Appendix G: Supplemental Water Supply Information

- Improvement District 4 2015 Report on Water Conditions
- DWR Groundwater Bulletin 118

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- Improvement District 4 2015 Report on Water Conditions

Improvement District No. 4

Report on Water Conditions 2015

February 1, 2016

Board of Directors
Kern County Water Agency
P. O. Box 58
Bakersfield, CA 93302-0058

Dear Members of the Board:

The *Improvement District No. 4 2015 Report on Water Conditions*, prepared as required by section 14.25 of the Kern County Water Agency (Agency) Act, is herewith filed with the Agency's Secretary of the Board. This is the 43rd in a series required for the setting of groundwater charges for funding operating costs of Improvement District No. 4 (ID4) project facilities.

This report describes surface and groundwater conditions for ID4 and includes estimates of water supplies and requirements for the Water Year July 1, 2016 through June 30, 2017.

Also included is an operating cost projection through 2016. This projection and the recommendations indicate the desirability of establishing a groundwater charge for the 2016-17 water year. The information for setting this charge is contained in this report and is recommended for consideration at the public hearing to be held on Monday, March 21, 2016 at 3:00 p.m. in the Stuart T. Pyle Water Resources Center Board Room, located at 3200 Rio Mirada Drive, Bakersfield, California.

Respectfully submitted,

James M. Beck
General Manager

I hereby acknowledge receipt of the *Improvement District No. 4 2015 Report on Water Conditions* and will make it available for examination by the public.

Secretary of the Board

Enclosure

(661) 634-1400

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P.O. Box 58
Bakersfield, CA 93302-0058

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3200 Rio Mirada Drive
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Improvement District No. 4

of the Kern County Water Agency

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Urban Bakersfield Advisory Committee – 2015

The Urban Bakersfield Advisory committee (UBAC) is charged with making recommendations to the Kern County Water Agency (Agency) Board of Directors (Board) on the Improvement District No. 4 (ID4) budget, water supply and water quality plans, and use of ID4 facilities. The Agency Board appoints nine members and nine alternate members to UBAC each year.

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Kern County Water Agency Appointed
Vaughn Water Company
Van Grayer

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Definitions

Acre-Foot (af) - The quantity of water required to cover one acre of land to a depth of one foot (325,851 gallons). This amount of water is normally used by a family of four during a one-year period for residential use.

Agency - Kern County Water Agency.

Agricultural Water - Water first used on land in the production of crops or livestock for market.

Aquifer - Porous water-bearing stratum or zone below the Earth's surface.

Central Valley Project - In Kern County, this refers to the Friant-Kern Canal and its service area.

Customers - Based on the new treated water contracts.

DWR - California Department of Water Resources.

Enterprise Fund - General operating fund used to fund ID4 operations.

Groundwater Replenishment - Any act of God or man which replenishes or adds water to the subsurface aquifer system.

ID4 - Improvement District No. 4.

MCL - Maximum Contaminant Level - The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

MGD - Million gallons per day.

M&I - Municipal and Industrial – Generally refers to water used for domestic purposes.

PHG - Public Health Goal - The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Potable Water - Water fit to drink pursuant to State and federal statutory requirements and aesthetic acceptability.

Project Water - Any combination of State Water Project water and additional water generated from the State Water Project, or from exchanges with Kern River interests or other sources.

Purveyor - Company or organization that provides a domestic water supply to a group of water users on a retail basis.

Small Groundwater Producing Facility - Facilities that have a discharge opening not greater than two (2) inches in diameter and do not provide water for an area in excess of 10,000 square feet.

SWP - The State Water Project – In Kern County, its major feature is the Edmund G. Brown California Aqueduct.

Table A - The amount of water from the State Water Project allocated to ID4, according to the Agency's contract with the California Department of Water Resources.

TWCEP - Treated Water Capacity Expansion Project.

Very Small Groundwater Producing Facility - Facilities where, in the opinion of ID4 staff, the cost of collection would exceed the flat rate charge.

Water Year - The water year as referenced within this report refers to the first day of January through the end of December.

Summary & Recommendations

Based on the information compiled and presented herein, it has been determined that the amount of agricultural water withdrawn from the groundwater supplies of Improvement District No. 4 (ID4) for the year 2015 is estimated to be 960 acre-feet (af). See the Groundwater Production Table on page 38.

The estimated amount of all other non-agricultural water withdrawn from the groundwater supplies of ID4 for the 2015 calendar year is 74,575 af (page 38).

29,032 af (including Henry C. Garnett Water Purification Plant process) of treated surface water was delivered to water purveyors in ID4 during water year 2015 (page 34).

The Kern County Water Agency (Agency), on behalf of ID4, was obligated by contract to pay for 82,946 af of State Water Project (SWP) water in calendar year 2015 (page 36).

If the 2016 California Department of Water Resources (DWR) SWP allocation remains at 15 percent, Agency staff estimates that 70,600 af of water will be imported into ID4. Approximately 22,000 af of this water will be recharged as conveyance losses in delivering raw surface water to the Henry C. Garnett Water Purification Plant. At the time of printing, DWR SWP Table A water allocation remains at 15 percent.

Total fund accumulation in the Enterprise Fund was $8.7 million as of July 1, 2015 and is projected to be $6.6 million as of July 1, 2016. The total fund accumulation includes recommended reserve levels as summarized below.

Agency staff developed a reserve policy to identify appropriate levels of accumulation within the ID4 Enterprise Fund. The 2015-16 treated water rate is set at $141 per af. The components of these reserve funds should include: $1.5 million to cover the Henry C. Garnett Water Purification Plant equipment and replacement; $0.5 million for Cross Valley Canal (CVC) power reserves; $2.0 million in additional funds available for catastrophic needs of ID4; and $0.8 million for acquisition of additional surface water supplies. Additionally, ID4 has approximately 210,252 af (page 33) stored in the Kern Water Bank, the Pioneer Project, the City of Bakersfield's (City) 2800 Acre Recharge Facility, and the Rosedale-Rio Bravo Water Storage District (Rosedale) and ID4 Joint Use Groundwater Recovery Project area.

It is recommended that charges for groundwater production in ID4, for the fiscal year commencing July 1, 2016 and ending June 30, 2017, be levied as follows:

1. Agricultural groundwater production:
   $18.50 per acre-foot

2. All other groundwater production:
   $37 per acre-foot

3. Small groundwater-producing facilities:
   $37 (flat rate)

4. Very small groundwater producing facilities[1]:
   $0 (no charge)

[1]For administrative convenience, a flat rate annual charge of $37 was levied for small water-producing facilities, and no charge was levied for very small water-producing facilities where the cost of collection would exceed the flat rate charge.

Purpose

This is the 43rd in a series of annual reports on water conditions within ID4. This report is intended to provide information upon which the levying of groundwater charges for Fiscal Year 2016-17 is based. The first report, issued on October 1, 1973, detailed events leading to the formation of ID4 and formulation of a project plan for importing water from the California Aqueduct. Appended to the first ID4 report on water conditions are the full texts of the formation resolution and a resolution declaring an intention to establish groundwater charges within ID4. Appended to the 1993 report are two resolutions that amended the formation of ID4 (prior Resolution No. 17-71) by raising the maximum permissible groundwater charge to $40 per af, thereby raising the cost of treated water to a maximum level of $38 in excess of the maximum groundwater charge levied in a given year. These actions were superseded when the Agency Board of Directors (Board) adopted the ID4 Financial Management Plan in March 1999. The Board adopted the Revised ID4 Financial Management Plan (Revised Financial Plan) in January 2011, which replaced previous versions of the ID4 Financial Management Plan. The Revised Financial Plan updated the financial requirements and reserve policy of ID4 as a result of the Treated Water Capacity Expansion Project (TWCEP).

In December 1972, the Agency published a Notice of Intent to establish a groundwater charge in accordance with section 14.22 of the Agency Act 9098 (Act). Following the Act, as amended February 17, 1982, requires that [such notice]:

> All water-producing facilities (wells) located within ID4 shall be registered with the Agency by the owner or operator.
>
> The Agency Engineer shall prepare an annual report by February 1 of each year.
>
> A public hearing shall be held on the third Monday in March regarding the Engineer's report and to receive public testimony thereon.
>
> Within 30 days after the close of the hearing, the Board shall determine whether a groundwater charge will be levied, and if so, shall set the charge.
>
> Each owner or operator of a well shall file with the Agency, on or before January 31 and July 31 of each year, a statement of total water production for the preceding six months, and shall pay the groundwater charges as determined on the water production statement.

The Act requires a projection of estimates of water conditions and requirements for fiscal years commencing July 1. SWP operations are based on a calendar year. Local hydrologic conditions have a substantial impact on the ability of ID4 to receive and spread its SWP Table A water. Therefore, this report presents hydrologic and operational histories for back-to-back calendar years for use in projecting fiscal year supplies and requirements as required by the Act. Plate 1 (page 59) identifies agricultural, M&I and undeveloped lands within ID4 based on a 2015 land use survey. Also shown on page 40 is the acreage devoted to each land use classification within ID4 since 1972.

History of ID4

General

ID4 was formed by a resolution adopted by the Agency Board on December 21, 1971 to provide a supplemental water supply for portions of the urban Bakersfield area through the importation of water from the SWP. In order to have a means for transporting this supplemental water to ID4 from the California Aqueduct, the ID4 project included ID4's participation in the CVC. Upon reaching ID4, the imported supply was to be delivered directly to recharge areas for direct replenishment of the underlying groundwater aquifer or to the Henry C. Garnett Water Purification Plant for treatment and delivery to in-district water purveyors.

Creation of Improvement District No. 4

The Agency was formed by Chapter 1003 of the Statutes of 1961. The primary purpose for creating the Agency was the establishment of a single entity in Kern County to negotiate and administer a water supply contract with the State of California for its SWP. In November 1963, to provide a firm water supply to supplement the estimated safe yield of the underground basin, the Agency contracted with DWR for a water supply for member units within Kern County, which included 77,000 af annually for ID4.

Subsequent amendments to the Act added provisions for the formation of improvement districts as needed to expedite solutions to specific problems relating to flood control, drainage or water supply. Activities leading to the creation of ID4 were initiated by the Agency Board by adoption of Resolution No. 25-70 on December 10, 1970, which outlined the need for such an improvement district. ID4 was formed by a resolution adopted by the Agency Board on December 21, 1971 for the purpose of financing the construction of a water purification plant, related water conveyance facilities, and a portion of the cost of the CVC. Resolution Nos. 16-71 and 17-71 were adopted by the Agency Board on December 21, 1971 to finalize formation activity and establish the boundaries of ID4 as they exist today.

On September 12, 1972, an election was held within ID4 authorizing $17.5 million of general obligation bonds to construct ID4's share of the CVC and water purification facilities, making the contracted water supply available to the areas of need within ID4. Five water districts in the easterly portion of the San Joaquin Valley in Kern County shared in the construction of the CVC to convey their water to their respective districts.

Historic Conditions

Prior to construction of the CVC, the primary water supply for all uses within ID4 was groundwater. The groundwater basin underlying ID4 receives its recharge from the Kern River, which traverses ID4 from east to west, a distance of about 12 miles, through a wide, flat, permeable bed. Historically, flood flows that overflowed on lands on both sides of the river contributed further to groundwater recharge. Seepage and percolation through a number of unlined canals provided another source of recharge.

In the 1860s, when the first settlers arrived in Bakersfield, water levels were close to the surface. These levels declined from 40 to 90 feet by the 1940s and pumping lifts of 100 feet or more were common. Due to the declining water table, the quality of the groundwater in portions of ID4 degraded as poorer quality water moved into the area from adjacent lands.

Section 14.25 of the Act requires that, "... the Agency Engineer shall annually prepare a report which shall include, among other matters which the Agency may desire, information on the availability of surface and groundwater in the improvement district, the quantity of water needed for surface delivery and for replenishment of the groundwater supplies within the improvement district for the ensuing water year, the amount of water which the Agency is obligated to purchase for use in the improvement district during the ensuing water year and an estimate of the amount of groundwater to be extracted within the improvement district during the ensuing water year."

This report addresses establishing a groundwater charge for the fiscal year commencing July 1, 2016. However, the SWP operates on a calendar year basis. Water orders and payments for water are on the calendar year. Collection of tax funds by the County of Kern and Agency bookkeeping are on a fiscal year basis. For this reason, many of the comparisons cited in this report refer to calendar year 2016, which overlaps the 2016-17 fiscal year.

Water Supply & Requirements

Availability of Surface Water and Groundwater

The annual surface water supply for ID4 includes a SWP Table A allocation of 77,000 af of municipal and industrial (M&I) water and 5,946 af of firm agricultural water supplies for a total of 82,946 af. The annual Table A allocation received from the SWP is subject to reduction during drought conditions and regulatory requirements for environmental protection. Unless additional facilities are constructed to increase the SWP yield, Table A allocation reductions will occur more frequently in future years.

The Board recognized the need for advanced planning to meet the water demand of a growing community and adopted Resolution No. 13-83 on June 23, 1983, stating that the Agency will do everything in its power to provide the urban Bakersfield area additional potable surface water supplies. The Agency completed studies to determine the timing and extent of needs for such additional potable water supplies and the best way to meet these needs. Resolution No. 21-93, adopted on May 27, 1993, established policy for meeting future water supply requirements of ID4 and the joint City/County 2010 General Plan Area.

On May 26, 1988, the Board adopted Resolution No. 12-88 allocating to ID4 10,276 af of firm agricultural water and 1,554 af of surplus agricultural water. This resolution provides 35 cubic feet per second (cfs) of additional flow capacity in the California Aqueduct through Reach 16 to the forebay of the A.D. Edmonston Pumping Plant. This water had been previously contracted to Wheeler Ridge-Maricopa Water Storage District.

In 1996, the Kern Water Bank property was transferred to the entities participating in the Kern Water Bank Authority. As payment for its share of the Kern Water Bank, ID4 returned 4,330 af of its SWP firm agricultural Table A allocation to DWR. This reduction is reflected in current ID4 SWP Table A amounts.

Other supplies utilized to maximize replenishment operations in normal to wet years include interruptible water from the SWP (Article 21 water), water that is surplus to the Central Valley Project, water available from the Friant-Kern Canal and Kern River water. The amounts of 2015 SWP Table A water received are shown on page 33, together with adjustments for exchanges and purchases. Actual historic deliveries are shown on page 36. ID4 actively negotiates exchanges with Kern River interests for a supply of Kern River water.

Kern River supplies are delivered to agricultural water users in areas served by the City and Kern Delta Water District (Kern Delta) within ID4. Most of these agricultural service areas have dual supply systems allowing for the use of groundwater in dry years and river water in wet years. The City of Bakersfield and Kern Delta supplied 3,332 af of Kern River water for agricultural use within in 2015.

