10,429	5,798	1,843	1,643
2001	14,273	3,638	3,297	1,611	0	0	16,173	7,714	6,293	4,008	0	0	17,857	12,182	10,889	7,661	1,053	637	17,851	15,126	12,023	8,281	1,234	906	18,446	18,446	14,091	10,414	1,793	1,496
2002	18,446	7,812	7,582	3,981	0	0	16,655	12,527	10,704	7,422	0	0	17,792	12,234	11,300	7,915	934	659	17,851	15,489	11,338	7,476	1,829	1,346	18,446	16,226	11,102	7,461	2,085	1,579
2003	18,446	8,411	8,121	4,720	0	0	16,661	10,550	6,134	3,947	0	0	18,075	11,181	10,497	7,183	684	444	17,851	12,607	9,804	6,579	1,301	827	18,752	16,844	11,669	8,050	1,589	1,224
2004	18,446	5,091	4,732	3,194	0	0	17,256	9,551	4,867	2,922	0	0	18,163	16,323	12,981	9,033	914	724	17,851	17,851	13,966	10,959	1,500	1,101	18,446	18,446	15,584	11,660	1,717	1,413
2005	18,865	3,919	3,905	2,146	0	0	16,661	14,198	6,579	4,293	0	0	18,250	14,891	8,798	5,083	968	734	17,851	13,602	11,953	8,054	1,467	1,111	20,045	17,777	13,153	9,373	1,372	1,039
2006	18,446	4,270	4,254	2,209	0	0	16,661	13,837	11,577	9,286	0	0	18,294	11,059	6,933	4,925	445	372	18,000	15,031	7,272	4,845	1,051	849	20,251	20,251	15,681	11,945	1,968	1,808
2007	18,265	7,208	7,194	4,702	0	0	16,661	11,557	6,401	4,728	0	0	17,945	14,272	11,310	8,233	814	667	17,851	14,675	11,659	8,619	998	799	18,446	17,081	13,764	10,065	1,892	1,603
Avg	**18,362**	**6,440**	**6,296**	**3,881**	**0**	**0**	**16,880**	**12,042**	**6,771**	**4,552**	**0**	**0**	**18,110**	**12,423**	**10,241**	**7,028**	**760**	**574**	**17,911**	**14,142**	**10,675**	**7,421**	**1,277**	**974**	**19,055**	**17,518**	**13,037**	**9,284**	**1,787**	**1,505**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	January (AF per month)						February (AF per month)						March (AF per month)						April (AF per month)						May (AF per month)					
Year	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.
1997	8,493	5,792	5,786	3,071	0	0	16,661	16,661	8,622	5,100	0	0	18,315	17,336	16,464	12,597	723	648	17,909	16,506	14,642	10,807	1,663	1,357	20,055	20,055	19,382	15,189	2,313	1,949
1998	8,493	8,493	8,412	5,922	0	0	18,369	13,835	1,315	787	0	0	18,373	3,817	3,547	1,394	167	121	18,307	4,389	3,707	1,434	551	331	19,821	11,574	7,290	4,500	1,123	1,080
1999	8,493	6,039	5,986	4,248	0	0	16,661	12,124	4,878	2,835	0	0	18,032	11,489	10,292	6,848	573	442	17,851	12,979	9,568	6,625	1,188	1,038	18,446	17,550	11,258	7,665	1,958	1,722
2000	8,493	8,493	8,335	5,732	0	0	17,256	9,908	7,114	4,749	0	0	18,119	11,865	9,644	6,441	1,083	863	17,851	17,308	11,493	7,955	1,264	1,051	18,446	18,446	10,429	5,798	1,843	1,643
2001	8,493	3,638	3,297	1,611	0	0	16,173	7,714	6,293	4,008	0	0	17,857	12,182	10,889	7,661	1,053	637	17,851	15,126	12,023	8,281	1,234	906	18,446	18,446	14,091	10,414	1,793	1,496
2002	8,493	7,812	7,582	3,981	0	0	16,655	12,527	10,704	7,422	0	0	17,792	12,234	11,300	7,915	934	659	17,851	15,489	11,338	7,476	1,829	1,346	18,446	16,226	11,102	7,461	2,085	1,579
2003	8,493	8,411	8,121	4,720	0	0	16,661	10,550	6,134	3,947	0	0	18,075	11,181	10,497	7,183	684	444	17,851	12,607	9,804	6,579	1,301	827	18,752	16,844	11,669	8,050	1,589	1,224
2004	8,493	5,091	4,732	3,194	0	0	17,256	9,551	4,867	2,922	0	0	18,163	16,323	12,981	9,033	914	724	17,851	17,851	13,966	10,959	1,500	1,101	18,446	18,446	15,584	11,660	1,717	1,413
2005	8,493	3,919	3,905	2,146	0	0	16,661	14,198	6,579	4,293	0	0	18,250	14,891	8,798	5,083	968	734	17,851	13,602	11,953	8,054	1,467	1,111	20,045	17,777	13,153	9,373	1,372	1,039
2006	8,493	4,270	4,254	2,209	0	0	16,661	13,837	11,577	9,286	0	0	18,294	11,059	6,933	4,925	445	372	18,000	15,031	7,272	4,845	1,051	849	20,251	20,251	15,681	11,945	1,968	1,808
2007	8,493	7,208	7,194	4,702	0	0	16,661	11,557	6,401	4,728	0	0	17,945	14,272	11,310	8,233	814	667	17,851	14,675	11,659	8,619	998	799	18,446	17,081	13,764	10,065	1,892	1,603
Avg	**8,493**	**6,288**	**6,146**	**3,776**	**0**	**0**	**16,880**	**12,042**	**6,771**	**4,552**	**0**	**0**	**18,110**	**12,423**	**10,241**	**7,028**	**760**	**574**	**17,911**	**14,142**	**10,675**	**7,421**	**1,277**	**974**	**19,055**	**17,518**	**13,037**	**9,284**	**1,787**	**1,505**