Treated municipal effluent irrigates agricultural land in the southeast area of ID4. City and County sewage treatment plants in the southeast portion of ID4 treat and process wastewater, which is applied to agricultural areas south of Brundage Lane and east of Cottonwood Road.

Water Needed for Surface Delivery and Groundwater Replenishment

In 2016, ID4 needs about 48,600 af for direct deliveries to the purveyors, with an additional 22,000 af for internal purification plant processing and canal losses to allow for a maximum, non-interruptible supply to the Henry C. Garnett Water Purification Plant. Water needed for surface delivery will be SWP water contracted for by the Agency on behalf of ID4 as described earlier in this report, and/or Kern River water obtained by purchase or exchange and/or water recovered from ID4's banking projects to augment surface supplies.

SWP Table A water supplies not required for the Henry C. Garnett Water Purification Plant are normally utilized for groundwater replenishment. As of January 2016, the Kern River watershed is projected to be about 83 percent of normal. SWP supplies are projected to be at least 15 percent of SWP Table A water amounts, which results in an allocation to ID4 of 12,442 af. This supply is insufficient for full deliveries from the Henry C. Garnett Water Purification Plant. Additional supplies will be recovered from various banking projects to fulfill demand. In the past, natural replenishment of the basin's groundwater supply derived primarily from Kern River flows. When a dry year follows a period of heavy replenishment, rapid declines in groundwater levels adjacent to the river are noted as mounds dissipate.

Water Obligated for Purchase by the Agency

The Agency was obligated to pay for 82,946 af on behalf of ID4 in 2015.

Groundwater Conditions

Data collected by Agency staff indicates an average decrease in groundwater levels of 13.1 feet in 2015. In previous years, the change in groundwater levels has been calculated from contour maps generated from data collected in the fall (September through October). Comparing fall data can produce an erroneous interpretation in the calculation due to the large amount of groundwater extraction occurring in and adjacent to ID4 during the time it was collected. A more accurate calculation may be made by comparing data from mid-winter through early spring (January through March), due to the decrease in groundwater demand (pumping). Calculating the change in groundwater levels using data collected in the spring was instituted in 2011 (see Figure 1).

The average depth is weighted to account for the non-uniform density of monitored wells within three distinct areas of the groundwater service area of ID4. These three areas consist of the area approximately north of Rosedale Highway, the area approximately south of Stockdale Highway and the Kern River area. These three areas are considered separately due to varying groundwater recharge practices, different groundwater extraction demands and geological considerations with respect to the relative ease of subsurface migration of groundwater. Pages 64-65 depict the elevation of water in wells and depth to water in wells, respectively.

Estimated Groundwater Extractions

Groundwater extraction is closely related to land use within ID4. Agency staff has conducted annual land use surveys since 1972. Data of historical land use within ID4 is shown on page 40. The estimated amount of groundwater extracted in 2015 was 75,535 af (page 38).

Groundwater Replenishment

ID4 provides a treated surface water supply to replace a portion of groundwater pumping. The replaced pumping, or in-lieu recharge, combined with imported SWP or exchanged Kern River water recharges the underground aquifer. Recharge made possible by water exchanges with Kern River interests commenced in 1971. Recharge using SWP water commenced in 1975 with the completion of the CVC. Actual amounts spread may vary from about 8,000 af of unavoidable seepage losses to over 90,000 af, depending on local and SWP water conditions and regulation afforded by exchanges.

Since 1971, ID4 has recharged 1,812,891 af (page 35). The SWP Table A water available for recharge or total in the same period was 898,144 af (page 35). The difference of 914,747 af was obtained from exchanges with Kern River or Friant-Kern Canal interests and banked water imports.

In-District recharge for 2015 was 14,491 af (page 35). The final SWP Table A water allocation was 20 percent and the Kern River runoff was 18 percent.

Operations

Banking

In 2015, ID4 utilized capacity in all of the following groundwater banking projects due to the extremely dry hydrologic conditions. As water levels in the aquifer declined, the maximum annual recovery of the wells (described in the banking summaries below) also declined. Additionally, ID4 utilized capacity in the City's Olcese well field to recover 252 af of previously banked water from the City's 2800 Acre Recharge Facility as provided for in Agreement 08-035 between the Agency and City.

Kern Water Bank

ID4 has a 9.62 percent interest in the Kern Water Bank recharge and recovery facilities as a result of the 1996 agreement among project participants, the Agency and DWR. The number of recovery wells currently available is 72, yielding a total annual recovery capacity of approximately 230,000 af. The maximum annual recharge capacity of the project is about 450,000 af. ID4 recovered 12,921 af in the Kern Water Bank facilities in 2015.

Pioneer Project

ID4 has a 10 percent interest in the Agency-owned Pioneer Project recharge and recovery facilities as a result of the 1998 Pioneer Participation Agreement. The total number of completed wells on the project is 38, which yield a total annual recovery of approximately 100,000 af. The maximum annual recharge capacity of the project is about 146,000 af. ID4 recovered 3,852 af in the Pioneer Project facilities in 2015.

ID4 Recovery Program

ID4 currently owns four wells on the City's 2800 Acre Recharge Facility, located west of Allen Road and south of Stockdale Highway. These wells were drilled and cased in 1999 and remained idle during 2000 through 2002. In 2003, the project was completed with the installation of pumps, motors and pipelines. ID4's overall recovery capacity for this project is 20 cfs or 12,000 af annually. ID4 recovered 7,788 af from the 2800 Acre Recharge Facility in 2015.

Allen Road Complex Well Field

ID4 owns and operates seven wells located along the north side of the Kern River between Allen Road and Coffee Road. These wells may be used as part of a joint program with the City to recover previously recharged water for delivery into the Kern River channel for recreational purposes during dry years. ID4 can also use the wells to enhance potential exchanges or for water quality benefits for the Henry C. Garnett Water Purification Plant. ID4 recovered 23,258 af from the Allen Road Complex Well Field in 2015.

Improvement District No. 4 - Rosedale-Rio Bravo Joint Use Recovery Program

The Rosedale and ID4 Joint Use Groundwater Recovery Program (JURP) facility includes seven recovery wells with a total capacity of 35 cfs. ID4 operates this well field to recover banked water for two of Rosedale's partners, Kern-Tulare Water District (Kern-Tulare) and Arvin-Edison Water Storage District, with a maximum annual recovery capacity of 21,000 af. The JURP Agreement also provides ID4 with the ability to exchange surface water for an equal amount of banked water in the JURP area. In 2015, ID4 recovered 5,614 af to meet district demands and 6,899 af on behalf of Rosedale's banking partners.

Exchanges

Exchanges of SWP water for Kern River and Friant-Kern Canal water will typically improve the quality of raw water delivered to the Henry C. Garnett Water Purification Plant and water spread for replenishment of the groundwater aquifer. Also, there are savings to ID4 in reduced CVC pumping costs when the exchange entity can accept return of ID4 water in the California Aqueduct, or at locations west of the Henry C. Garnett Water Purification Plant. These power savings occur when ID4 does not have to pump the water easterly, from the SWP through the seven lift stations on the CVC to bring it into ID4. The current power costs averaged for the year are $3.13 per af at pumping plants one through seven, resulting in a total average cost of approximately $21.88 per af when water is delivered the full distance from the California Aqueduct to the terminus of the CVC Extension. An activity table depicting exchange activity for 2015 is shown on page 33.

In 2015, ID4 exchanged water with several entities to benefit all parties by saving costs, conserving supplies and keeping water quality consistent. An exchange between Kern Delta and California Water Service Company (CWS) provided supplies from the Kern River to CWS in exchange for SWP water from ID4. ID4 received banked supplies in the City's 2800 Acre Recharge Facility. In 2015, a total of 3,692 af was exchanged between these three entities. An exchange with Kern-Tulare Water District (Kern-Tulare) provided ID4 with banked supplies in the JURP area while Kern-Tulare received SWP supplies. The exchange was for 9,000 af. Additionally, ID4 received 1,500 af of SWP supplies from Kern-Tulare in exchange for supplies in the JURP area. ID4 also exchanged 210 af of SWP supplies with Lost Hills Water District for Friant-Kern supplies.

The 2013 Agreement for a Dry Year Water Supply from ID4 (Dry Year Agreement) provides the terms for treated water customers to access previously banked water from the groundwater banking projects that ID4 participates in. The Dry Year Agreement helps to reduce water shortages for treated water customers. As part of the Dry Year Agreement, 5,187 af were recovered in 2015.

Summary of Water Supply Operations

The total amount of direct, in-lieu and Kern River recharge incidental to ID4 operations since 1971 is shown in Figure 1 on page 53. This includes banking programs outside of ID4 boundaries, which also benefit ID4.

Total ID4 In-District Recharge (Direct Recharge)	1,812,995 af
Total Treated Water Supply (In-Lieu Recharge)	1,086,529 af
Subtotal of ID4 Project Recharge Activities	2,899,524 af

Recharge of water incidental to the ID4 Project effort also occurs during Kern River flood years and through conveyance of Kern River water to others.

Subtotal of ID4 Project Recharge Activities	2,899,524 af
Incidental Canal & River Recharge	3,254,075 af
Total Recharge Within ID4	6,153,599 af
Total Reported Groundwater Production Within ID4	(3,313,972) af
Net Balance for ID4 Project Duration	2,839,627 af


Amtrak California
DANGER
DO NOT DREDGE
OR
DRAG ANCHOR
5

Education

ID4 has historically participated in funding a comprehensive Water Education Program to educate local students about Kern County's water supplies, the importance of water and water use efficiency. The goal of the Water Education Program is to provide the public with the opportunity to make informed decisions when it comes to water use and conservation. The ID4 program incorporates teacher workshops, curriculum materials, assemblies, classroom presentations and student contests. All curricula and instruction offered through the Water Education Program support the Common Core Standards and Next Generation Science Standards for grades kindergarten-6.

Water Education Program Components

Project WET

Project WET (Water Education for Teachers) promotes the awareness, appreciation, knowledge and stewardship of water resources. Project WET workshops maximize the time engaged in hands-on activities, help educators become familiar with teacher-designed features of the guide and provide opportunities to bounce implementation ideas around with fellow educators. Every Project WET activity was created by teachers, for teachers, and each incorporates nationally recognized education principles and practices. Project WET activities provide step-by-step instructions making the activities very popular with California educators of all levels of teaching experience. Project WET activities are correlated to Common Core Standards, Next Generation Science Standards and California Environmental Education Initiative (EEI) learning objectives.

ID4 is proud to be a facilitator for Project WET and annually hosts two Project WET Workshops and Practicum Sessions. In the 2014-2015 school year, 37 teachers from ID4's service area attended the Project WET teacher workshops. The workshops feature classroom-proven, hands-on learning activities that make water topics come alive for teachers and students. The Project WET activities that were presented during the workshops were specifically tailored to easily integrate knowledge of local water resources and to highlight local water issues. Each teacher received a new Project WET 2.0 Guide (Guide) that was provided through a U.S. Bureau of Reclamation Central Valley grant. The Guide features 65 kindergarten-12th grade Project WET activities to enhance student application of curricular skills in math, language arts, science and history/social science to the study of water. An additional feature of the Guide includes a website portal address that enables teachers to broaden their educational resources.

Teachers had the opportunity to register for continuing education units from California State University, San Marcos after their participation in the workshop and left with custom-made activity kits to use in their classrooms.

Water Awareness Poster Contest

Water Awareness Month is celebrated statewide in May, and ID4 celebrates the importance of water in the community by having students express how they can play a part in water conservation. As part of this commitment to water conservation, ID4 holds an annual poster contest for students in grades 1-6. In the 2015 poster contest, over 350 entries were received from 14 different schools within ID4's service area. From those entries, 12 winning posters were selected. The winners received an award of recognition and their posters are displayed on the Agency's website. First, second and third place winners were presented with awards during year-end assemblies.

5th Grade Water Cycle Presentation

The Incredible Journey—This Project WET activity is conducted in the classroom. As part of the lesson, students role-play as a water molecule, which helps them to conceptualize the water cycle as more than a two-dimensional path. At the conclusion of the lesson, the students will have made a water cycle bracelet that describes their "Incredible Journey" as a water molecule. The objectives covered in the lesson include: the movement of water within the water cycle; the different states of water as it moves through the water cycle; the location of most of the water on Earth; and the concepts of evaporation and condensation. As a language arts extension activity, teachers have the option of having the students write a story about the water molecule's journey. In the 2014-2015 school year, over 250 students within ID4's service area participated in this presentation. .

Water Education Videos and Lesson Plans

As part of the Water Education Program, all schools that held an assembly received three water education videos and coordinating lesson plans. These videos are meant to enrich the students' understanding and knowledge of local and state water supplies.

California's Water California's Water System—This video, produced by and starring Huell Howser, explores the unique California water system. Mr. Howser focuses on how water is moved and stored along the California Aqueduct. This video and lesson plan were designed for use in grades 4-6.

California's Water Groundwater Banking—This video, produced by and starring Huell Howser, looks at how groundwater basins play a critical role in meeting California's water needs. Mr. Howser visits the Kern Water Bank Authority where groundwater basins are used to improve local water supply reliability. This video and lesson plan were designed for use in grades 4-6.

All About Water and You!—This video, produced by the California Water Awareness Campaign, is a comprehensive water education video that introduces the students to the water storage and delivery system in California. The video also explores how people use water and how to use water wisely. The video and lesson plans were designed for use in grades 1-3.

3rd-5th Grade WebQuests

Published on the Agency's website are two Water Education WebQuests. The two WebQuests have been developed for students in grades 3-5. Using the internet, the students are able to explore the world of water. The following objectives are covered in the WebQuests:

The different water sources in Kern County;
How water is purified;
How students can play a role in water conservation; and
The science of water.

2014-2015 Water Education Assemblies

ID4 offers the following Common Core and Next Generation Science Standards-based grade-level assemblies and materials to schools located within ID4's service area. All assemblies address Kern County's state and local water supplies, the Henry C. Garnett Water Purification Plant, local groundwater banking programs and water conservation. The lively assemblies include colorful pictures and videos as well as interactive activities for the students to follow. At the conclusion of the assembly, all teachers receive a water education curriculum packet and grade-level educational materials for all students. An effort has been made to integrate many subject areas (science, social studies, English-language arts and art) and to help students develop specific skills (critical thinking, organizing data and predicting).

Kindergarten Assembly Program

"Ruby the Radish" Urban Water Use and Water Conservation Story—This Common Core and Next Generation Science Standards-based Water Education unit was designed to teach kindergarten students within ID4's service area the importance of water and its conservation. This unit includes the story "*Ruby the Radish*," which has been written and illustrated exclusively for ID4. In the story, the main character Ruby the Radish starts as a seed, and raises awareness of how to use water wisely as she grows. Through the interaction with the other characters in the story, Ruby the Radish is able to relay to the young reader ways to help save and conserve water inside and outside the average urban household. Also in the unit are three lesson plans, which have been created to coordinate with the story, and materials to conduct the activities outlined in the lesson plans. The lesson plans included are: Responding to Literature, Water Cycle in a Cup and Growing Radishes. In an effort to reach more people, a special part of the unit calls for each student to take the storybook home to read to members in the household and complete a water conservation home survey.

A 20-minute kindergarten assembly presentation has been created around the character Ruby the Radish. The assembly addresses where water in ID4 comes from, how the water is cleaned and purified, and how to save and conserve water. The Water Education unit is also introduced and given to the teachers at the end of the assembly. In the 2014-2015 school year, 1,270 students within ID4's service area participated in this program.

1st Grade Assembly Program

"Suzie-Q's Water Awareness Campaign" - Urban Water Use and Water Conservation—This Common Core and Next Generation Science Standards-based Water Education unit has been designed to teach 1st grade students within ID4's service area the importance of water and its conservation. This Water Education unit includes the story "*Suzie-Q's Water Awareness Campaign*," which has been written and illustrated exclusively for ID4. The story features a main character Suzie-Q, also known to her friends as "The Queen of Water Conservation," a heroic squirrel that leaps from tall trees to make urban Bakersfield residents aware of water conservation. Also in the unit are two lesson plans, which have been created to coordinate with the story, and materials to conduct the activities outlined in the lesson plans. The lesson plans included are: Responding to Literature, Water Molecules in Motion and The Amazing Water Molecule. In an effort to reach more people, a special part of the unit calls for each student to take home a plush squirrel along with the storybook to read to members in the household and complete a water conservation home survey.

A 30-minute 1st grade assembly presentation was created around the character Suzie-Q. The assembly addresses where water in ID4 comes from, how the water is cleaned and purified, and how to save and conserve water. The unit is also introduced and given to the teachers at the end of the assembly. In the 2014-2015 school year, 940 students within ID4's service area participated in this program.

2nd Grade Assembly Program

"Casey's Incredible Journey" - Water Purification and Water Conservation — This Common Core and Next Generation Science Standards-based Water Education unit has been designed to teach 2nd grade students within ID4 how their water is purified and how they can save that water. This Water Education unit includes the story "*Casey's Incredible Journey,*" which has been written and illustrated using photographs exclusively for ID4. The story features a main character Casey the Water Drop, who takes an incredible journey from the top of Mt. Whitney through the Henry C. Garnett Water Purification Plant before going to homes and businesses in metropolitan Bakersfield. Also in the unit are three lesson plans, which have been created to coordinate with the story, and materials to conduct the activities outlined in the lesson plans. The lesson plans included are: Responding to Literature, Exploring the Scientific Process and Our Water Footprint. In an effort to reach more people, a special part of the unit calls for each student to take home a plush water drop along with the storybook to read to members in the household and complete a water conservation home survey.

A 40-minute 2nd grade assembly presentation was created around the character Casey. The assembly addresses where water in ID4 comes from, how the water is purified, how to save and conserve water, and features a fun water conservation game show that details the steps through the purification process. The unit is also introduced and given to the teachers at the end of the assembly. In the 2014-2015 school year, over 1,135 students within ID4's service area participated in this program.

3rd-4th Grade Assembly Program

Uncover the Facts! Metropolitan Bakersfield's Water Story—Water in California is the theme explored in this exciting Common Core and Next Generation Science Standards-based program that highlights Bakersfield's rich water history and how water is moved throughout the state of California. The 45-minute engaging and interactive assembly teaches students about Kern County's water supplies, how that water is used and the importance of water conservation. An interactive part of the assembly invites students to help build a pizza display, allowing them to see how much water is required to make one of the foods we all enjoy. At the conclusion of the assembly, all teachers receive a curriculum packet and water education materials for the classroom. In the 2014-2015 school year, 2,003 students within ID4's service area participated in this program.

5th-6th Grade Assembly Program

H2O & You – Exploring Metropolitan Bakersfield's Water Supplies—Water Awareness is the theme explored in this exciting Common Core and Next Generation Science Standards-based program that highlights the water cycle, the importance of groundwater and how water is purified at the Henry C. Garnett Water Purification Plant. The 50-minute engaging and interactive assembly features an exploration of the scientific process through the demonstration of two chemistry experiments on the chemical components of water. At the conclusion of the assembly, all teachers receive a curriculum packet and water education materials for the classroom. In the 2014-2015 school year, 2,110 students within ID4's service area participated in this program.


Runoff
Percolation
OCEAN
CLOUDS

Planning & Engineering

Improvement District No. 4 Construction & Maintenance Projects

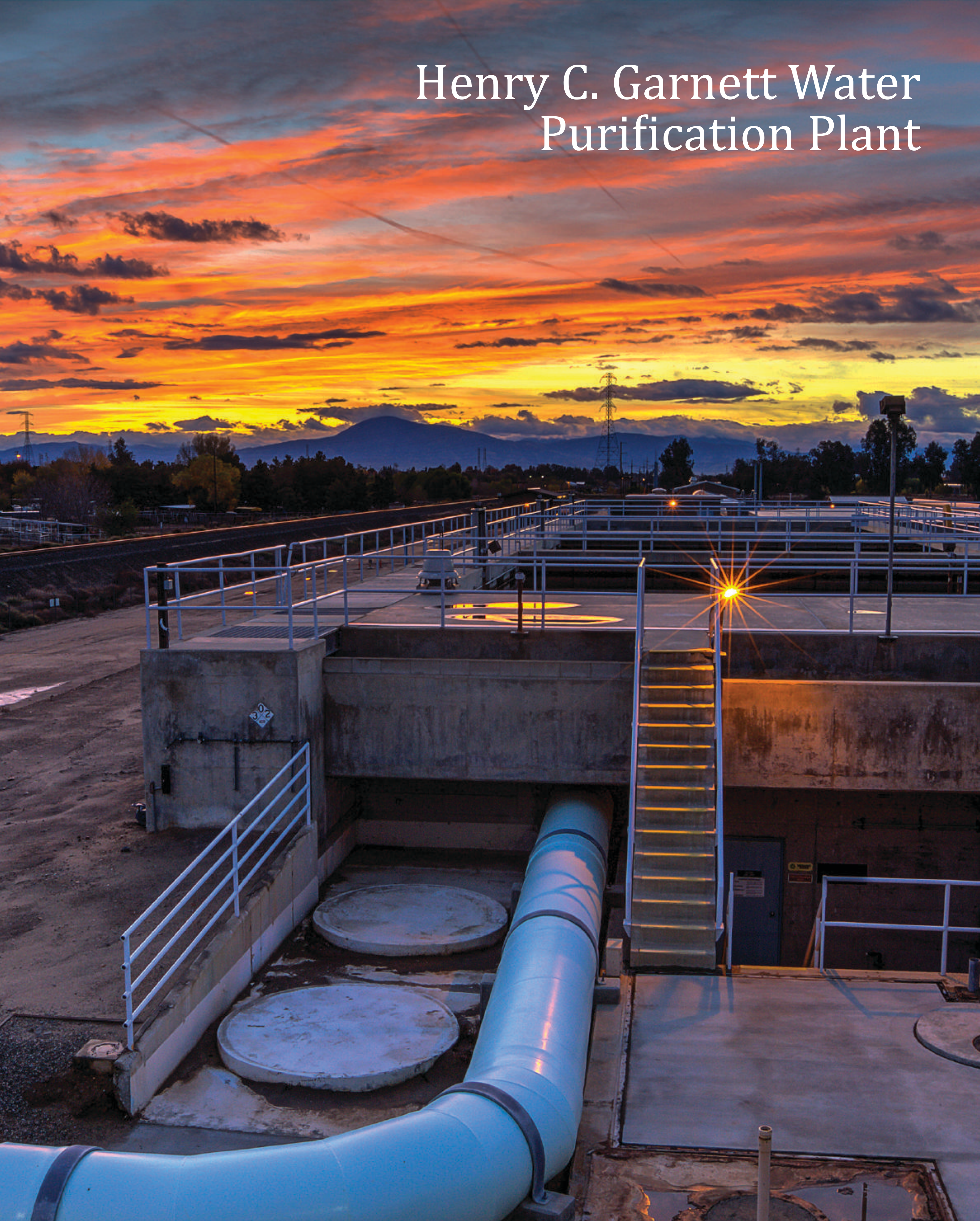
Improvement District No. 4 Influent Valve Coordination Modifications: The project design kickoff meeting occurred on April 7, 2015 to make coordination improvements between the Henry C. Garnett Water Purification Plant influent valves and raw water pump station. Design and Supervisory Control and Data Acquisition (SCADA) System programing has been completed, and startup was completed in December 2015.

Improvement District No. 4 23 Corner Tank Replacement Project: Beginning in the summer of 2014, Agency staff retained consultants to assist with the development of a contract bidding package for the demolition of the existing 23 Corner Tank and construction of a new 160,000-gallon bolted steel reservoir. On August 27, 2015, the Agency Board rejected all bids for the 23 Corner Tank Replacement Project in light of the substantial increase in costs over the construction cost estimate. Agency staff met with East Niles Community Services District and California Water Service Company staff to review project design alternatives, and began design work to replace the existing tank with a 50,000-gallon welded steel tank.

Improvement District No. 4 – Cross Valley Canal Extension Pool Nos. 7 and 8 Lining Project: On September 25, 2014, Agency staff entered into an agreement with Provost and Pritchard Consulting Group to perform preliminary design, surveying, and final design to line the Cross Valley Canal Extension Pool Nos. 7 and 8. A Notice to Invite Bids is scheduled for January 2016 with a construction date beginning in late spring 2016.

Improvement District No. 4 Kern River Turnout No. 4 Rehabilitation Project: Project design began in early 2014. In 2015, Agency staff continued work on the permitting processes with the California Department of Fish and Wildlife. Revisions to the Stream Alteration Permit application were sent in September 2015. Bidding and construction are expected to occur in fiscal year 2016-2017.

Henry C. Garnett Water Purification Plant



Operations

In 2015, the Henry C. Garnett Water Purification Plant delivered 27,877 af of water for domestic consumption. This represents an 11 percent decrease when compared to the amount delivered in 2014 (31,332 af). Additional water was used for filter backwash, plant process use, sludge discharge and evaporation.

The peak production flow occurred on August 18, 2015 and amounted to 50.3 million gallons per day (mgd). This represents 49 percent of the expanded maximum permitted flow of 103 mgd. The Henry C. Garnett Water Purification Plant did not operate at flows greater than design capacity in 2015.

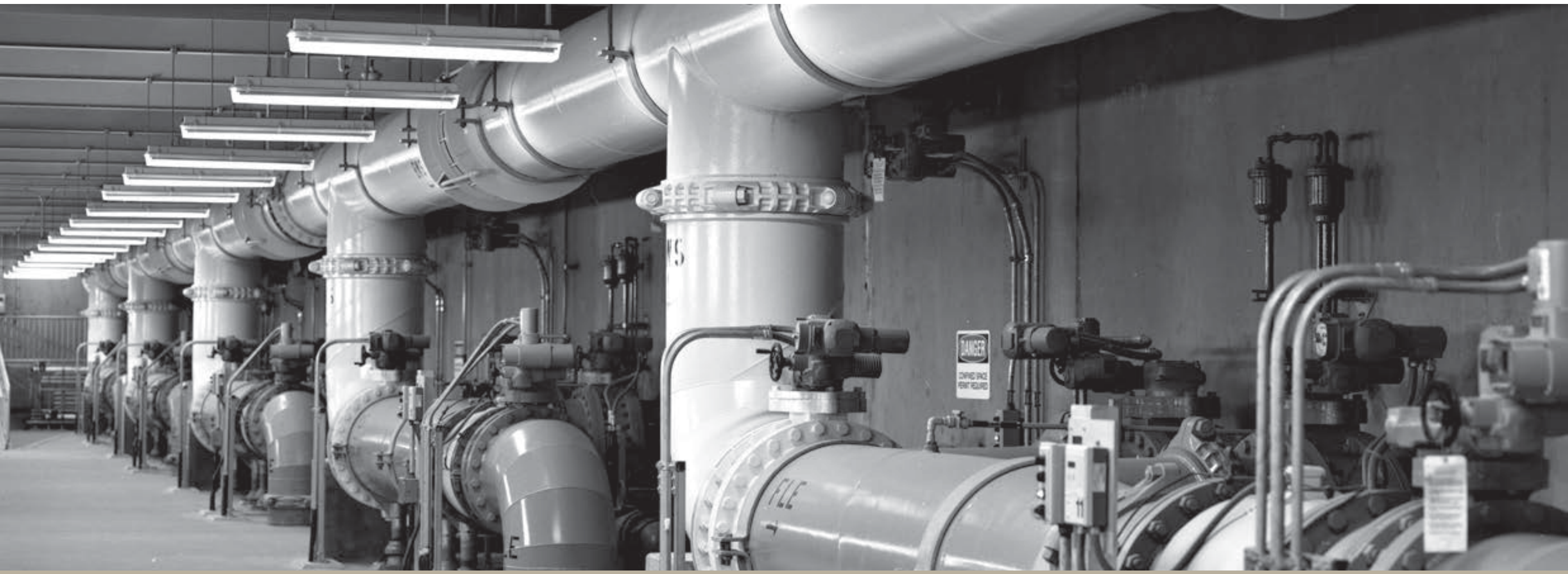
The Henry C. Garnett Water Purification Plant's chemical costs were 17.3 percent less in 2015 than 2014 ($386,378 in 2015 and $467,451 in 2014). This represents an incremental cost decrease of approximately $1.06 per af of water delivered for domestic purposes. This change is a result of changes in source water quality. Chemical costs reported on the Henry C. Garnett Water Purification Plant Operations Costs tables on page 42 reflect actual chemical usage rather than the total paid invoices recorded in prior reports.

In 2015, chemicals consisting of sodium hypochlorite, aluminum sulfate, sodium hydroxide, cationic polymer, powdered activated carbon, zinc orthophosphate and sulfuric acid were used for water treatment processes. A detailed accounting of chemical consumption and a complete breakdown of the 2015 and historical operating costs is shown on page 42. A history of water use by source is on page 34.

Agency staff continued to use copper sulfate instead of potassium permanganate for algae control in the temperature equalization pond. In 2015, the utilization of copper sulfate as an oxidant continued to show a significant cost savings compared to potassium permanganate, with no impact to water quality.

Agency staff also conducted semiannual well measurements within ID4. This included static water level monitoring of hundreds of wells in the metropolitan Bakersfield area.

Agency staff continued to operate the ID4 Solar Photovoltaic Project (Solar Project) in 2015. The Solar Project produced a total of 1,358 megawatt-hours of energy (MWh), saving $1,099,170 through energy offset production in 2015.