Table A-2
Kern Island/Eastside Canals

Historic Entitlements and Utilization

Calendar	June (AF per month)						July (AF per month)						August (AF per month)						September (AF per month)						October (AF per month)					
Year	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.
1997	18,086	18,086	21,954	17,505	2,404	2,128	18,446	18,446	20,816	17,342	2,067	1,758	18,446	17,755	16,386	12,163	954	881	17,845	8,928	8,874	5,487	0	0	18,256	5,547	5,505	2,923	0	0
1998	19,157	14,118	15,829	12,345	2,035	1,797	19,259	15,841	20,279	16,303	2,326	2,032	18,446	16,815	20,109	15,972	1,095	1,057	17,851	9,740	9,698	6,835	0	0	18,446	5,247	5,211	2,700	0	0
1999	17,851	17,711	17,589	14,310	2,150	1,811	18,446	18,063	22,614	17,719	2,124	1,818	16,205	16,205	20,013	15,704	854	708	11,892	10,103	9,721	6,121	0	0	11,038	6,066	5,999	2,679	0	0
2000	17,851	17,851	22,392	17,887	2,430	2,228	18,446	18,446	23,020	19,390	1,952	1,914	15,154	15,154	15,417	11,987	1,039	971	10,282	9,461	8,031	4,659	0	0	12,236	4,966	4,856	2,352	0	0
2001	17,851	17,851	17,374	12,086	2,299	2,017	16,860	16,860	15,692	11,239	2,225	1,885	10,882	10,882	14,510	11,449	889	889	8,261	8,261	8,243	5,027	0	0	8,466	7,388	4,870	2,840	0	0
2002	17,851	17,851	15,718	10,806	2,342	1,873	17,203	16,241	15,469	11,497	2,013	1,626	9,763	9,763	16,025	12,207	909	741	7,065	7,065	6,986	4,290	0	0	8,263	8,087	5,907	3,573	0	0
2003	18,196	18,196	15,907	11,496	2,174	1,613	18,446	18,446	22,878	18,292	2,243	1,806	18,198	18,198	19,421	15,358	944	813	13,275	9,417	8,801	5,319	0	0	10,122	6,494	6,429	3,511	0	0
2004	17,851	17,851	22,384	18,579	2,166	1,780	17,841	17,841	15,507	11,507	1,918	1,594	11,673	11,673	15,181	11,868	819	676	8,667	8,667	8,285	5,303	0	0	12,140	4,234	2,981	1,355	0	0
2005	19,017	19,017	23,169	19,555	2,063	1,782	18,577	18,577	22,588	18,818	2,331	2,107	18,446	18,446	20,712	17,247	1,098	1,028	17,851	9,987	9,006	6,186	0	0	18,446	4,777	4,737	2,582	0	0
2006	18,981	18,981	23,492	19,494	2,435	2,273	18,446	18,446	22,159	17,977	2,269	1,950	18,446	18,106	18,564	15,105	942	934	17,815	11,811	11,742	8,784	0	0	18,398	5,822	5,764	3,749	0	0
2007	16,998	16,998	15,586	10,706	1,922	1,677	11,687	11,687	17,435	13,597	1,604	1,283	9,265	9,265	11,971	8,089	813	712	7,892	7,892	6,003	3,727	0	0	9,275	6,923	4,942	2,318	0	0
Avg	**18,154**	**17,683**	**19,218**	**14,979**	**2,220**	**1,907**	**17,605**	**17,172**	**19,860**	**15,789**	**2,097**	**1,798**	**14,993**	**14,751**	**17,119**	**13,377**	**941**	**855**	**12,609**	**9,212**	**8,672**	**5,613**	**0**	**0**	**13,190**	**5,959**	**5,200**	**2,780**	**0**	**0**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	June (AF per month)						July (AF per month)						August (AF per month)						September (AF per month)						October (AF per month)					
Year	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.
1997	18,086	18,086	21,954	17,505	2,404	2,128	18,446	18,446	20,816	17,342	2,067	1,758	18,446	17,755	16,386	12,163	954	881	17,845	8,928	8,874	5,487	0	0	6,989	5,547	5,505	2,923	0	0
1998	19,157	14,118	15,829	12,345	2,035	1,797	19,259	15,841	20,279	16,303	2,326	2,032	18,446	16,815	20,109	15,972	1,095	1,057	17,851	9,740	9,698	6,835	0	0	6,989	5,247	5,211	2,700	0	0
1999	17,851	17,711	17,589	14,310	2,150	1,811	18,446	18,063	22,614	17,719	2,124	1,818	16,205	16,205	20,013	15,704	854	708	11,892	10,103	9,721	6,121	0	0	6,989	6,066	5,999	2,679	0	0
2000	17,851	17,851	22,392	17,887	2,430	2,228	18,446	18,446	23,020	19,390	1,952	1,914	15,154	15,154	15,417	11,987	1,039	971	10,282	9,461	8,031	4,659	0	0	6,989	4,966	4,856	2,352	0	0
2001	17,851	17,851	17,374	12,086	2,299	2,017	16,860	16,860	15,692	11,239	2,225	1,885	10,882	10,882	14,510	11,449	889	889	8,261	8,261	8,243	5,027	0	0	6,989	6,989	4,870	2,840	0	0
2002	17,851	17,851	15,718	10,806	2,342	1,873	17,203	16,241	15,469	11,497	2,013	1,626	9,763	9,763	16,025	12,207	909	741	7,065	7,065	6,986	4,290	0	0	6,989	6,989	5,907	3,573	0	0
2003	18,196	18,196	15,907	11,496	2,174	1,613	18,446	18,446	22,878	18,292	2,243	1,806	18,198	18,198	19,421	15,358	944	813	13,275	9,417	8,801	5,319	0	0	6,989	6,494	6,429	3,511	0	0
2004	17,851	17,851	22,384	18,579	2,166	1,780	17,841	17,841	15,507	11,507	1,918	1,594	11,673	11,673	15,181	11,868	819	676	8,667	8,667	8,285	5,303	0	0	6,989	4,234	2,981	1,355	0	0
2005	19,017	19,017	23,169	19,555	2,063	1,782	18,577	18,577	22,588	18,818	2,331	2,107	18,446	18,446	20,712	17,247	1,098	1,028	17,851	9,987	9,006	6,186	0	0	6,989	4,777	4,737	2,582	0	0
2006	18,981	18,981	23,492	19,494	2,435	2,273	18,446	18,446	22,159	17,977	2,269	1,950	18,446	18,106	18,564	15,105	942	934	17,815	11,811	11,742	8,784	0	0	6,989	5,822	5,764	3,749	0	0
2007	16,998	16,998	15,586	10,706	1,922	1,677	11,687	11,687	17,435	13,597	1,604	1,283	9,265	9,265	11,971	8,089	813	712	7,892	7,892	6,003	3,727	0	0	6,989	6,923	4,942	2,318	0	0
Avg	**18,154**	**17,683**	**19,218**	**14,979**	**2,220**	**1,907**	**17,605**	**17,172**	**19,860**	**15,789**	**2,097**	**1,798**	**14,993**	**14,751**	**17,119**	**13,377**	**941**	**855**	**12,609**	**9,212**	**8,672**	**5,613**	**0**	**0**	**6,989**	**5,823**	**5,200**	**2,780**	**0**	**0**

Table A-2
Kern Island/Eastside Canals

Historic Entitlements and Utilization

Calendar	November (AF per month)						December (AF per month)						Total (AFY)							
Year	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	KI&ES Div	KI&ES Del
1997	17,794	2,596	2,408	1,140	0	0	18,446	5,107	4,917	2,718	0	0	224,820	152,815	145,756	106,042	10,124	8,721	155,880	114,763
1998	17,851	1,990	1,932	903	0	0	18,446	4,442	4,424	2,763	0	0	222,772	111,301	102,744	72,555	7,297	6,418	110,041	78,973
1999	11,633	4,177	4,139	1,628	0	0	12,381	5,252	5,222	2,925	0	0	188,882	137,758	127,279	89,307	8,847	7,539	136,126	96,846
2000	12,109	3,122	3,086	1,076	0	0	12,012	9,235	9,207	6,381	0	0	185,108	144,929	133,685	94,862	9,611	8,670	143,296	103,532
2001	12,942	3,727	3,681	754	0	0	17,615	7,166	7,144	4,027	0	0	177,477	129,241	118,107	79,397	9,493	7,830	127,600	87,227
2002	17,794	2,146	1,769	421	0	0	18,446	7,117	7,039	5,324	0	0	185,575	132,558	120,939	82,373	10,112	7,824	131,051	90,197
2003	12,307	4,085	4,055	2,265	0	0	15,618	7,510	7,425	5,909	0	0	195,947	141,939	131,141	92,629	8,935	6,727	140,076	99,356
2004	13,852	2,010	1,942	324	0	0	15,572	8,269	8,243	6,330	0	0	187,758	137,807	126,653	93,034	9,034	7,288	135,687	100,322
2005	17,851	3,710	3,647	1,812	0	0	18,446	5,384	5,372	3,837	0	0	220,306	144,285	133,619	98,986	9,299	7,801	142,918	106,787
2006	16,470	2,702	2,674	1,080	0	0	18,049	7,417	7,361	5,389	0	0	218,257	147,733	137,473	104,788	9,110	8,186	146,583	112,974
2007	9,445	3,375	4,681	3,013	0	0	12,010	2,050	3,346	3,133	0	0	165,740	122,983	114,292	80,930	8,043	6,741	122,335	87,671
Avg	**14,550**	**3,058**	**3,092**	**1,311**	**0**	**0**	**16,095**	**6,268**	**6,336**	**4,431**	**0**	**0**	**197,513**	**136,668**	**126,517**	**90,446**	**9,082**	**7,613**	**135,599**	**98,059**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	November (AF per month)						December (AF per month)						Total (AFY)							
Year	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	Entl.	+ or -	KI Div.	KI Del.	ES Div.	ES Del.	KI/ES Div	KI/ES Del
1997	3,375	2,596	2,408	1,140	0	0	2,050	2,050	2,050	1,500	0	0	166,670	149,758	142,889	104,824	10,124	8,721	153,013	113,545
1998	3,375	1,990	1,932	903	0	0	2,050	2,050	2,050	1,500	0	0	170,490	107,909	99,379	70,595	7,297	6,418	106,676	77,013
1999	3,375	3,375	3,375	1,700	0	0	2,050	2,050	2,050	1,500	0	0	156,291	133,754	123,343	87,954	8,847	7,539	132,190	95,493
2000	3,375	3,122	3,086	1,076	0	0	2,050	2,050	2,050	1,500	0	0	154,312	137,070	125,867	89,526	9,611	8,670	135,478	98,196
2001	3,375	3,375	3,375	754	0	0	2,050	2,050	2,050	1,500	0	0	145,088	123,374	112,707	76,870	9,493	7,830	122,200	84,700
2002	3,375	2,146	1,769	421	0	0	2,050	2,050	2,050	1,500	0	0	143,533	126,393	115,950	78,549	10,112	7,824	126,062	86,373
2003	3,375	3,375	3,375	1,700	0	0	2,050	2,050	2,050	1,500	0	0	160,361	135,769	125,086	87,655	8,935	6,727	134,021	94,382
2004	3,375	2,010	1,942	324	0	0	2,050	2,050	2,050	1,500	0	0	148,655	131,588	120,460	88,204	9,034	7,288	129,494	95,492
2005	3,375	3,375	3,375	1,700	0	0	2,050	2,050	2,050	1,500	0	0	167,605	140,616	130,025	96,537	9,299	7,801	139,324	104,338
2006	3,375	2,702	2,674	1,080	0	0	2,050	2,050	2,050	1,500	0	0	167,801	142,366	132,162	100,899	9,110	8,186	141,272	109,085
2007	3,375	3,375	4,681	3,013	0	0	2,050	2,050	2,050	1,500	0	0	137,652	122,983	112,996	79,297	8,043	6,741	121,039	86,038
Avg	**3,375**	**2,858**	**2,908**	**1,256**	**0**	**0**	**2,050**	**2,050**	**2,050**	**1,500**	**0**	**0**	**156,223**	**131,962**	**121,897**	**87,355**	**9,082**	**7,613**	**130,979**	**94,969**

Table A-3
Buena Vista Canal

Historic Entitlements and Utilization

Calendar	January (AF per month)				February (AF per month)				March (AF per month)				April (AF per month)				May (AF per month)				June (AF per month)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	9,782	1,053	1,049	40	2,620	2,620	3,429	1,954	0	549	3,100	2,656	3,172	3,975	1,746	1,354	5,439	6,788	2,634	1,812	3,138	3,315	4,111	3,236
1998	4,750	926	884	373	5,837	6,486	726	620	932	4,915	1,254	606	2,507	1,500	1,257	476	4,168	1,477	1,378	638	3,958	3,189	3,026	2,263
1999	4,683	1,113	988	461	4,312	3,522	1,497	1,261	0	768	768	373	795	1,272	916	246	1,851	1,601	389	79	1,333	1,435	3,128	2,268
2000	914	1,122	821	488	3,223	2,435	1,577	1,115	333	1,073	797	284	1,309	1,164	0	0	2,802	2,824	0	0	1,515	1,527	2,332	1,778
2001	152	2,033	1,632	849	1,059	1,392	1,016	692	105	1,313	1,252	679	764	1,081	688	282	2,283	2,389	417	244	410	410	3,993	2,613
2002	2,958	1,695	855	381	2,158	2,720	1,934	1,327	0	48	48	0	797	770	371	127	1,246	1,045	206	21	1,057	1,057	3,180	2,351
2003	4,687	760	581	151	4,225	3,273	639	533	337	3,201	2,818	1,667	887	1,660	906	343	2,578	2,982	2,581	1,671	2,582	2,582	3,163	2,233
2004	2,499	10	0	0	2,638	2,390	1,222	847	942	1,934	1,297	876	1,218	1,218	133	0	1,622	1,716	161	0	821	821	3,657	2,515
2005	4,877	98	0	0	4,353	2,975	758	526	1,426	2,676	2,194	1,274	3,140	5,223	2,533	1,642	5,469	5,949	1,484	1,095	4,126	4,068	4,490	3,706
2006	4,746	1,087	1,019	421	4,270	3,270	2,192	1,760	660	1,768	852	491	2,890	3,056	392	69	5,487	6,157	2,906	2,100	3,844	4,332	5,005	4,289
2007	665	1,462	1,454	971	2,190	1,823	1,302	888	0	500	500	371	28	10	520	260	601	560	865	407	0	0	904	386
Avg	**3,701**	**1,033**	**844**	**376**	**3,353**	**2,991**	**1,481**	**1,048**	**430**	**1,704**	**1,353**	**843**	**1,592**	**1,903**	**860**	**436**	**3,050**	**3,044**	**1,184**	**733**	**2,071**	**2,067**	**3,363**	**2,513**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	January (AF per month)				February (AF per month)				March (AF per month)				April (AF per month)				May (AF per month)				June (AF per month)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	347	347	347	250	2,620	2,620	3,429	1,954	0	549	3,100	2,656	3,172	3,975	1,746	1,354	5,439	6,788	2,634	1,812	3,138	3,315	4,111	3,236
1998	347	347	347	250	5,837	6,486	726	620	932	4,915	1,254	606	2,507	1,500	1,257	476	4,168	1,477	1,378	638	3,958	3,189	3,026	2,263
1999	347	347	347	250	4,312	3,522	1,497	1,261	0	768	768	373	795	1,272	916	246	1,851	1,601	389	79	1,333	1,435	3,128	2,268
2000	347	347	347	250	3,223	2,435	1,577	1,115	333	1,073	797	284	1,309	1,164	0	0	2,802	2,824	0	0	1,515	1,527	2,332	1,778
2001	152	347	347	250	1,059	1,392	1,016	692	105	1,313	1,252	679	764	1,081	688	282	2,283	2,389	417	244	410	410	3,993	2,613
2002	347	347	347	250	2,158	2,720	1,934	1,327	0	48	48	0	797	770	371	127	1,246	1,045	206	21	1,057	1,057	3,180	2,351
2003	347	347	347	250	4,225	3,273	639	533	337	3,201	2,818	1,667	887	1,660	906	343	2,578	2,982	2,581	1,671	2,582	2,582	3,163	2,233
2004	347	10	10	0	2,638	2,390	1,222	847	942	1,934	1,297	876	1,218	1,218	133	0	1,622	1,716	161	0	821	821	3,657	2,515
2005	347	98	98	0	4,353	2,975	758	526	1,426	2,676	2,194	1,274	3,140	5,223	2,533	1,642	5,469	5,949	1,484	1,095	4,126	4,068	4,490	3,706
2006	347	347	347	250	4,270	3,270	2,192	1,760	660	1,768	852	491	2,890	3,056	392	69	5,487	6,157	2,906	2,100	3,844	4,332	5,005	4,289
2007	347	347	347	250	2,190	1,823	1,302	888	0	500	500	371	28	10	520	260	601	560	865	407	0	0	904	386
Avg	**329**	**294**	**294**	**205**	**3,353**	**2,991**	**1,481**	**1,048**	**430**	**1,704**	**1,353**	**843**	**1,592**	**1,903**	**860**	**436**	**3,050**	**3,044**	**1,184**	**733**	**2,071**	**2,067**	**3,363**	**2,513**