The Solar Project began producing energy in March 2009. Annual summaries of the energy produced, CSI rebates earned and energy cost offsets are shown in the following table.

ID4 Solar Project Operations

Year	MWh Produced	CSI Rebate	Energy Cost Offset
2009	1,286	$ 622,955	$ 149,343
2010	1,602	$ 773,818	$ 171,503
2011	1,661	$ 802,313	$ 175,021
2012	1,853	$ 907,434	$ 185,569
2013	1,939	$ 935,629	$ 149,595
2014	1,671	$ 146,500	$ 150,121
2015	1,358	$ 0	$ 118,018
Totals	**11,370**	**$ 4,188,649**	**$ 1,099,170**

Maintenance

Agency staff provided coordination for ID4 projects and facility modifications in order to facilitate construction and minimize Henry C. Garnett Water Purification Plant shutdowns. Staff also performed corrective and preventive maintenance to existing ID4 facilities, and continued drafting and implementing new preventive maintenance procedures for various facilities and equipment. Staff conducted annual cleaning, inspections and repairs to all eight sedimentation basins, the 12 filter basins, and the Train B constant head box and combined filter structures. Staff reorganized and restocked ID4 electrical spare parts, and prepared surplus equipment and materials for disposal and recycling. Staff installed new data communications conduits and duct banks in preparation for the Network and Data Communications Project. Staff installed new conduits and electrical feeders for the emergency standby electrical power systems and extended the circuits to the Train A and Train B automated control systems. Staff setup and oversaw the repairs to the 72-inch raw water pipeline adjacent to Backwash Pond No. 1. Staff completed maintenance and cleaning on the temperature equalization pond temperature equalization pond, Backwash Pond No. 2 and the nine precipitated solids drying beds. Staff completed maintenance inspections and chemical feed line repairs on the Train A and Train B flash mixer systems. Staff completed repair to the sulfuric acid feed system injection piping systems. Staff installed sodium hypochlorite flow metering on four chemical delivery systems and transferred the temporary storage of sodium hydroxide back to the repaired permanent storage tank. Staff completed repairs to the temperature equalization pond traveling water screen unit. Staff configured and installed flow monitors and alarming on the laboratory fume hood units. Staff oversaw and assisted with the removal and replacement of Primary Coagulant Tank No. 1.

Staff performed weekly pipeline surveillance and preventive maintenance activities on the North, East and Northwest Feeder pipelines. Staff completed annual maintenance and repairs on various transmission pipeline appurtenances and system valves. Staff completed coating repairs to the North Pipeline Station 54+90 blow off valve assembly. Staff oversaw the rehabilitation and repairs to the East Pump Station Pump No. 4 and conducted predictive maintenance and energy usage analytical measurement on the other East and North Pump Stations. Annual landscaping and weekly maintenance was conducted at the Oswell Storage Tank and Pump Station and the 23 Corner Tank facilities. Staff repaired and modified the Oswell Storage Tank Facility's landscape irrigation systems to incorporate water conservation measures. Staff dewatered and conducted an inspection of the East Pump Station wet-well vault and pump suction piping. Staff completed repairs and modifications to the East Pump Station surge tank controls. Staff oversaw and performed annual electrical maintenance and inspections on the Northwest Feeder medium voltage variable frequency drive units and associated switchgear.

Staff conducted weekly and monthly monitoring of the Electrical Service Entrance facility. Staff continued the process of drafting and implementing new preventive maintenance tasks for the complex array of electrical equipment, controls and switchgear for the Electrical Service Entrance facility. Staff conducted weekly inspections and monthly load testing of the two 2.0-megawatt, the 1.75-megawatt, and the 60-kilowatt standby generators, and the 40-kilowatt uninterruptable power supply system. Staff completed electrical arc flash coordination studies for all ID4 facilities and the ID4 groundwater well facilities. Staff oversaw the scheduled battery maintenance and testing for the 40-kilowatt critical load standby power system. Staff completed annual electrical metering inspections and calibrations.

Staff operated and performed maintenance on 18 of the ID4 groundwater recovery project well facilities and pump sites. Staff oversaw the repairs to the ID4-08, ID4-12, RRB-ID4-05 and RRB-ID4-07 recovery wells, pumps and motors.

Laboratory

Title 22 and constituents of concern analyses were performed on the Henry C. Garnett Water Purification Plant treated and source water and several groundwater wells. Treated and source water samples were also analyzed quarterly for 1,2-dibromomethane (EDB), 1,2-dibromo-3-chloropropane (DBCP), volatile organic chemical (VOC), organochlorine and organonitrogen non-volatile synthetic organic chemical, general mineral, physical, metal and inorganic nonmetallic constituents, and monthly for general mineral, physical and inorganic nonmetallic constituents. The influent water supply was analyzed weekly for arsenic, conductivity and nitrate, and monthly for EDB, DBCP, VOCs, and gross alpha as requested by the State Water Resources Control Board Division of Drinking Water (DDW) whenever the influent water supply consists primarily of groundwater.

The distribution system was monitored weekly for coliform bacteria and physical constituents, monthly for total organic carbon (TOC) and total trihalomethanes (TTHM), and quarterly for regulated haloacetic acid, TOC and TTHM constituents. Treated water was monitored every other week and six distribution system sample locations were monitored twice a year for pH, calcium, orthophosphate and zinc as requested by DDW due to corrosion control treatment in the distribution system.

Kern River sanitary survey samples were collected quarterly and analyzed for general mineral, physical, coliform bacteria, TOC, dissolved oxygen and VOC constituents. Lake Isabella was monitored for VOCs following all holiday weekends and Lake Ming was monitored periodically for VOCs following any drag boat races as requested by DDW.

Taste and odor samples were analyzed weekly in the warmer months and monthly in the cooler months in an effort to detect and avoid odor incidents. Multiple batches of copper samples were analyzed as a result of aquatic growth control measures occurring in the temperature equalization pond.

Samples were collected monthly from the Henry C. Garnett Water Purification Plant's four sources beginning in April, and analyzed for protozoa (cryptosporidium and giardia), E. coli and turbidity. The Long Term 2 Enhanced Surface Water Treatment Rule, Round 2 requires the collection and analysis of protozoa samples from all four sources for 24 consecutive months.

Financial Aspects of the Project

ID4 is an original participant in the construction of the CVC to convey water to the Henry C. Garnett Water Purification Plant and to the Kern River for groundwater replenishment. CVC construction was completed in 1976, and on February 29, 1980, Fox & Company completed a final construction cost audit. The audit was reviewed and accepted by the Agency Board. The total construction cost of the CVC was $22,777,873, of which ID4's share was $6,833,362.

Also, Fox & Company audited the ID4 construction fund to include the original Henry C. Garnett Water Purification Plant and treated water pipelines. This audit was completed on June 30, 1982. Updated construction costs since the two Fox & Company audits are summarized as follows:

CVC (ID4 share)	*$7,132,899*
Purification Plant and Conveyance Facilities	*$25,755,025*
Total	*$32,887,924*

Annual Costs and Revenue

Cash flow for the fiscal year ending June 30, 2015, for all ID4 funds together with a forecast of cash flow conditions for the next fiscal year, is shown on pages 43-45. These projections are subject to change based on capital projects deemed necessary to the continued operation of ID4. The Agency Board adopted Resolution No. 04-11 which incorporated the Revised Financial Plan and established groundwater charges as well as a long-term surcharge on treated water rates. The new rates are projected to generate adequate revenues for the continued operation of the ID4 Project, while meeting ID4 debt service coverage requirements.

ID4 continues to look for ways to provide a supplemental water supply to metropolitan Bakersfield in a cost-effective manner. Under action taken by the Agency Board in 1996, Zone of Benefit credits are authorized to be used for the purchase of additional water from the State or federal projects. This measure was taken to mitigate the inability of the SWP to deliver 100 percent of Table A amounts annually. ID4 also works to reduce water pumping costs by exchanging SWP water for Friant-Kern and Kern River water. An optimum exchange can eliminate power costs for CVC pumping and potentially lessen the quantity of chemicals applied in the purification process. Chemical costs are affected substantially by the source and condition of the raw water. The availability of most exchanges cannot be predicted; therefore, power and chemical costs are budgeted conservatively by assuming use of the CVC for all but those exchanges currently in effect.

Improvement District No. 4 Funds

ID4 has four income sources managed within three fund accounts:

1. The ID4 Bond Fund was established to account for the receipts and disbursements of money needed to comply with the interest and redemption requirements of the bonds issued to construct the TWCEP. This fund will continue until the settlement of the debt incurred to construct the TWCEP. The interest and principal payments are being paid through a Capital Facilities Charge (CFC) as provided by the Agreements.

2. Zone of Benefit No. 7 was established in accordance with the SWP contract with the Agency dated November 15, 1963 to account for property taxes collected and interest earned on money held. Zone of Benefit No. 7 is used for the purchase of State or federal water supplies. The 2014-15 tax rate (per $100.00) is 0.024783.

3. The Enterprise Fund is an operations fund established to account for money necessary for operation of the Henry C. Garnett Water Purification Plant, the treated water distribution system, groundwater replenishment and ID4's share of CVC costs. Expenditures are primarily for current day-to-day operating expenses and operating equipment. Revenues are recorded by source; principally water sales, groundwater pumping charges and interest earned on reserves. Revenues are derived from groundwater and treated water charges. The 2014-15 charges for each water type were $18 per af for produced agricultural groundwater and $36 per af for all other types of produced groundwater, and sales of treated water were at the rate of $143 per af.

ID4 has no other regular revenue sources other than those described above. Money from the Enterprise Fund can be transferred into either or both of the other two funds to reduce the ad valorem tax burden, but excess revenues collected in the ID4 Bond Fund and Zone of Benefit No. 7 funds must remain in those funds. The Enterprise Fund accumulation as of July 1, 2015 was $8.7 million, including reserves of about $1.5 million for equipment replacement, $0.5 million for CVC power reserves, $2.0 million for catastrophic needs of ID4 and $0.8 million for acquisition of additional surface water supplies.

The present level of groundwater charges and sales of treated water are projected to yield approximately $9.5 million. It is anticipated that the operating expenses of ID4 will exceed the estimated revenues in 2015-16 due to the increase in operational costs related to recovering water from groundwater banking projects, ID4 will also expend reserves in 2015-16 to construct various capital replacement projects.

Well Registration and Collection of Groundwater Charges

Wells within ID4 are registered pursuant to Section 14.24 of the Agency Act (see page 39).

On July 1, 2015, agricultural groundwater charges were $18 per af, and charges for all other groundwater extractions were $36 per af. For administrative convenience, a flat rate annual charge of $36 was levied for small water-producing facilities and no charge was levied for very small water-producing facilities where the cost of collection would exceed the flat rate charge.

ID4 Financial Management Plan

On January 26, 2011, the Board adopted the Revised Financial Plan, which updated the previous versions of the ID4 Financial Management Plan. The Revised Financial Plan provides detail on the principles and practices to be followed in administering the financial resources of ID4. The Revised Financial Plan identifies the need for a long-term surcharge on treated water rates to address increasing costs associated with operation of the Henry C. Garnett Water Purification Plant and to meet ID4's debt repayment obligation. With the adoption of the Revised Financial Plan, the Board authorized the setting of rates and charges to ensure sufficient revenues to continue the ID4 project.

Refinancing of General Obligation Bonds

In November 2006, the Agency successfully retired the remaining balance of its $17.5 million general obligation bond used to construct the Henry C. Garnett Purification Plant, the treated water distribution system and ID4's share of the CVC.

Sale of Certificates of Participation for Capital Projects

In 2006, ID4 issued $27 million in water revenue Certificates of Participation (COP) to fund $22.5 million of the TWCEP costs and refund the 1999 COPs. In 2008, ID4 issued an additional $121 million in water revenue COPs to fund capital improvement projects associated with the TWCEP. The COPs will be retired in 30 years. In 2006, ID4 also entered into a low-interest loan agreement with the DWR Safe Drinking Water State Revolving Fund (SDWSRF) Program for $2.82 million to fund the Oswell Bypass Project. The SDWSRF loan payments became due in 2010 and will retire in 2030. The SDWSRF loan is a parity obligation to the 2006 COPs.

Money to be used for the repayment of debt is provided for in the Agreements. The Agreements, and subsequent project agreements, include a contract provision for the biannual payment of a Capital Facilities Charge (CFC) to charge purveyors for all capital facility costs, including principal, interest and other costs associated with repayment of any debt incurred in the development and construction of the TWCEP. The Agreement will be effective through 2035, or until the COPs and any additional financing for the TWCEP are paid in full. Under the Agreements, each purveyor is responsible for its proportionate share of capital costs. The CFC is considered a "general obligation" expense of the purveyor, regardless of the amount of water delivered or whether the capacity is actually required for delivery of the purveyor's water.

Outstanding Bond Issues
(As of March 1, 2015)

Series	Dated	Interest Rate	Original Par	Final Maturity	Outstanding (as of 3/1/15)
Water Revenue COP, Series 2006A	4/19/2006	4% - 4.6%	$17,150,000	5/1/2036	$12,955,000
Water Revenue COP, Series 2006B (Taxable)	4/19/2006	5.87%	$10,550,000	5/1/2036	$9,230,000
Water Revenue COP, Series 2008A	5/6/2008	3% - 5%	$84,365,000	5/1/2038	$75,190,000
Water Revenue COP, Series 2008B (Tble)	5/6/2008	4.838%-6.649%	$36,555,000	5/1/2038	$33,425,000

Tables and Figures

2015 ID4 Water Supplies, Exchanges and Deliveries (acre-feet)

All units in acre-feet unless otherwise noted.