Table A-3
Buena Vista Canal

Historic Entitlements and Utilization

Calendar	July (AF per month)				August (AF per month)				September (AF per month)				October (AF per month)				November (AF per month)				December (AF per month)				Total (AFY)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	1,450	2,325	3,263	2,641	172	302	3,987	3,283	2,906	1,389	1,849	893	986	726	700	26	2,535	153	133	30	4,554	431	405	0	36,754	23,626	26,406	17,925
1998	2,759	14	4,848	4,158	1,894	0	3,814	3,507	4,645	888	1,356	920	4,711	682	660	181	4,544	137	125	42	4,685	642	545	331	45,390	20,856	19,873	14,115
1999	12	171	1,584	1,176	0	0	1,132	645	0	1,002	635	193	0	1,293	313	144	0	1,170	480	0	0	1,599	843	279	12,986	14,946	12,673	7,125
2000	0	0	3,300	2,691	0	0	1,805	1,497	0	304	0	0	0	1,226	0	0	0	22	0	0	0	26	6	0	10,096	11,723	10,638	7,853
2001	42	42	218	126	0	0	0	0	0	0	0	0	0	175	0	0	498	1,520	220	0	664	3,871	1,684	973	5,977	14,226	11,120	6,458
2002	0	361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,736	3,368	1,297	436	3,489	1,417	1,057	550	16,441	12,481	8,948	5,193
2003	75	75	2,361	1,363	22	22	474	170	363	2,526	2,243	1,437	0	1,309	485	84	0	382	176	0	520	439	177	0	16,276	19,211	16,604	9,652
2004	0	0	2,097	1,362	0	0	0	0	0	0	0	0	113	1,242	121	0	0	819	232	35	480	954	200	20	10,333	11,104	9,120	5,655
2005	1,744	1,772	7,230	6,077	567	567	4,689	3,809	3,398	3,071	2,128	1,501	2,606	659	635	435	1,778	522	407	14	4,488	276	135	0	37,972	27,856	26,683	20,079
2006	852	852	5,185	4,615	202	392	3,478	2,969	1,355	4,263	2,882	2,251	139	2,303	1,795	1,259	127	655	454	226	643	1,882	1,267	855	25,215	30,017	27,427	21,305
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	1,262	0	0	0	236	0	0	202	191	0	0	3,686	6,044	5,545	3,283
Avg	**630**	**510**	**2,735**	**2,201**	**260**	**117**	**1,762**	**1,444**	**1,152**	**1,222**	**1,008**	**654**	**778**	**989**	**428**	**194**	**1,293**	**817**	**320**	**71**	**1,793**	**1,066**	**574**	**273**	**20,102**	**17,463**	**15,912**	**10,786**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	July (AF per month)				August (AF per month)				September (AF per month)				October (AF per month)				November (AF per month)				December (AF per month)				Total (AFY)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	1,450	2,325	3,263	2,641	172	302	3,987	3,283	2,906	1,389	1,849	893	986	726	700	26	236	236	236	30	191	191	191	0	20,657	22,763	25,593	18,135
1998	2,759	14	4,848	4,158	1,894	0	3,814	3,507	4,645	888	1,356	920	4,711	682	660	181	236	236	236	42	191	191	191	100	32,185	19,925	19,093	13,761
1999	12	171	1,584	1,176	0	0	1,132	645	0	1,002	635	193	0	0	0	0	0	0	0	0	0	0	0	0	8,650	10,118	10,396	6,491
2000	0	0	3,300	2,691	0	0	1,805	1,497	0	304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,529	9,674	10,158	7,615
2001	42	42	218	126	0	0	0	0	0	0	0	0	0	0	0	0	236	236	236	0	191	191	191	100	5,242	7,401	8,358	4,986
2002	0	361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	236	236	236	90	191	191	191	100	6,032	6,775	6,513	4,266
2003	75	75	2,361	1,363	22	22	474	170	363	2,526	2,243	1,437	0	0	0	0	0	0	0	0	191	191	191	0	11,607	16,859	15,723	9,667
2004	0	0	2,097	1,362	0	0	0	0	0	0	0	0	113	113	113	0	0	0	0	35	191	191	191	20	7,892	8,393	8,881	5,655
2005	1,744	1,772	7,230	6,077	567	567	4,689	3,809	3,398	3,071	2,128	1,501	2,606	659	635	435	236	236	236	14	191	191	191	0	27,603	27,485	26,666	20,079
2006	852	852	5,185	4,615	202	392	3,478	2,969	1,355	4,263	2,882	2,251	139	139	139	70	127	127	127	65	191	191	191	100	20,364	24,894	23,696	19,029
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	191	191	191	0	3,357	3,431	4,629	2,562
Avg	**630**	**510**	**2,735**	**2,201**	**260**	**117**	**1,762**	**1,444**	**1,152**	**1,222**	**1,008**	**654**	**778**	**211**	**204**	**65**	**119**	**119**	**119**	**25**	**156**	**156**	**156**	**38**	**13,920**	**14,338**	**14,519**	**10,204**