ID4 SUPPLIES	SWP[1]	SWP by Exchange[2]	Kern River	SWP by Exchange[3]	Bank Recovery	Total
SWP (M&I)	15,400					15,400
SWP (Ag)	1,189					1,189
2014 Carryover	2,993					2,993
2015 Agency Table A	136					136
Multi-Year	72					72
Yuba Accord	306					306
Recovered Supplies					42,164	42,164
Subtotal	20,096	-	-	-	42,164	62,260
ID4 EXCHANGES / OBLIGATIONS						
California Aqueduct					(5,000)	(5,000)
Kern Delta WD/California WSC Exchange	(3,692)				3,692	-
Kern Tulare WD Exchange	(9,000)				4,735	(4,265)
Kern Tulare WD Exchange	1,500				(1,500)	-
Lost Hills WD Exchange	(210)			210		-
Pastoria					(306)	(306)
Total Exchanges/Obligations	(11,402)	-	-	210	1,621	(9,571)
Available Supplies	**8,694**	**-**	**-**	**210**	**43,785**	**52,689**

ID4 DELIVERIES	SWP[1]	SWP by Exchange[2]	Kern River	SWP by Exchange[3]	Bank Recovery	Total (*acre-feet*)
Henry C. Garnett Water Purification Plant	963			121	27,948	29,032
In-District Transportation Recharge	537			89	13,865	14,491
In-District Recharge						-
Out of District Losses					1,972	1,972
Carryover to 2016	7,194					7,194
Total Deliveries	**8,694**	**-**	**-**	**210**	**43,785**	**52,689**

ID4 Groundwater Recharge and Recovery Asset Summary

Groundwater Banking Facility	ID4 Interest	Annual Recharge Capacity	Annual Recovery Capacity[6]	ID4 Recharge Capacity	ID4 Recovery Capacity	Summary of Banked Water
Kern Water Bank	9.62%	450,000	230,000	43,290	22,126	130,806
Pioneer Project	10%	146,000	100,000	14,600	10,000	44,895
ID4 Banking Wells[4]	100%		12,000		12,000	31,805
ID4/Rosedale Joint Use Recovery Project[5]	22.2%		21,000		5,940	2,746
Allen Road Well Field	100%		36,000		36,000	
Total		596,000	399,000	57,890	86,066	210,252

[1] *SWP allocation for 2015 was 20%.*

[2] *SWP water by exchange with Kern River interests.*

[3] *SWP water by exchange with Friant-Kern interests.*

[4] *ID4 recovery wells and banked water in City of Bakersfield's 2800 Acres Recharge Facility.*

[5] *First priority for 10 cfs of recovery capacity.*

[6] *Recovery capacity varies with respect to depth to groundwater.*

ID4 History of Purification Plant Water Use by Sources (acre-feet)

Year	State Water Project	State Water Project by Exchange[1]	Kern River	State Water Project by Exchange[2]	Recovered	Total
1975						-
1976						-
1977	15,950					15,950
1978	8,329	15,607				23,936
1979	5,347	21,078				26,425
1980	4,288	18,551				22,839
1981	20,457	3,407				23,864
1982	3,584	21,488				25,072
1983	1,287	23,317				24,604
1984	21,068	5,200				26,268
1985	942	23,331				24,273
1986	1,487	22,967				24,454
1987	1,974	23,534				25,508
1988	7,971	21,360				29,331
1989	11,844	15,593				27,437
1990	24,728	2,694				27,422
1991	2,467	9,146			7,719	19,332
1992	6,830	8,442			12,241	27,513
1993	4,653	23,414		2,883		30,950
1994	4,030	20,680		715	4,186	29,611
1995	2,528	28,883			222	31,633
1996	24	28,527		1,387		29,938
1997		25,416		7,980		33,396
1998		26,510		1,906		28,416
1999		28,340				28,340
2000	132	29,023				29,155
2001	3,503	7,579			15,810	26,892
2002	5,228	21,327			1,194	27,749
2003	9,826	14,011			2,111	25,948
2004	4,282	14,419			6,693	25,394
2005	1,967	24,320			787	27,074
2006	7,160	18,412				25,572
2007	4,826	14,874			7,301	27,001
2008	1,462	25,000				26,462
2009	-	28,335				28,335
2010	718	29,231				29,949
2011	2,473	20,751	13,021			36,245
2012	22,272	8,892	14,066			45,230
2013	2,554	19,049	3,007		13,051	37,661
2014		7,682	457		24,179	32,318
2015	963			121	27,948	29,032
TOTAL	**217,154**	**700,390**	**30,551**	**14,992**	**123,442**	**1,086,529**

[1] *SWP water by exchange with Kern River interests.*

[2] *SWP water by exchange with Friant-Kern interests.*

History of Groundwater Replenishment by ID4

All units in acre-feet unless otherwise noted.

Year	% Allocation	Kern-River Runoff (% of mean)[4]	SWP	Recovery[1]	SWP by Exchange[2]	Kern River	Friant-Kern[3]	In District Recharge	Banked Water	Total
1971					6,400		-	6,400	-	6,400
1972					11,000		-	11,000	-	11,000
1973					67,500		-	67,500	-	67,500
1974					10,900		-	10,900	-	10,900
1975		81	5,700		-		-	5,700	-	5,700
1976		23	27,800		-		-	27,800	-	27,800
1977		20	6,400		2,000		-	8,400	-	8,400
1978	100%	230	1,470		37,840		2,990	42,300	-	42,300
1979	100%	88	60,680		36,200		1,120	98,000	-	98,000
1980	100%	208	23,210		23,230		3,460	49,900	-	49,900
1981	100%	53	55,270		2,350		480	58,100	-	58,100
1982	100%	168	5,480		35,810		2,110	43,400	-	43,400
1983	100%	325	1,250		10,860		3,290	15,400	-	15,400
1984	100%	89	15,690		5,120		1,690	22,500	-	22,500
1985	100%	89	7,980		32,280		940	41,200	-	41,200
1986	100%	187	22,530		68,000		2,220	83,423	9,327	92,750
1987	100%	44	14,000		18,200		540	32,740	-	32,740
1988	100%	34	5,210		29,850		-	35,060	-	35,060
1989	100%	50	6,990		14,040		-	21,030	-	21,030
1990	50%	24	10,713		3,116		-	13,829	-	13,829
1991	0%	59	1,651		6,279		-	7,930	-	7,930
1992	45%	39	2,574	1,750	4,437		-	8,761	-	8,761
1993	100%	126	51,045	-	30,319		32,727	92,195	21,896	114,091
1994	50%	41	24,671	-	15,250		193	30,005	10,109	40,114
1995	100%	199	50,200 [5]	-	76,878		23,000 [5]	104,148	45,935	150,083
1996	100%	128	58,934	-	65,281		13,283	85,232	52,266	137,498
1997	100%	122	744	-	66,015		5,432	67,670	4,521	72,191
1998	100%	239	17,642	-	45,680		4,793	40,427	27,688	68,115
1999	100%	53	70,898	-	13,872		842	85,543	69	85,612
2000	90%	65	26,304	-	22,843		4,699	46,054	7,792	53,846
2001	39%	54	4,440	4,496	18,601		-	24,973	2,564	27,537
2002	70%	43	7,537	-	43,904		-	41,258	10,183	51,441
2003	90%	70	24,303	-	24,229		-	20,152	28,380	48,532
2004	65%	48	20,018	2,640	14,466		-	35,152	1,972	37,124
2005	90%	169	89,743	689	36,502		16,557	104,053	39,438	143,491
2006	100%	156	89,601	-	38,962		12,831	107,938	33,456	141,394
2007	60%	26	25,901	336	20,411		1,567	45,592	2,623	48,215
2008	35%	72	2,179	124	34,530			10,371		10,371
2009	40%	63			38,166			9,831		9,831
2010	50%	125	8,469		56,426			34,946	715	35,661
2011	80%	201	11,703		38,585	23,453	172	37,668	56,324	93,992
2012	65%	38	30,969		12,828	18,898		17,465		17,465
2013	35%	22	6,745	20,553	30,982	3,007 [6]		23,626		23,626
2014	5%	24	-	38,441	15,931	774 [6]		22,828		22,828
2015	20%	18	1,500	41,813			210	14,491		14,491
TOTAL			**898,144**	**110,842**	**1,186,073**	**46,132**	**135,146**	**1,812,891**	**355,258**	**2,168,149**

[1] Recovered from wells on Kern Fan Element property (unavoidable losses in conveyance to water treatment plant).

[2] SWP water by exchange with Kern River interests.

[3] Acquired from Friant-Kern interests.

[4] Percentage of the 1894 to date, long-term average of the April-July snow melt runoff at First Point.

[5] Estimated.

[6] City of Bakersfield delivered their own supply to be delivered via the NW Feeder pipeline.

ID4 History of State Water Project (SWP) Entitlement and Actual Water Deliveries

		SWP SUPPLIES						
		Table A Entitlement						
Year	SWP Allocation	M&I	Ag	Table A Allocated	Long Term Purchase	Surplus *	Other **	Total Supply
1970	100%	18,700		18,700				18,700
1971	100%	22,100		22,100				22,100
1972	100%	24,500		24,500				24,500
1973	100%	28,000		28,000				28,000
1974	100%	31,400		31,400				31,400
1975	100%	35,000		35,000				35,000
1976	100%	37,300		37,300				37,300
1977	90%	40,800		36,720				36,720
1978	100%	43,100		43,100			10,892	53,992
1979	100%	45,400		45,400			48,524	93,924
1980	100%	47,700		47,700	1,050		3,104	51,854
1981	100%	50,200		50,200	1,250		30,545	81,995
1982	100%	53,600		53,600	1,550		2,000	57,150
1983	100%	56,000		56,000	1,850			57,850
1984	100%	59,400		59,400	2,530		7,913	69,843
1985	100%	62,900		62,900	2,795			65,695
1986	100%	65,300		65,300	3,875		2,908	72,083
1987	100%	68,800		68,800	3,950			72,750
1988	100%	71,200	9,335	80,535	4,750		620	85,905
1989	100%	73,500	9,860	83,360	5,477		6,530 [4]	95,367
1990	100%	77,000	10,276	82,138	6,100	1,554		89,792
1991	30%	77,000	10,276	23,100	5,600	1,554	635	30,889
1992	45%	77,000	10,276	39,274	5,400	1,554	2,500	48,728
1993	100%	77,000	10,276	87,276	5,310	1,554	39,189	133,329
1994	53%	77,000	10,276	46,169	5,220	1,554		52,943
1995	100%	77,000	10,276	87,276	5,050		(2,195) [5]	90,131
1996	100%	77,000	10,276	87,276	11,100		2,011	100,387
1997	100%	77,000	5,946	82,946	11,000			93,946
1998	100%	77,000	5,946	82,946	10,800			93,746
1999	100%	77,000	5,946	82,946	10,600			93,546
2000	90%	77,000	5,946	74,651	14,352		47,122	136,125
2001	39%	77,000	5,946	32,349	6,219		14,395	52,963
2002	70%	77,000	5,946	58,062	6,455		3,593	68,110
2003	90%	77,000	5,946	74,651	10,503		15,938	101,092
2004	65%	77,000	5,946	53,915	5,435		7,904	67,254
2005	90%	77,000	5,946	74,651	11,474		72,709	158,834
2006	100%	77,000	5,946	82,946	13,219		42,564	138,729
2007	60%	77,000	5,946	49,768	4,080		8,280	62,128
2008	35%	77,000	5,946	29,031			136	29,167
2009	40%	77,000	5,946	33,178			1,236	34,414
2010	50%	77,000	5,946	41,473			12,974	54,447
2011	80%	77,000	5,946	66,357			25,057	91,414
2012	65%	77,000	5,946	53,915			1,727	55,642
2013	35%	77,000	5,946	29,031			10,314	39,345
2014	5%	77,000	5,946	4,147			611	4,758
2015	20%	77,000	5,946	16,589			514	17,103
TOTALS		**2,936,900**	**204,101**	**2,426,078**	**176,994**	**7,770**	**420,250**	**3,031,092**

* Replaced by interruptible water after execution of the Monterey Agreement in December 1994

** Surplus, Unscheduled Surplus, Dry Year Cutback/Payback, Carryover, Interruptible, exchanges and GRP water

*** ID4 banking in City's 2,800 acres, Pioneer North & South, and Kern Water Bank

[1] CVC/ID4 project not completed.

[2] Due to State Water Project shortfalls.

[3] Wet years on the Kern River.

[4] Includes 5,000 af released to water pool for use by agricultural districts.

[5] Carryover 6,131 af and 5,000 af Kern-Tulare/Lost Hills/ID4 exchange.

[6] Includes 635 af of carryover and 8,193 af released to water pool for use by agricultural district.

All units in acre-feet unless otherwise noted.

		ID4 Deliveries						
Year	SWP Allocation	Deliveries within ID4	Banked Water ***	Water Transfers	Total Deliveries	Carryover	SWP Supply Deficiency	Inability to Accept SWP Supply
1970	100%				-			18,700 [1]
1971	100%	22,100			22,100			
1972	100%	24,500			24,500			
1973	100%	27,907			27,907			93 [3]
1974	100%	30,816			30,816			584 [3]
1975	100%	35,000			35,000			
1976	100%	37,300			37,300			
1977	90%	23,695		5,000	28,695	8,025 [4]	4,080 [2]	
1978	100%	42,020			42,020			11,972 [3]
1979	100%	93,924			93,924			
1980	100%	38,678			38,678			13,176 [3]
1981	100%	71,995			71,995			10,000 [3]
1982	100%	20,120			20,120			37,030 [3]
1983	100%	3,427			3,427			54,423 [3]
1984	100%	69,843			69,843			
1985	100%	65,695		1,100	66,795	2,908		
1986	100%	32,040	9,327	1,100	42,467			29,616 [3]
1987	100%	71,030		1,100	72,130	620		
1988	100%	73,674		6,100 [4]	79,774	6,131		
1989	100%	77,367		18,000	95,367			
1990	100%	79,413			79,413	8,828 [6]	5,138 [2]	
1991	30%	24,851			24,851	2,500	64,176 [2]	
1992	45%	44,992			44,992	(1,083) [7]	48,002 [2]	
1993	100%	109,879	21,896		131,775			
1994	53%	69,917	10,109		80,026	(2,195) [7]	41,107 [2]	
1995	100%	108,781	45,935		154,716	2,011		
1996	100%	120,324	52,266		172,590			
1997	100%	103,767	4,521		108,288			
1998	100%	79,474	27,688		107,162			7,700 [3]
1999	100%	191,201	69		191,270			
2000	90%	121,774	7,792		129,566	10,471 [8]	8,295 [2]	
2001	39%	46,744	2,564		49,308		50,597 [2]	
2002	70%	71,195	10,183		81,378		24,884 [2]	
2003	90%	86,619	28,380		114,999	5,062	8,295 [2]	
2004	65%	79,571	1,972		81,543		29,031 [2]	
2005	90%	51,811	39,438		91,249	390	8,295 [2]	
2006	100%	63,921	33,456		97,377	1,425		
2007	60%	63,552	2,623		66,175	(477) [7]	33,178 [2]	
2008	35%	29,167	-		29,167	1,190	53,915 [2]	
2009	40%	21,716	-		21,716	12,698	49,768 [2]	
2010	50%	43,753	715		44,468	8,182	41,473 [2]	
2011	80%	58,378	31,630		90,008	211	16,589 [2]	
2012	65%	55,183			55,183	1,927	29,031 [2]	
2013	35%	47,202			47,202	(7,225) [7]	53,915 [2]	
2014	5%	-			-	2,993	78,799 [2]	
2015	20%	1,500			1,500	11,876	66,357 [2]	
TOTALS		**2,635,816**	**330,564**	**32,400**	**2,998,780**	**76,468**	**714,923**	**183,294**

[7] Overdeliveries.