Table A-4
Stine Canal

Historic Entitlements and Utilization

Calendar	January (AF per month)				February (AF per month)				March (AF per month)				April (AF per month)				May (AF per month)				June (AF per month)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	10,294	1,589	1,585	0	4,463	4,463	2,097	561	4	4	3,745	2,164	4,042	4,042	1,318	756	4,800	4,800	1,500	921	4,074	4,074	4,326	2,549
1998	5,812	845	833	23	8,227	7,560	48	0	1,662	1,111	1,444	427	2,759	1,521	1,050	219	3,677	1,470	1,389	449	3,485	2,866	2,733	1,502
1999	2,926	958	930	279	5,796	3,276	97	28	0	0	0	0	1,489	1,305	428	195	3,467	2,664	331	142	2,507	2,423	2,412	1,507
2000	529	489	0	0	3,606	913	0	0	611	520	0	0	2,468	2,194	0	0	4,011	4,011	103	0	2,851	2,851	4,620	2,791
2001	4	305	0	0	87	33	0	0	196	119	0	0	1,430	786	0	0	4,066	3,659	0	0	771	771	3,210	1,882
2002	1,023	238	0	0	0	0	0	0	0	0	0	0	1,496	752	0	0	2,341	1,896	0	0	1,978	1,978	3,414	2,085
2003	1,001	747	707	213	1,646	1,720	139	31	641	641	0	0	1,668	1,376	0	0	3,322	2,850	876	281	3,463	3,463	3,980	1,703
2004	0	22	22	9	732	843	147	75	1,762	1,762	613	0	2,287	2,287	287	0	3,059	3,059	131	0	1,535	1,535	4,392	2,034
2005	6,730	1,506	0	0	8,158	4,239	280	218	2,529	2,531	2,676	1,202	3,971	3,951	1,676	787	4,836	3,739	2,054	891	3,637	3,434	4,308	2,789
2006	7,047	1,524	1,504	963	3,217	2,965	2,136	1,460	1,226	728	0	0	3,390	3,220	1,135	413	4,836	4,836	3,175	2,008	3,400	3,400	4,620	3,526
2007	81	0	0	0	228	119	0	0	0	0	0	0	52	16	0	0	1,127	837	1,049	390	0	0	1,202	627
Avg	**3,222**	**748**	**507**	**135**	**3,287**	**2,376**	**449**	**216**	**785**	**674**	**771**	**345**	**2,277**	**1,950**	**536**	**215**	**3,595**	**3,075**	**964**	**462**	**2,518**	**2,436**	**3,565**	**2,090**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	January (AF per month)				February (AF per month)				March (AF per month)				April (AF per month)				May (AF per month)				June (AF per month)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	10,294	1,589	1,585	0	4,463	4,463	2,097	561	4	4	3,745	2,164	4,042	4,042	1,318	756	4,800	4,800	1,500	921	4,074	4,074	4,326	2,549
1998	5,812	845	833	23	8,227	7,560	48	0	1,662	1,111	1,444	427	2,759	1,521	1,050	219	3,677	1,470	1,389	449	3,485	2,866	2,733	1,502
1999	2,926	958	930	279	5,796	3,276	97	28	0	0	0	0	1,489	1,305	428	195	3,467	2,664	331	142	2,507	2,423	2,412	1,507
2000	529	489	0	0	3,606	913	0	0	611	520	0	0	2,468	2,194	0	0	4,011	4,011	103	0	2,851	2,851	4,620	2,791
2001	4	305	0	0	87	33	0	0	196	119	0	0	1,430	786	0	0	4,066	3,659	0	0	771	771	3,210	1,882
2002	1,023	238	0	0	0	0	0	0	0	0	0	0	1,496	752	0	0	2,341	1,896	0	0	1,978	1,978	3,414	2,085
2003	1,001	747	707	213	1,646	1,720	139	31	641	641	0	0	1,668	1,376	0	0	3,322	2,850	876	281	3,463	3,463	3,980	1,703
2004	0	22	22	9	732	843	147	75	1,762	1,762	613	0	2,287	2,287	287	0	3,059	3,059	131	0	1,535	1,535	4,392	2,034
2005	6,730	1,506	0	0	8,158	4,239	280	218	2,529	2,531	2,676	1,202	3,971	3,951	1,676	787	4,836	3,739	2,054	891	3,637	3,434	4,308	2,789
2006	7,047	1,524	1,504	963	3,217	2,965	2,136	1,460	1,226	728	0	0	3,390	3,220	1,135	413	4,836	4,836	3,175	2,008	3,400	3,400	4,620	3,526
2007	81	0	0	0	228	119	0	0	0	0	0	0	52	16	0	0	1,127	837	1,049	390	0	0	1,202	627
Avg	**3,222**	**748**	**507**	**135**	**3,287**	**2,376**	**449**	**216**	**785**	**674**	**771**	**345**	**2,277**	**1,950**	**536**	**215**	**3,595**	**3,075**	**964**	**462**	**2,518**	**2,436**	**3,565**	**2,090**

Table A-4
Stine Canal

Historic Entitlements and Utilization

Calendar	July (AF per month)				August (AF per month)				September (AF per month)				October (AF per month)				November (AF per month)				December (AF per month)				Total (AFY)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	2,711	1,797	4,284	2,576	326	326	3,757	1,840	571	2,067	2,029	948	0	26	0	0	119	10	0	0	801	8	0	0	32,205	23,206	24,641	12,315
1998	2,463	791	4,648	3,136	3,549	1,161	4,582	3,180	6,647	2,481	2,455	1,357	1,470	1,052	1,030	274	1,490	201	189	16	1,234	182	172	19	42,475	21,241	20,573	10,602
1999	26	26	2,908	1,603	0	0	3,741	1,837	0	0	535	266	0	0	0	0	0	0	0	0	0	0	0	0	16,211	10,652	11,382	5,857
2000	0	0	4,367	2,393	0	0	1,347	719	0	0	0	0	0	153	0	0	0	93	0	0	0	2	0	0	14,076	11,226	10,437	5,903
2001	79	79	2,424	1,579	0	0	0	0	0	0	0	0	0	0	0	0	291	516	0	0	869	752	0	0	7,793	7,020	5,634	3,461
2002	0	0	2,337	1,324	0	0	0	0	0	0	0	0	0	0	0	0	3,703	2,234	664	11	938	70	54	0	11,479	7,168	6,469	3,420
2003	145	145	5,137	2,490	41	41	972	0	0	0	0	0	0	0	0	0	0	214	0	0	341	295	0	0	12,268	11,492	11,811	4,718
2004	0	0	3,800	1,675	0	0	155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,375	9,508	9,547	3,793
2005	2,325	2,325	5,811	3,889	1,063	1,063	4,412	2,832	0	1,671	1,091	281	4	1,228	1,176	575	0	1,371	1,264	304	1,279	1,081	970	318	34,532	28,139	25,718	14,086
2006	1,454	1,454	4,787	3,525	369	369	1,655	1,184	0	0	294	173	0	758	276	260	0	2,110	1,188	235	0	342	0	0	24,939	21,706	20,770	13,747
2007	0	0	105	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	1,488	984	2,356	1,116
Avg	**837**	**602**	**3,692**	**2,208**	**486**	**269**	**1,875**	**1,054**	**656**	**565**	**582**	**275**	**134**	**292**	**226**	**101**	**509**	**614**	**300**	**51**	**497**	**249**	**109**	**31**	**18,804**	**13,849**	**13,576**	**7,183**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	July (AF per month)				August (AF per month)				September (AF per month)				October (AF per month)				November (AF per month)				December (AF per month)				Total (AFY)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	2,711	1,797	4,284	2,576	326	326	3,757	1,840	571	571	571	290	0	0	0	0	22	22	22	0	12	12	12	0	31,319	21,700	23,217	11,657
1998	2,463	791	4,648	3,136	3,549	1,161	4,582	3,180	583	583	583	290	1,380	1,052	1,052	274	22	22	22	16	12	12	12	6	33,631	18,994	18,396	9,522
1999	26	26	2,908	1,603	0	0	3,741	1,837	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,211	10,652	10,847	5,591
2000	0	0	4,367	2,393	0	0	1,347	719	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,076	10,978	10,437	5,903
2001	79	79	2,424	1,579	0	0	0	0	0	0	0	0	0	0	0	0	22	22	22	0	12	12	12	0	6,667	5,786	5,668	3,461
2002	0	0	2,337	1,324	0	0	0	0	0	0	0	0	0	0	0	0	22	22	22	11	12	12	12	0	6,872	4,898	5,785	3,420
2003	145	145	5,137	2,490	41	41	972	0	0	0	0	0	0	0	0	0	0	0	0	0	12	12	12	0	11,939	10,995	11,823	4,718
2004	0	0	3,800	1,675	0	0	155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,375	9,508	9,547	3,793
2005	2,325	2,325	5,811	3,889	1,063	1,063	4,412	2,832	0	0	0	0	4	4	4	0	0	0	0	0	12	12	12	0	33,265	22,804	21,233	12,608
2006	1,454	1,454	4,787	3,525	369	369	1,655	1,184	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,939	18,496	19,012	13,079
2007	0	0	105	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,488	972	2,356	1,116
Avg	**837**	**602**	**3,692**	**2,208**	**486**	**269**	**1,875**	**1,054**	**105**	**105**	**105**	**53**	**126**	**96**	**96**	**25**	**8**	**8**	**8**	**2**	**7**	**7**	**7**	**1**	**17,253**	**12,344**	**12,575**	**6,806**

Table A-5
Farmers Canal

Historic Entitlements and Utilization

Calendar	January (AF per month)				February (AF per month)				March (AF per month)				April (AF per month)				May (AF per month)				June (AF per month)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	10,294	553	549	0	4,463	4,463	2,265	879	4	4	2,388	1,746	4,042	4,006	1,458	873	4,800	2,420	2,313	1,434	4,074	3,576	3,745	2,641
1998	2,622	639	633	158	8,227	5,085	575	202	1,662	392	660	319	2,759	1,325	963	327	3,677	1,618	1,564	878	3,485	2,731	2,642	2,093
1999	1,267	425	415	100	878	878	119	45	0	0	0	0	1,462	1,321	472	258	3,467	2,937	699	481	2,459	2,459	2,434	1,862
2000	121	101	0	0	1,170	627	135	75	605	514	0	0	2,468	2,194	0	0	4,011	3,862	994	707	2,787	2,503	3,282	2,504
2001	0	0	0	0	0	0	0	0	196	119	0	0	1,390	767	0	0	4,066	3,659	119	119	730	730	2,204	1,293
2002	201	141	0	0	0	0	0	0	0	0	0	0	1,414	997	283	283	2,317	1,955	188	168	1,947	1,947	3,421	2,247
2003	0	897	883	339	623	216	10	0	641	641	22	8	1,559	1,355	56	56	3,297	2,840	718	365	3,463	3,463	3,475	2,372
2004	0	64	143	55	272	385	395	226	1,762	1,762	141	0	2,235	2,235	93	0	3,059	2,852	537	421	1,446	1,446	3,596	2,610
2005	6,478	1,627	127	0	3,679	3,127	1,565	699	2,529	2,050	1,010	508	3,971	3,298	1,295	785	4,836	2,084	1,997	1,390	3,637	2,821	2,794	2,213
2006	3,709	748	738	516	522	921	783	627	1,186	712	0	0	3,390	3,104	697	391	4,836	3,292	1,918	1,372	3,400	2,439	2,352	1,789
2007	0	0	0	0	0	0	0	0	0	0	0	0	40	12	0	0	980	752	672	434	0	0	1,258	962
Avg	**2,245**	**472**	**317**	**106**	**1,803**	**1,427**	**532**	**250**	**780**	**563**	**384**	**235**	**2,248**	**1,874**	**483**	**270**	**3,577**	**2,570**	**1,065**	**706**	**2,493**	**2,192**	**2,837**	**2,053**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	January (AF per month)				February (AF per month)				March (AF per month)				April (AF per month)				May (AF per month)				June (AF per month)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	10,294	553	549	0	4,463	4,463	2,265	879	4	4	2,388	1,746	4,042	4,006	1,458	873	4,800	2,420	2,313	1,434	4,074	3,576	3,745	2,641
1998	2,622	639	633	158	8,227	5,085	575	202	1,662	392	660	319	2,759	1,325	963	327	3,677	1,618	1,564	878	3,485	2,731	2,642	2,093
1999	1,267	425	415	100	878	878	119	45	0	0	0	0	1,462	1,321	472	258	3,467	2,937	699	481	2,459	2,459	2,434	1,862
2000	121	101	0	0	1,170	627	135	75	605	514	0	0	2,468	2,194	0	0	4,011	3,862	994	707	2,787	2,503	3,282	2,504
2001	0	0	0	0	0	0	0	0	196	119	0	0	1,390	767	0	0	4,066	3,659	119	119	730	730	2,204	1,293
2002	201	141	0	0	0	0	0	0	0	0	0	0	1,414	997	283	283	2,317	1,955	188	168	1,947	1,947	3,421	2,247
2003	0	897	883	339	623	216	10	0	641	641	22	8	1,559	1,355	56	56	3,297	2,840	718	365	3,463	3,463	3,475	2,372
2004	0	64	143	55	272	385	395	226	1,762	1,762	141	0	2,235	2,235	93	0	3,059	2,852	537	421	1,446	1,446	3,596	2,610
2005	6,478	1,627	127	0	3,679	3,127	1,565	699	2,529	2,050	1,010	508	3,971	3,298	1,295	785	4,836	2,084	1,997	1,390	3,637	2,821	2,794	2,213
2006	3,709	748	738	516	522	921	783	627	1,186	712	0	0	3,390	3,104	697	391	4,836	3,292	1,918	1,372	3,400	2,439	2,352	1,789
2007	0	0	0	0	0	0	0	0	0	0	0	0	40	12	0	0	980	752	672	434	0	0	1,258	962
Avg	**2,245**	**472**	**317**	**106**	**1,803**	**1,427**	**532**	**250**	**780**	**563**	**384**	**235**	**2,248**	**1,874**	**483**	**270**	**3,577**	**2,570**	**1,065**	**706**	**2,493**	**2,192**	**2,837**	**2,053**