[8] Includes 10,000 af exchanged with Arvin-Edison; 47 af carryover.

Groundwater Production

All units in acre-feet unless otherwise noted.

Year	Agricultural	All Other	Total Production	Charges Collected
1976	20,000	78,200	98,200	$1,321,000
1977	11,700	61,900	73,600	$1,102,000
1978	14,500	55,500	70,000	$1,119,000
1979	14,100	61,600	75,700	$1,369,000
1980	11,900	63,000	74,900	$1,190,000
1981	12,797	68,697	81,494	$1,458,000
1982	7,655	63,140	70,795	$1,575,700
1983	4,869	62,591	67,460	$1,302,530
1984	9,755	73,052	82,807	$1,564,580
1985	7,568	74,080	81,648	$1,522,013
1986	2,726	74,386	77,112	$1,516,070
1987	4,595	72,330	76,925	$1,426,287
1988	4,555	67,500	72,055	$1,384,849
1989	4,730	69,100	73,830	$1,541,380
1990	5,000	71,000	76,000	$1,546,222
1991	12,000	72,000	84,000	$1,524,830
1992	4,454	81,230	85,684	$1,621,910
1993	3,281	79,455	82,736	$2,365,720
1994	5,743	87,009	92,752	$1,582,433
1995	4,834	80,673	85,507	$2,500,738
1996	3,889	89,226	93,115	$2,736,595
1997	2,089	88,721	90,810	$2,696,467
1998	988	76,492	77,480	$2,315,939
1999	2,676	92,197	94,873	$2,871,004
2000	1,569	92,182	93,751	$2,797,852
2001	1,098	95,677	96,775	$2,828,000
2002	360	99,821	100,181	$2,961,831
2003	173	96,522	96,695	$2,310,515
2004	157	93,290	93,447	$2,799,629
2005	108	82,614	82,722	$2,623,381
2006	380	76,120	76,500	$2,800,000
2007	508	89,794	90,302	$2,983,707
2008	466	94,034	94,500	$3,065,002
2009	636	90,747	91,383	$3,162,445
2010	398	78,027	78,425	$3,103,644
2011	117	75,751	75,868	$2,640,849
2012	63	77,271	77,334	$2,720,115
2013	263	73,677	73,940	$2,679,707
2014	1,657	75,474	77,131	$3,042,016
2015*	960	74,575	75,535	$2,724,571
Total	**185,318**	**3,128,654**	**3,313,972**	**$86,397,531**

** Estimated production values. Reported use not returned at time of publication.*

Registered Active Wells Within ID4 2005-2015

Year	Commercial	Domestic	Irrigation	Purveyor	Total Active Wells
2006	125	97	11	60	293
2007	125	97	11	60	293
2008	123	97	11	70	301
2009	119	91	9	73	292
2010	113	90	12	235	450
2011	114	89	10	224	437
2012	108	87	12	222	429
2013	106	83	11	221	421
2014	105	82	10	222	419
2015	105	82	10	222	419

History of ID4 Groundwater Charges ($/Acre-foot)

Year	Agricultural Use	All Other Uses	Sm Groundwater Facilities
1975-1978	$7.50	$15.00	$0.00
1978-1994	$10.00	$20.00	$0.00
1994-2008	$15.00	$30.00	$30.00
2008-2009	$17.00	$34.00	$34.00
2009-2012	$17.50	$35.00	$35.00
2012-2015	$18.00	$36.00	$36.00

ID4 Land Use 1972 - 2015 (acres)

Year	M & I	Agricultural	Undeveloped	Total
1972	24,200	19,500	21,700	65,400
1974	30,700	18,400	16,300	65,400
1976	30,600	18,500	16,300	65,400
1978	33,500	18,000	13,900	65,400
1980	36,700	16,500	12,200	65,400
1982	38,600	14,700	12,100	65,400
1984	40,000	12,000	13,400	65,400
1986	42,000	10,800	12,600	65,400
1988	42,270	10,821	12,309	65,400
1990	49,364	8,558	7,478	65,400
1991	49,424	12,493	3,483	65,400
1992	49,759	11,641	4,000	65,400
1993	50,456	11,102	3,842	65,400
1994	51,418	10,214	3,768	65,400
1995	51,472	11,533	2,395	65,400
1996	52,775	9,431	3,194	65,400
1997	53,146	8,816	3,438	65,400
1998	51,503	7,951	5,946	65,400
1999	52,558	7,228	5,614	65,400
2000	53,457	6,592	5,351	65,400
2001	54,145	6,204	5,051	65,400
2002	52,907	8,787	3,706	65,400
2003	52,907	8,787	3,706	65,400
2004	52,907	8,788	3,705	65,400
2005	53,019	8,722	3,659	65,400
2006	53,019	8,715	3,666	65,400
2007	52,993	8,742	3,665	65,400
2008	52,993	8,741	3,666	65,400
2009	52,984	8,741	3,675	65,400
2010	55,708	6,029	3,663	65,400
2011	55,708	6,029	3,663	65,400
2012	55,708	6,029	3,663	65,400
2013	55,920	6,359	3,121	65,400
2014	59,055	4,127	2,218	65,400
2015*	55,019	5,199	5,182	65,400

* *Aerial imagery used to calculate land use designations.*

Henry C. Garnett Water Purification Plant Operations Costs 2015

	Purchased Chemicals[1] ($)	Labor ($)	Energy ($)	Miscellaneous Expenditures[2] ($)	Capital Outlays ($)	Total ($)	Deliveries (af)	Unit Rate ($/af)
January	11,642	221,570	24,234	102,008	-	359,454	870	413
February	17,922	204,944	18,622	99,511	2,522	343,521	1,056	325
March	26,490	206,637	14,724	160,131	-	407,982	1,745	234
April	30,807	221,964	10,580	160,237	13,599	437,187	2,152	203
May	31,114	301,741	11,498	100,327	14,930	459,610	2,240	205
June	38,064	167,497	54,269	305,232	69,192	634,254	2,740	231
July	49,627	188,563	(12,787)	80,523	-	305,926	3,814	80
August	47,826	194,259	29,112	94,728	-	365,925	3,906	94
September	43,281	183,808	29,862	130,042	-	386,993	3,517	110
October	37,700	289,059	3,514	112,281	-	442,554	2,555	173
November	30,331	239,674	37,480	109,365	20,872	437,722	1,641	267
December	21,574	206,519	22,107	114,856	-	365,056	1,641	222
Totals	**386,378**	**2,626,235**	**243,215**	**1,569,241**	**121,115**	**4,946,184**	**27,877**	**177**

Henry C. Garnett Water Purification Plant Historic Annual Operations Costs

	Purchased Chemicals[1] ($)	Labor ($)	Energy ($)	Miscellaneous Expenditures[2] ($)	Capital Outlays ($)	Total ($)	Deliveries (af)	Unit Rate ($/af)
2006	410,347	1,736,945	269,666	1,168,357	76,412	3,661,727	25,166	146
2007	496,534	1,759,677	259,859	1,288,309	74,081	3,878,460	26,998	144
2008	563,518	1,592,535	230,467	1,010,175	199,101	3,595,796	26,463	136
2009	619,402	1,643,238	454,070	955,730	27,399	3,699,839	28,335	131
2010	449,778	1,759,894	228,145	935,348	24,817	3,397,982	29,384	116
2011	737,123	2,279,966	308,657	1,102,132	(1,092)	4,426,786	33,849	131
2012	1,004,472	2,521,149	388,141	1,116,506	494,395	5,524,663	41,209	134
2013	642,527	2,442,765	368,358	1,239,965	989,628	5,683,243	36,294	157
2014	467,451	2,776,433	463,510	1,324,211	468,368	5,499,974	31,332	176
2015	386,378	2,626,235	243,215	1,569,241	121,115	4,946,184	27,877	177
Totals	**4,923,701**	**15,736,169**	**2,507,363**	**8,816,522**	**1,884,741**	**33,868,496**	**247,698**	

[1] Chemical costs reflect actual use rather than invoices paid starting in 2013 forward.

[2] Includes: operations (less chemicals), maintenance, office supplies, memberships, professional services, licenses & permits, insurance premiums, debt service on ID4 capital assets, KCWA overhead charges and other expenses.

ID4 Operations Fund

Revenues	Final Actual 2012-13	Actual 2013-14	Budget 2014-15	Estimated Actual 2014-15	Proposed Budget 2015-16
4150 Treated Water Sales	6,271,061	6,632,873	6,778,200	6,224,000	6,768,000
4170 Other Water Sales	198,749	227,236	112,600	112,600	112,600
Water Sales Total	**6,469,811**	**6,860,109**	**6,890,800**	**6,336,600**	**6,880,600**
4290 Refunds & Credits	913,096	645,026	-	-	-
Credits & Refunds Total	**913,096**	**645,026**	**-**	**-**	**-**
4400 Participant's Annual Payments	196,420	294,630	196,420	196,420	196,420
4401 Participant's O&M Costs	342,092	438,509	515,770	515,770	586,837
4402 Participant's Power Costs	2,052,637	2,629,982	3,190,110	2,362,000	3,033,450
4430 Exchange/Conveyance Fees	356,521	1,143,042	294,400	750,000	387,500
4499 Other User Charges	471,324	795,890	1,215,840	1,749,280	687,280
User ChargesTotal	**3,418,995**	**5,302,054**	**5,412,540**	**5,573,470**	**4,891,487**
4500 Groundwater Charge Collection	2,682,901	3,013,694	2,775,500	3,000,000	2,886,000
Ground Water Charges Total	**2,682,901**	**3,013,694**	**2,775,500**	**3,000,000**	**2,886,000**
4610 Reimburseables	753,966	560,993	319,920	319,920	315,500
Reimbursements Total	**753,966**	**560,993**	**319,920**	**319,920**	**315,500**
4700 Investment Income	53,656	35,514	40,000	20,000	20,000
4705 Interest From Other Sources	-	-	-	-	-
Interest Income Total	**53,656**	**35,514**	**40,000**	**20,000**	**20,000**
4800 Proceeds from Debt Issuance	-	-	-	-	2,150,000
Proceeds From Debt Insurance Total	**-**	**-**	**-**	**-**	**2,150,000**
4900 Other Revenue	-	463	-	20,000	4,025,000
4901 Disposal of Fixed Assets	(2,195)	-	-	-	-
4902 Lease Income	24,000	8,000	-	-	-
4911 Water Analyses	19,620	19,400	17,500	28,500	17,500
Other Revenue Total	**41,425**	**27,863**	**17,500**	**48,500**	**4,042,500**
Total Revenues	**14,333,850**	**16,445,252**	**15,456,260**	**15,298,490**	**21,186,087**

ID4 Operations Fund - continued

Expenditures	Final Actual 2012-13	Actual 2013-14	Budget 2014-15	Estimated Actual 2014-15	Proposed Budget 2015-16
5000 Salaries Regular	1,920,967	2,001,350	2,114,580	2,118,200	2,120,300
5001 Salaries Overtime	61,536	58,354	66,050	75,000	72,700
5002 Salaries Temporary	12,311	34,452	10,000	9,400	7,500
5010 Benefits Social Security	143,592	144,051	167,360	168,630	168,680
5011 Workers Compensation Insurance	88,124	88,656	112,720	91,540	58,760
5012 Benefits Unemployment Insurance	2,387	-	-	-	-
5020 Benefits Retirement	712,505	752,140	848,620	850,000	919,660
5021 Benefits Health Insurance	514,029	552,875	601,200	512,600	583,800
5022 Benefits Life Insurance	11,163	11,088	11,880	11,120	14,160
5023 Benefits Dental Insurance	30,285	30,226	32,880	29,710	30,000
5024 Benefits Vision Insurance	5,649	5,780	6,600	5,980	6,240
5025 Benefits LTD Insurance	15,149	15,592	19,060	19,080	19,000
5026 Benefits LTC Insurance	3,211	3,438	5,160	3,410	3,720
Labor CostsTotal	**3,520,907**	**3,698,002**	**3,996,110**	**3,894,670**	**4,004,520**
5250 Member Unit Credits	-	-	-	-	-
Member Unit Credit Total	**-**	**-**	**-**	**-**	**-**
5100 Groundwater Recharge Fees	78,478	83,397	103,000	103,000	103,000
5101 Groundwater Extraction Fees	348,685	3,097,921	1,565,500	2,500,000	2,533,330
5103 Water Exchange & Convey. Fees	223,238	322,517	39,500	2,000	54,775
5115 Reregulation Fees					
5130 CVC O&M Costs	794,462	605,971	726,800	726,800	746,240
5131 CVC Power & Standby Charges	1,115,300	681,130	896,000	550,000	896,000
5170 Other Water Purchases					
Water Purchases & Fees Total	**2,560,163**	**4,790,935**	**3,330,800**	**3,881,800**	**4,333,345**
5260 Fuels, Oils and Grease	40,231	56,896	46,700	52,700	58,100
5270 Chemicals	945,453	471,375	1,031,500	450,000	1,083,000
5280 Water Analyses	71,280	94,368	83,500	82,500	99,000
5290 Rents and Leases	1,338	11,248	6,550	5,000	5,000
5299 Other Operating Supplies	4,128	5,298	5,750	5,400	5,300
Operations Total	**1,062,430**	**639,185**	**1,174,000**	**595,600**	**1,250,400**
5300 Power for Operations	2,474,367	3,892,452	5,364,110	4,559,950	4,954,450
5301 Standby Charges for Power	23,520	5,630	12,000	-	-
Power Total	**2,497,887**	**3,898,081**	**5,376,110**	**4,559,950**	**4,954,450**
5400 Maint - Structures & Improvmts	95,700	171,168	403,000	363,200	186,500
5401 Maint - Mobile Equip	23,904	19,486	17,080	17,530	17,020
5402 Maint - Electronic Equip	56,529	106,131	57,500	71,250	72,500
5403 Maint - Wells, Pumps, Motors	8,872	73,131	160,000	215,000	115,000
5404 Maint - Chemicals	-	-	-	50	-
5408 Maint - Office Equip & Furnish	1,397	506	500	500	500
5409 Maint - Other	41,074	34,062	32,000	42,650	35,500
5410 Maint - Janitorial	21,066	19,062	24,000	20,000	20,000
Maintenance Total	**248,542**	**423,546**	**694,080**	**730,180**	**447,020**