Table A-5
Farmers Canal

Historic Entitlements and Utilization

Calendar	July (AF per month)				August (AF per month)				September (AF per month)				October (AF per month)				November (AF per month)				December (AF per month)				Total (AFY)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	2,711	2,013	3,622	2,699	167	167	2,781	1,963	294	1,294	577	405	0	0	236	202	0	10	0	0	196	8	0	0	31,045	18,514	19,934	12,842
1998	2,463	1,793	3,687	3,116	3,549	1,768	3,187	2,532	4,308	737	1,198	730	0	189	663	282	61	150	138	75	0	56	46	7	32,813	16,483	15,956	10,719
1999	4	4	2,273	1,676	0	0	1,616	967	0	0	579	221	0	0	422	138	0	0	0	0	0	0	10	8	9,537	8,024	9,039	5,756
2000	0	0	3,725	2,648	0	0	1,214	890	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,162	9,801	9,350	6,824
2001	61	61	1,904	1,350	0	0	814	462	0	0	0	0	0	0	0	0	206	297	0	0	869	752	0	0	7,518	6,385	5,041	3,224
2002	0	0	1,878	1,257	0	0	0	0	0	0	0	0	0	0	0	0	2,711	2,050	494	0	395	101	81	0	8,985	7,191	6,345	3,955
2003	107	107	3,606	2,700	34	34	872	416	0	0	297	0	0	0	434	142	0	0	137	52	214	184	0	0	9,938	9,737	10,510	6,450
2004	0	0	2,735	1,939	0	0	575	372	0	0	246	138	0	0	0	0	0	0	0	0	0	42	42	42	8,774	8,786	8,503	5,803
2005	2,325	1,978	3,788	3,046	984	984	2,658	2,056	0	1,158	1,370	882	0	434	908	338	0	198	210	0	867	199	161	0	29,306	19,958	17,883	11,917
2006	1,454	1,103	2,936	2,403	317	317	3,354	2,514	0	0	577	339	0	0	0	0	0	960	0	0	0	265	0	0	18,814	13,861	13,355	9,951
2007	0	0	198	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	207	0	0	1,020	971	2,128	1,594
Avg	**830**	**642**	**2,759**	**2,094**	**459**	**297**	**1,552**	**1,107**	**418**	**290**	**440**	**247**	**0**	**57**	**242**	**100**	**271**	**333**	**89**	**12**	**231**	**165**	**31**	**5**	**15,356**	**10,883**	**10,731**	**7,185**

Entitlement and Utilization as Adjusted by Reed Decision/Appeal Process

Calendar	July (AF per month)				August (AF per month)				September (AF per month)				October (AF per month)				November (AF per month)				December (AF per month)				Total (AFY)			
Year	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.	Entl.	+ or -	Div.	Del.
1997	2,711	2,013	3,622	2,699	167	167	167	85	268	268	268	134	0	0	0	0	0	0	0	0	196	196	196	0	31,019	17,666	16,971	10,491
1998	2,463	1,793	3,687	3,116	610	610	610	305	268	268	268	134	0	0	0	0	61	61	61	30	0	0	0	0	25,834	14,522	11,663	7,562
1999	4	4	2,273	1,676	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,537	8,024	6,412	4,422
2000	0	0	3,725	2,648	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,162	9,801	8,136	5,934
2001	61	61	1,904	1,350	0	0	0	0	0	0	0	0	0	0	0	0	206	206	0	0	207	207	207	0	6,856	5,749	4,434	2,762
2002	0	0	1,878	1,257	0	0	0	0	0	0	0	0	0	0	0	0	2,711	2,050	494	0	207	207	207	0	8,797	7,297	6,471	3,955
2003	107	107	3,606	2,700	34	34	34	17	0	0	0	0	0	0	0	0	0	0	0	0	207	207	207	0	9,931	9,760	9,011	5,857
2004	0	0	2,735	1,939	0	0	0	0	0	0	246	138	0	0	0	0	0	0	0	0	0	0	0	0	8,774	8,744	7,886	5,389
2005	2,325	1,978	3,788	3,046	610	610	610	305	0	0	0	0	0	0	0	0	0	0	0	0	207	207	207	0	28,272	17,802	13,393	8,946
2006	1,454	1,103	2,936	2,403	317	317	317	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,814	12,636	9,741	7,258
2007	0	0	198	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,020	764	2,128	1,594
Avg	**830**	**642**	**2,759**	**2,094**	**158**	**158**	**158**	**79**	**49**	**49**	**71**	**37**	**0**	**0**	**0**	**0**	**271**	**211**	**50**	**3**	**93**	**93**	**93**	**0**	**14,547**	**10,251**	**8,750**	**5,834**

Appendix B

Data Tables

Table B-1: Potential Use of Release Water on Eastside Canal and State Lands via Central Canal

Eastside and KI Central/20 Ft Ditch State Diversions

Year	Jan Demand	Feb Demand	Mar Demand	Apr Demand	May Demand	Jun Demand	Jul Demand	Aug Demand	Sep Demand	Oct Demand	Nov Demand	Dec Demand	Total Demand
1997	0	1,356	2,059	1,446	2,092	2,115	5,258	3,199	1,584	900	117	169	20,295
1998	500	12	174	192	0	1,382	2,137	3,421	2,162	986	395	206	11,567
1999	448	807	941	838	1,353	1,192	1,145	2,013	2,060	1,646	540	109	13,092
2000	73	90	1,037	1,083	1,569	1,638	2,737	3,593	1,656	763	167	8	14,414
2001	12	20	357	252	605	1,110	1,059	4,000	1,309	543	0	0	9,267
2002	0	353	858	488	571	1,124	1,420	2,515	1,767	790	159	44	10,089
2003	226	385	942	289	638	2,251	1,857	1,502	1,440	644	659	664	11,497
2004	136	303	1,530	1,398	1,154	930	1,523	1,557	1,479	169	14	113	10,306
2005	444	601	700	841	175	783	1,057	230	260	270	393	151	5,905
2006	436	1,310	1,394	119	0	334	1,467	1,802	948	413	428	260	8,911
2007	105	582	880	99	416	416	754	2,073	1,610	58	99	2	7,094
Avg	216	529	988	640	779	1,207	1,856	2,355	1,480	653	270	157	11,131
Max	500	1,356	2,059	1,446	2,092	2,251	5,258	4,000	2,162	1,646	659	664	