ID4 Operations Fund - continued

Expenditures - continued	Final Actual 2012-13	Actual 2013-14	Budget 2014-15	Estimated Actual 2014-15	Proposed Budget 2015-16
5500 General Office Supplies	3,999	4,810	3,450	3,900	3,650
5501 Printing and Reproduction	879	64	300	350	350
5502 Computer Supplies	541	2,177	1,570	1,720	1,470
5503 Publications & Subscriptions	3,920	4,675	4,370	5,360	5,260
5504 Mailing Services	3,273	1,336	1,600	1,400	1,550
5510 Laundry and Uniforms	19,073	21,744	20,900	13,200	13,200
5520 Legal Notices & Job Advertise.	8,023	6,642	4,000	-	3,000
5530 Computer Access Fees	4,779	4,820	5,160	5,080	16,700
5540 Promotions & Advertisements	-	825	-	-	-
5550 Assoc. & Prof. Membership Fees	114,911	118,634	129,570	124,910	150,620
5570 Telephone	10,921	23,943	25,400	24,530	22,730
5571 Utilities	6,498	5,920	6,110	5,750	5,750
5581 Liability Insurance	60,602	53,498	65,800	65,330	72,800
5582 Property Insurance	50,454	68,474	72,250	52,150	52,550
5589 Safety Programs & Equipment	23,502	17,703	16,450	23,660	22,500
5590 Directors' Fees	7,701	7,268	8,200	11,160	11,000
5591 Business Meetings & Travel	11,908	13,097	16,400	13,760	15,600
5592 Education & Training	4,773	9,720	10,300	10,900	10,500
5593 Employee Recruitment	-	8,548	-	-	1,000
5599 Agency Overhead Allocation	863,952	981,043	951,000	952,700	985,000
AdministrationTotal	**1,199,709**	**1,354,941**	**1,342,830**	**1,315,860**	**1,395,230**
5601 Legal Services	13,865	17,622	79,000	8,000	40,000
5602 Consulting Engineers	24,157	57,261	62,500	76,500	40,000
5603 Audit Services	7,007	7,884	12,000	11,000	12,000
5604 Special Consultants	179,603	99,274	180,370	161,870	246,300
Professional Services Total	**224,633**	**182,041**	**333,870**	**257,370**	**338,300**
5710 Land Purchase	-	-	-	-	-
5720 Structures & Improvements	1,525,068	1,119,505	1,322,450	481,000	1,289,350
5730 Mobile Equipment	-	-	60,000	60,000	-
5740 Electrical & Mechanical Equip	63,533	60,706	129,700	120,140	78,700
5790 Other Equipment	11,113	(1,776)	-	110	-
Capital Outlays Total	**1,599,714**	**1,178,434**	**1,512,150**	**661,250**	**1,368,050**
5800 Principal on Long Term Debt	189,604	119,942	120,000	120,000	125,800
5801 Interest on Long Term Debt	30,687	58,621	60,000	60,000	52,800
Debt Repayment Total	**220,291**	**178,563**	**180,000**	**180,000**	**178,600**
5910 Tax Collection Charge	-	-	-	-	-
5920 Amort. / Deprec. Expense	4,596,298	4,950,698	-	5,131,978	-
5950 Licenses & Permits	35,556	17,292	33,500	33,600	33,550
5951 Prof. License & Certification Fees	-	1,941	2,500	1,000	2,000
5960 Security	45,246	49,341	59,000	65,000	62,000
5970 Special Projects	913,096	645,026	-	-	6,150,000
5999 Other Expenses	13,630	16,818	21,650	24,260	20,750
Other Expenses Total	**5,603,826**	**5,681,115**	**116,650**	**5,255,838**	**6,268,300**
5900 Unapplied Appropriations	-	-	-	-	-
Unapplied Appropriations Total	**-**	**-**	**-**	**-**	**-**
Total Expenditures	**17,320,839**	**18,468,023**	**14,055,890**	**21,120,067**	**24,119,580**

Treated Water 2015

Constituent	Maximum Contaminant Level			Parameter			Months in Compliance	
Microbiological								
Coliform Bacteria	> 5.0% of samples present for coliform bacteria in one month			40 or more samples collected per month			12	
Constituent	**Units**	**PHG**	**MCL**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Average**
Primary Inorganic Chemicals								
Aluminum	mg/L	0.6	1	0.088	0.072	0.137	0.203	0.125
Antimony	mg/L	0.02	0.006	ND	ND	ND	ND	ND
Arsenic	mg/L	0.000004	0.010	0.002	ND	0.003	0.004	0.002
Asbestos	MFL	7	7	-	ND	-	-	N/A
Barium	mg/L	2	1	ND	ND	ND	ND	ND
Beryllium	mg/L	0.001	0.004	ND	ND	ND	ND	ND
Cadmium	mg/L	0.00004	0.005	ND	ND	ND	ND	ND
Chromium, Total	mg/L	N/A	0.05	ND	ND	ND	ND	ND
Chromium, Hexavalent	mg/L	0.00002	0.010	-	0.00069	-	-	N/A
Cyanide	mg/L	0.15	0.15	-	ND	-	-	N/A
Fluoride	mg/L	1	2	0.18	0.13	0.16	0.16	0.16
Lead*	mg/L	0.0002	0.015	ND	ND	ND	ND	ND
Mercury	mg/L	0.0012	0.002	ND	ND	ND	ND	ND
Nickel	mg/L	0.012	0.1	ND	ND	ND	ND	ND
Nitrate (as NO_3)	mg/L	45	45	6.05	12.3	7.20	5.46	7.75
Nitrite (as Nitrogen, N)	mg/L	1	1	ND	ND	ND	ND	ND
Nitrite + Nitrate (sum as Nitrogen, N)	mg/L	10	10	1.37	2.78	1.63	1.23	1.75
Perchlorate	mg/L	0.001	0.006	-	-	ND	-	N/A
Selenium	mg/L	0.03	0.05	ND	ND	ND	ND	ND
Thallium	mg/L	0.0001	0.002	ND	ND	ND	ND	ND
Secondary Standards								
Aluminum	mg/L	N/A	0.2	0.088	0.072	0.137	0.203	0.125
Color	Units	N/A	15	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Copper*	mg/L	0.3	1.3	ND	ND	ND	ND	ND
Foaming Agents (MBAS)	mg/L	N/A	0.5	-	ND	-	-	N/A
Iron	mg/L	N/A	0.3	ND	ND	ND	ND	ND
Manganese	mg/L	N/A	0.05	ND	ND	ND	ND	ND
Methyl tert-butyl ether	mg/L	N/A	0.005	ND	ND	ND	ND	ND
Odor	Units	N/A	3	1.4	1.4	1.4	1.4	1.4
Silver	mg/L	N/A	0.1	ND	ND	ND	ND	ND
Thiobencarb	mg/L	N/A	0.001	-	ND	-	-	N/A
Turbidity	NTU	N/A	5	0.06	0.04	0.04	0.04	0.05
Zinc	mg/L	N/A	5.0	0.086	0.097	0.097	0.056	0.084
Total Dissolved Solids	mg/L	N/A	1000	168	224	192	148	183
Specific Conductance	uS/cm	N/A	1600	293	357	317	256	306
Chloride	mg/L	N/A	500	25.4	33.6	37.5	22.4	29.7
Sulfate	mg/L	N/A	500	31.4	51.4	31.9	29.3	36.0
General Minerals								
Total Alkalinity (as $CaCO_3$)	mg/L	N/A	N/A	66	62	55	56	60
Bicarbonate	mg/L	N/A	N/A	80.5	75.6	67.1	68.3	72.9
Carbonate	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Hydroxide	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Total Hardness (as $CaCO_3$)	mg/L	N/A	N/A	70.6	92.4	57.7		55.2
Calcium	mg/L	N/A	N/A	24.4	32.7	21.5	18.0	24.2
Magnesium	mg/L	N/A	N/A	2.36	2.62	0.97	1.01	1.74
Sodium	mg/L	N/A	N/A	26.7	31.2	34.3	26.6	29.7
Potassium	mg/L	N/A	N/A	1.52	1.83	1.18	1.12	1.41
pH	Units	N/A	N/A	7.33	7.59	7.40	7.29	7.40
Additional Analyses								
Ammonia	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Boron**	mg/L	N/A	1	-	0.10	-	-	N/A
Bromide	mg/L	N/A	N/A	0.03	0.07	0.10	0.05	0.06
Chlorate**	mg/L	N/A	0.8	0.405	0.138	0.477	0.146	0.292
Chlorite	mg/L	0.05	1.0	ND	ND	ND	ND	ND
Phosphate	mg/L	N/A	N/A	ND	0.41	0.33	ND	0.19
Silica	mg/L	N/A	N/A	17.8	18.6	15.1	14.6	16.5
Total Organic Carbon	mg/L	N/A	N/A	ND	0.64	ND	ND	0.16
Radioactivity								
Gross Alpha	pCi/L	N/A	15	-	ND	-	-	N/A

*Values identified as MCLs are Action Levels under the lead and copper rule
**Values identified as MCLs are Notification Levels or Advisory Levels for constituents lacking MCLs
MCL = Maximum Contaminant Level
MFL = million fibers per liter: MCL for fibers exceeding 10 micrometers in length
mg/L = milligrams per liter (parts per million)
N/A = Not Applicable

ND = Not Detected
NTU = nephelometric turbidity units
pCi/L = picocuries per liter
PHG = Public Health Goal
uS/cm = microsiemens per centimeter

Treated water quarterly monitoring compliance determined by running annual average of four quarterly samples.

Treated Water 2015 - continued

Constituent	Units	PHG	MCL	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Average
Regulated Organic Chemicals								
Total Trihalomethanes	mg/L	N/A	0.080	Refer to Attachment 1				
Haloacetic Acids (HAA5)	mg/L	N/A	0.060	Refer to Attachment 1				
Benzene	mg/L	0.00015	0.001	ND	ND	ND	ND	ND
Carbon Tetrachloride	mg/L	0.0001	0.0005	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	mg/L	0.6	0.6	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	mg/L	0.006	0.005	ND	ND	ND	ND	ND
1,1-Dichloroethane	mg/L	0.003	0.005	ND	ND	ND	ND	ND
1,2-Dichloroethane	mg/L	0.0004	0.0005	ND	ND	ND	ND	ND
1,1-Dichloroethylene	mg/L	0.01	0.006	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	mg/L	0.1	0.006	ND	ND	ND	ND	ND
trans-1,2-Dichloroethylene	mg/L	0.06	0.01	ND	ND	ND	ND	ND
Dichloromethane	mg/L	0.004	0.005	ND	ND	ND	ND	ND
1,2-Dichloropropane	mg/L	0.0005	0.005	ND	ND	ND	ND	ND
1,3-Dichloropropene	mg/L	0.0002	0.0005	ND	ND	ND	ND	ND
Ethylbenzene	mg/L	0.3	0.3	ND	ND	ND	ND	ND
Methyl tert-butyl ether	mg/L	0.013	0.013	ND	ND	ND	ND	ND
Monochlorobenzene	mg/L	0.07	0.07	ND	ND	ND	ND	ND
Styrene	mg/L	0.0005	0.1	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	mg/L	0.0001	0.001	ND	ND	ND	ND	ND
Tetrachloroethylene	mg/L	0.00006	0.005	ND	ND	ND	ND	ND
Toluene	mg/L	0.15	0.15	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	mg/L	0.005	0.005	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	mg/L	1	0.2	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	mg/L	0.0003	0.005	ND	ND	ND	ND	ND
Trichloroethylene	mg/L	0.0017	0.005	ND	ND	ND	ND	ND
Trichlorofluoromethane	mg/L	1.3	0.15	ND	ND	ND	ND	ND
1,1,2-Trichloro-1,2,2-Trifluoroethane	mg/L	4	1.2	ND	ND	ND	ND	ND
Vinyl Chloride	mg/L	0.00005	0.0005	ND	ND	ND	ND	ND
Xylenes (total)	mg/L	1.8	1.75	ND	ND	ND	ND	ND
Regulated Non-Volatile Synthetic Organic Chemicals								
Alachlor	mg/L	0.004	0.002	ND	ND	ND	ND	ND
Atrazine	mg/L	0.00015	0.001	ND	ND	ND	ND	ND
Bentazon	mg/L	0.2	0.018	-	ND	-	-	N/A
Benzo(a)pyrene	mg/L	0.000007	0.0002	-	ND	-	-	N/A
Carbofuran	mg/L	0.0017	0.018	-	ND	-	-	N/A
Chlordane	mg/L	0.00003	0.0001	-	ND	-	-	N/A
Dalapon	mg/L	0.79	0.2	-	ND	-	-	N/A
1,2-Dibromo-3-chloropropane	mg/L	0.0000017	0.0002	0.0000103	ND	ND	ND	0.0000026
2,4-Dichlorophenoxyacetic acid (2,4-D)	mg/L	0.02	0.07	-	ND	-	-	N/A
Di(2-ethylhexyl)adipate	mg/L	0.2	0.4	-	ND	-	-	N/A
Di(2-ethylhexyl)phthalate	mg/L	0.012	0.004	-	ND	-	-	N/A
Dinoseb	mg/L	0.014	0.007	-	ND	-	-	N/A
Diquat	mg/L	0.015	0.02	-	ND	-	-	N/A
Endrin	mg/L	0.0018	0.002	ND	ND	ND	ND	ND
Endothall	mg/L	0.094	0.1	-	ND	-	-	N/A
Ethylene Dibromide	mg/L	0.00001	0.00005	ND	ND	ND	ND	ND
Glyphosate	mg/L	0.9	0.7	-	ND	-	-	N/A
Heptachlor	mg/L	0.000008	0.00001	ND	ND	ND	ND	ND
Heptachlor Epoxide	mg/L	0.000006	0.00001	ND	ND	ND	ND	ND
Hexachlorobenzene	mg/L	0.00003	0.001	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	mg/L	0.002	0.05	ND	ND	ND	ND	ND
Lindane	mg/L	0.000032	0.0002	ND	ND	ND	ND	ND
Methoxychlor	mg/L	0.00009	0.03	ND	ND	ND	ND	ND
Molinate	mg/L	0.001	0.02	-	ND	-	-	N/A
Oxamyl	mg/L	0.026	0.05	-	ND	-	-	N/A
Pentachlorophenol	mg/L	0.0003	0.001	-	ND	-	-	N/A
Picloram	mg/L	0.5	0.5	-	ND	-	-	N/A
Polychlorinated Biphenyls	mg/L	0.00009	0.0005	-	ND	-	-	N/A
Simazine	mg/L	0.004	0.004	ND	ND	ND	ND	ND
2,4,5-TP (Silvex)	mg/L	0.003	0.05	-	ND	-	-	N/A
2,3,7,8-TCDD (Dioxin)	mg/L	0.00000000005	0.00000003	-	waived	-	-	N/A
Thiobencarb	mg/L	0.07	0.07	-	ND	-	-	N/A
Toxaphene	mg/L	0.00003	0.003	ND	ND	ND	ND	ND

*Values identified as MCLs are Action Levels under the lead and copper rule
**Values identified as MCLs are Notification Levels or Advisory Levels for constituents lacking MCLs
MCL = Maximum Contaminant Level
MFL = million fibers per liter: MCL for fibers exceeding 10 micrometers in length
mg/L = milligrams per liter (parts per million)
N/A = Not Applicable

ND = Not Detected
NTU = nephelometric turbidity units
pCi/L = picocuries per liter
PHG = Public Health Goal
uS/cm = microsiemens per centimeter

Treated water quarterly monitoring compliance determined by running annual average of four quarterly samples.