Eastside and KI Central/20 Ft Ditch In-Lieu Potential

Year	Jan Demand	Feb Demand	Mar Demand	Apr Demand	May Demand	Jun Demand	Jul Demand	Aug Demand	Sep Demand	Oct Demand	Nov Demand	Dec Demand	Total Demand
1997	500	0	430	636	1,031	321	737	561	2,162	1,646	659	0	8,683
1998	500	1,356	2,059	1,446	2,092	2,251	5,258	4,000	2,162	1,646	659	0	23,429
1999	500	1,356	2,059	1,446	2,092	122	224	0	787	923	0	0	9,509
2000	60	1,356	2,059	1,236	127	272	0	0	517	1,646	253	0	7,526
2001	500	1,356	2,059	1,446	708	0	0	0	0	0	0	0	6,069
2002	500	1,356	2,059	1,446	2,092	0	601	0	0	0	659	0	8,713
2003	-561	1,356	2,059	1,446	2,092	0	0	0	1,695	495	0	0	8,582
2004	500	1,356	848	0	113	0	0	0	0	1,646	659	0	5,122
2005	500	1,356	2,059	1,446	2,092	1,077	319	0	2,162	1,646	0	0	12,657
2006	500	1,356	2,059	1,446	874	473	351	150	2,162	1,167	659	0	11,197
2007	500	1,356	2,059	1,446	1,924	0	0	0	0	66	0	0	7,351
Avg	364	1,233	1,801	1,222	1,385	411	681	428	1,059	989	323	0	9,894

Table B-2: Potential Use of Release Water in Buena Vista Service Area

Historic Diversions Lost Due to Reed Decision/Appeal

Year	Jan Demand	Feb Demand	Mar Demand	Apr Demand	May Demand	Jun Demand	Jul Demand	Aug Demand	Sep Demand	Oct Demand	Nov Demand	Dec Demand	Total Demand
1997	702	0	0	0	0	0	0	0	0	0	0	214	916
1998	537	0	0	0	0	0	0	0	0	0	0	354	891
1999	641	0	0	0	0	0	0	0	0	313	480	843	2,277
2000	474	0	0	0	0	0	0	0	0	0	0	6	480
2001	1,285	0	0	0	0	0	0	0	0	0	0	1,493	2,778
2002	508	0	0	0	0	0	0	0	0	0	1,061	866	2,435
2003	234	0	0	0	0	0	0	0	0	485	176	0	895
2004	0	0	0	0	0	0	0	0	0	8	232	9	249
2005	0	0	0	0	0	0	0	0	0	0	171	0	171
2006	672	0	0	0	0	0	0	0	0	1,656	327	1,076	3,731
2007	1,107	0	0	0	0	0	0	0	0	0	0	0	1,107
Avg	560	0	0	0	0	0	0	0	0	224	222	442	1,448

Buena Vista Service Area Diversion Potential

Year	Jan Demand	Feb Demand	Mar Demand	Apr Demand	May Demand	Jun Demand	Jul Demand	Aug Demand	Sep Demand	Oct Demand	Nov Demand	Dec Demand	Total Demand
1997	702	0	0	0	0	0	0	0	0	0	0	0	702
1998	537	0	0	0	0	0	0	0	0	0	0	0	537
1999	641	0	0	0	0	0	0	0	0	0	0	0	641
2000	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	1,285	0	0	0	0	0	0	0	0	0	0	0	1,285
2002	508	0	0	0	0	0	0	0	0	0	1,061	0	1,569
2003	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	8	232	0	240
2005	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	672	0	0	0	0	0	0	0	0	0	14	0	686
2007	866	0	0	0	0	0	0	0	0	0	0	0	866
Avg	474	0	0	0	0	0	0	0	0	1	119	0	593

Table B-3: Potential Use of Release Water for M&I

M&I Direct Use or Recharge Potential

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1997	1,456	0	0	0	0	0	0	0	1,456	56	120	0	3,088
1998	1,456	1,456	1,456	1,456	1,456	1,456	1,456	1,456	1,456	1,456	726	0	15,286
1999	1,456	1,456	1,456	1,456	387	0	0	0	0	0	0	0	6,211
2000	0	1,456	1,456	0	0	0	0	0	0	377	0	0	3,289
2001	1,456	1,456	1,456	1,456	0	0	0	0	0	0	0	0	5,824
2002	518	1,456	1,456	1,456	1,136	0	0	0	0	0	170	0	6,192
2003	0	1,456	1,456	1,456	341	0	0	0	0	0	0	0	4,709
2004	1,456	1,456	0	0	0	0	0	0	0	1,101	474	0	4,487
2005	1,456	1,456	527	1,413	1,456	0	0	0	1,456	1,456	0	0	9,220
2006	1,456	1,456	1,456	1,456	0	0	0	0	934	0	0	0	6,758
2007	0	1,456	1,114	1,456	0	0	0	0	0	0	0	0	4,026
Avg	974	1,324	1,076	1,055	434	132	132	132	482	404	135	0	6,281

Table B-4: Potential Use of Release Water for In-District Recharge

In-District Recharge Potential

Year	Jan Recharge	Feb Recharge	Mar Recharge	Apr Recharge	May Recharge	Jun Recharge	Jul Recharge	Aug Recharge	Sep Recharge	Oct Recharge	Nov Recharge	Dec Recharge	Total Recharge
1997	12,700	0	0	0	0	0	0	0	6,816	0	0	0	19,516
1998	4,457	4,882	8,879	12,700	8,700	3,474	1,791	457	8,250	2,997	0	0	56,587
1999	2,667	5,035	2,260	1,818	0	0	0	0	0	0	0	0	11,780
2000	0	8,560	2,181	0	0	0	0	0	0	0	0	0	10,741
2001	1,118	5,368	1,106	773	0	0	0	0	0	0	0	0	8,365
2002	0	754	1,995	648	0	0	0	0	0	0	0	0	3,397
2003	0	4,584	515	2,065	0	0	0	0	0	0	0	0	7,164
2004	1,697	4,917	0	0	0	0	0	0	0	0	0	0	6,614
2005	12,700	5,500	0	0	2,089	0	0	0	4,573	1,057	0	0	25,919
2006	10,079	865	3,584	357	0	0	0	0	0	0	0	0	14,885
2007	0	2,768	0	356	0	0	0	0	0	0	0	0	3,124
Avg	4,129	3,930	1,865	1,702	981	316	163	42	1,785	369	0	0	15,281

Oct - Apr (12,700 AF max), May - Sep (8,700 AF max)

Table B-5: Potential Use of Release Water for Pioneer Recharge

Pioneer Recharge Potential

Year	Jan Recharge	Feb Recharge	Mar Recharge	Apr Recharge	May Recharge	Jun Recharge	Jul Recharge	Aug Recharge	Sep Recharge	Oct Recharge	Nov Recharge	Dec Recharge	Total Recharge
1997	750	0	0	0	0	0	0	0	0	0	0	0	750
1998	0	0	0	750	750	0	0	0	0	0	0	0	1,500
1999	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	242	0	0	0	0	0	0	0	0	0	0	0	242
2006	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0
Avg	90	0	0	68	68	0	0	0	0	0	0	0	226

Table B-6: Release Water Balance After In-District and Pioneer Uses

Balance Release Water

Year	Jan Release	Feb Release	Mar Release	Apr Release	May Release	Jun Release	Jul Release	Aug Release	Sep Release	Oct Release	Nov Release	Dec Release	Total Release
1997	5,039	0	0	0	0	0	0	0	0	0	0	0	5,039
1998	0	0	0	1,245	2,206	0	0	0	0	0	0	0	3,451
1999	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0
Avg	458	0	0	113	201	0	0	0	0	0	0	0	772