Treated Water 2015 - continued

Constituent	Units	PHG	MCL	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Average
Unregulated Organic Chemicals								
tert-Amyl methyl ether	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Bromobenzene	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Bromochloromethane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Bromomethane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Tertiary butyl alcohol**	mg/L	N/A	0.012	-	ND	0.034	ND	NA
n-Butylbenzene**	mg/L	N/A	0.26	ND	ND	ND	ND	ND
sec-Butylbenzene**	mg/L	N/A	0.26	ND	ND	ND	ND	ND
tert-Butylbenzene**	mg/L	N/A	0.26	ND	ND	ND	ND	ND
Chloroethane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Chloromethane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
2-Chlorotoluene**	mg/L	N/A	0.14	ND	ND	ND	ND	ND
4-Chlorotoluene**	mg/L	N/A	0.14	ND	ND	ND	ND	ND
Dibromomethane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
1,3-Dichlorobenzene**	mg/L	N/A	0.6	ND	ND	ND	ND	ND
Dichlorodifluoromethane**	mg/L	N/A	1	ND	ND	ND	ND	ND
1,3-Dichloropropane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
2,2-Dichloropropane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
1,1-Dichloropropene	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Diisopropyl ether	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Ethyl tert-butyl ether	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Hexachlorobutadiene	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Isopropylbenzene**	mg/L	N/A	0.77	ND	ND	ND	ND	ND
p-Isopropyltoluene	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Naphthalene**	mg/L	N/A	0.017	ND	ND	ND	ND	ND
Nitrobenzene	mg/L	N/A	N/A	ND	ND	ND	ND	ND
Pentachloroethane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
n-Propylbenzene**	mg/L	N/A	0.26	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	mg/L	N/A	N/A	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	mg/L	N/A	N/A	ND	ND	ND	ND	ND
1,3,5-Trichlorobenzene	mg/L	N/A	N/A	ND	ND	ND	ND	ND
1,2,3-Trichloropropane**	mg/L	0.0000007	0.000005	< 0.0005	0.0000053	< 0.0005	< 0.0005	< 0.0005
1,2,3-Trimethylbenzene	mg/L	N/A	N/A	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene**	mg/L	N/A	0.33	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene**	mg/L	N/A	0.33	ND	ND	ND	ND	ND
Methyl isobutyl ketone**	mg/L	N/A	0.12	ND	ND	ND	ND	ND
Unregulated Non-Volatile Synthetic Organic Chemicals								
Aldicarb**	mg/L	N/A	0.007	-	ND	-	-	N/A
Aldicarb Sulfone	mg/L	N/A	N/A	-	ND	-	-	N/A
Aldicarb Sulfoxide	mg/L	N/A	N/A	-	ND	-	-	N/A
Aldrin**	mg/L	N/A	0.000002	ND	ND	ND	ND	ND
Bromacil	mg/L	N/A	N/A	-	ND	-	-	N/A
Butachlor	mg/L	N/A	N/A	-	ND	-	-	N/A
Carbaryl**	mg/L	N/A	0.7	-	ND	-	-	N/A
Diazinon**	mg/L	N/A	0.0012	-	ND	-	-	N/A
Dicamba	mg/L	N/A	N/A	-	ND	-	-	N/A
Dieldrin**	mg/L	N/A	0.000002	ND	ND	ND	ND	ND
Dimethoate**	mg/L	N/A	0.001	-	ND	-	-	N/A
Diuron	mg/L	N/A	N/A	-	-	-	ND	N/A
3-Hydroxycarbofuran	mg/L	N/A	N/A	-	ND	-	-	N/A
Methomyl	mg/L	N/A	N/A	-	ND	-	-	N/A
Metolachlor	mg/L	N/A	N/A	-	ND	-	-	N/A
Metribuzin	mg/L	N/A	N/A	-	ND	-	-	N/A
Propachlor**	mg/L	N/A	0.09	-	ND	-	-	N/A
2,4,5-T	mg/L	N/A	N/A	-	ND	-	-	N/A

*Values identified as MCLs are Action Levels under the lead and copper rule
**Values identified as MCLs are Notification Levels or Advisory Levels for constituents lacking MCLs
MCL = Maximum Contaminant Level
MFL = million fibers per liter: MCL for fibers exceeding 10 micrometers in length
mg/L = milligrams per liter (parts per million)
N/A = Not Applicable

ND = Not Detected
NTU = nephelometric turbidity units
pCi/L = picocuries per liter
PHG = Public Health Goal
uS/cm = microsiemens per centimeter

Treated water quarterly monitoring compliance determined by running annual average of four quarterly samples.

Treated Water 2015 - continued

Total Trihalomethanes Monitoring 2015 (State Stage 2 D/DBPR)

Total Trihalomethanes MCL	0.080 ppm				
MCL in CCR units	80 ppb				
Location	2015 TTHM Results (ppb)				
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	LRAA
Site 1: 1022 Sequoia Street	31.1	17.6	12.6	10.8	18.0
Site 2: Francis Street Alley	38.3	25.0	12.5	9.3	21.3
Site 3: NOR Terminal Tank Inlet	35.8	25.0	18.0	10.4	22.3
Site 4: North King & Jeffrey	37.5	28.4	12.2	17.3	23.9
Site 5: Wenatchee Pump Station	42.1	55.2	12.5	45.2	38.8
Site 6: Oswell Large Tank	37.0	30.8	20.3	20.5	27.2
Site 7: Oswell Pump Station	26.8	24.4	22.6	21.7	23.9
Site 8: Meany & Alken	41.5	21.8	14.0	12.7	22.5
Site 9: Meany & Coffee	48.1	23.2	14.2	14.3	25.0

CCR Table Excerpt

Contaminant (CCR units)	MCL	PHG (or MCLG)	Highest LRAA	LRAA Range	Sample Date	Violation	Typical Source
TTHM (ppb)	80	N/A	38.8	18.0 - 38.8	2015	No	Byproduct of drinking water disinfection

Haloacetic Acids Monitoring 2015 (State Stage 2 D/DBPR)

Haloacetic Acids MCL	0.060 ppm				
MCL in CCR units	60 ppb				
Location	2015 HAA5 Results (ppb)				
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	LRAA
Site 1: 1022 Sequoia Street	20.6	7.0	4.0	4.9	9.1
Site 2: Francis Street Alley	21.8	9.1	3.8	4.9	9.9
Site 3: NOR Terminal Tank Inlet	22.0	8.6	4.8	4.7	10.0
Site 4: North King & Jeffrey	22.1	9.8	3.8	7.8	10.9
Site 5: Wenatchee Pump Station	29.3	24.4	3.9	23.3	20.2
Site 6: Oswell Large Tank	22.0	8.1	5.3	12.0	11.9
Site 7: Oswell Pump Station	19.2	9.2	5.2	11.2	11.2
Site 8: Meany & Alken	22.4	8.1	4.0	6.6	10.3
Site 9: Meany & Coffee	21.1	9.1	3.9	5.4	9.9

CCR Table Excerpt

Contaminant (CCR units)	MCL	PHG (or MCLG)	Highest LRAA	LRAA Range	Sample Date	Violation	Typical Source
HAA5 (ppb)	60	N/A	20.2	9.1 - 20.2	2015	No	Byproduct of drinking water disinfection

CCR = Consumer Confidence Report
LRAA = Locational Running Annual Average
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
N/A = Not Applicable
PHG = Public Health Goal
ppb = parts per billion
ppm = parts per million

Source Water 2015

Constituent	Units	PHG*	MCL*	Source			
				Friant Kern	Groundwater	Aqueduct	Kern River
Primary Inorganic Chemicals							
Aluminum	mg/L	0.6	1	0.210	ND	0.178	0.885
Antimony	mg/L	0.02	0.006	ND	ND	ND	ND
Arsenic	mg/L	0.000004	0.010	0.002	0.003	0.002	0.006
Asbestos	MFL	7	7	ND	ND	ND	ND
Barium	mg/L	2	1	0.126	0.097	ND	ND
Beryllium	mg/L	0.001	0.004	ND	ND	ND	ND
Cadmium	mg/L	0.00004	0.005	ND	ND	ND	ND
Chromium, Total	mg/L	N/A	0.05	0.001	0.001	ND	ND
Chromium, Hexavalent	mg/L	0.00002	0.010	0.0015	0.00080	ND	ND
Cyanide	mg/L	0.15	0.15	ND	ND	ND	ND
Fluoride	mg/L	1	2	0.12	0.12	0.11	0.25
Lead**	mg/L	0.0002	0.015	ND	ND	ND	ND
Mercury	mg/L	0.0012	0.002	ND	ND	ND	ND
Nickel	mg/L	0.012	0.1	ND	ND	ND	ND
Nitrate (as NO_3)	mg/L	45	45	22.2	11.9	2.17	ND
Nitrite (as Nitrogen, N)	mg/L	1	1	ND	ND	ND	ND
Nitrate + Nitrite (sum as Nitrogen, N)	mg/L	10	10	5.02	2.68	0.49	ND
Perchlorate	mg/L	0.001	0.006	ND	ND	ND	ND
Selenium	mg/L	0.03	0.05	ND	ND	ND	ND
Thallium	mg/L	0.0001	0.002	ND	ND	ND	ND
Secondary Standards							
Aluminum	mg/L	N/A	0.2	0.210	ND	0.178	0.885
Color	Units	N/A	15	12.5	7.5	30	20
Copper**	mg/L	0.3	1.3	ND	ND	ND	ND
Foaming Agents (MBAS)	mg/L	N/A	0.5	ND	ND	ND	ND
Iron	mg/L	N/A	0.3	0.104	ND	0.146	0.547
Manganese	mg/L	N/A	0.05	ND	ND	ND	0.046
Methyl tert-butyl ether	mg/L	N/A	0.005	ND	ND	ND	ND
Odor	Units	N/A	3	8	4	6	6
Silver	mg/L	N/A	0.1	ND	ND	ND	ND
Thiobencarb	mg/L	N/A	0.001	ND	ND	ND	ND
Turbidity	Units	N/A	5	1.59	0.69	1.15	5.57
Zinc	mg/L	N/A	5.0	ND	ND	ND	ND
Total Dissolved Solids	mg/L	N/A	1000	349	218	325	152
Specific Conductance	uS/cm	N/A	1600	560	351	557	245
Chloride	mg/L	N/A	500	58.3	32.0	81.1	9.60
Sulfate	mg/L	N/A	500	101	44.6	59.1	27.0
General Minerals							
Total Alkalinity (as $CaCO_3$)	mg/L	N/A	N/A	66	66	91	80
Bicarbonate	mg/L	N/A	N/A	80.5	80.5	111	97.6
Carbonate	mg/L	N/A	N/A	ND	ND	ND	ND
Hydroxide	mg/L	N/A	N/A	ND	ND	ND	ND
Total Hardness (as $CaCO_3$)	mg/L	N/A	N/A	140	94.3	139	69.2
Calcium	mg/L	N/A	N/A	50.6	33.5	28.3	21.6
Magnesium	mg/L	N/A	N/A	3.32	2.58	16.6	3.70
Sodium	mg/L	N/A	N/A	25.6	30.2	27.1	22.8
Potassium	mg/L	N/A	N/A	2.57	1.94	3.57	2.41
pH	Units	N/A	N/A	8.71	8.49	8.59	8.00
Additional Analyses							
Ammonia	mg/L	N/A	N/A	ND	ND	ND	0.03
Boron***	mg/L	N/A	1	ND	0.10	0.25	0.21
Bromide	mg/L	N/A	N/A	0.22	0.11	0.24	0.03
Phosphate	mg/L	N/A	N/A	ND	ND	ND	ND
Silica	mg/L	N/A	N/A	19.3	18.8	13.4	11.3
Total Organic Carbon	mg/L	N/A	N/A	1.0	0.79	6.0	2.0
Radioactivity							
Gross Alpha	pCi/L	N/A	15	3.58	ND	ND	2.56
Gross Beta	mrem/yr	N/A	4	-	-	-	-
Radium 226 + Radium 228	pCi/L	N/A	5	-	-	-	-
Radium 226	pCi/L	0.05	N/A	-	-	-	-
Radium 228	pCi/L	0.019	N/A	-	-	-	-
Strontium-90	pCi/L	0.35	8	-	-	-	-
Tritium	pCi/L	400	20,000	-	-	-	-
Uranium	pCi/L	0.43	20	-	-	-	-

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***Values identified as MCLs are Notification Levels or Advisory Levels for constituents lacking MCLs
MCL = Maximum Contaminant Level
MFL = million fibers per liter: MCL for fibers exceeding 10 micrometers in length
mg/L = milligrams per liter (parts per million)
mrem/yr = millirems per year

N/A = Not Applicable
ND = Not Detected
NTU = nephelometric turbidity units
pCi/L = picocuries per liter
PHG = Public Health Goal
uS/cm = microsiemens per centimeter

Source Water 2015 - continued

Constituent	Units	PHG*	MCL*	Sample Date			
				Friant Kern	Groundwater	Aqueduct	Kern River
Regulated Volatile Organic Chemicals							
Benzene	mg/L	0.00015	0.001	ND	ND	ND	ND
Carbon Tetrachloride	mg/L	0.0001	0.0005	ND	ND	ND	ND
1,2-Dichlorobenzene	mg/L	0.6	0.6	ND	ND	ND	ND
1,4-Dichlorobenzene	mg/L	0.006	0.005	ND	ND	ND	ND
1,1-Dichloroethane	mg/L	0.003	0.005	ND	ND	ND	ND
1,2-Dichloroethane	mg/L	0.0004	0.0005	ND	ND	ND	ND
1,1-Dichloroethylene	mg/L	0.01	0.006	ND	ND	ND	ND
cis-1,2-Dichloroethylene	mg/L	0.1	0.006	ND	ND	ND	ND
trans-1,2-Dichloroethylene	mg/L	0.06	0.01	ND	ND	ND	ND
Dichloromethane	mg/L	0.004	0.005	ND	ND	ND	ND
1,2-Dichloropropane	mg/L	0.0005	0.005	ND	ND	ND	ND
1,3-Dichloropropene	mg/L	0.0002	0.0005	ND	ND	ND	ND
Ethylbenzene	mg/L	0.3	0.3	ND	ND	ND	ND
Methyl tert-butyl ether	mg/L	0.013	0.013	ND	ND	ND	ND
Monochlorobenzene	mg/L	0.07	0.07	ND	ND	ND	ND
Styrene	mg/L	0.0005	0.1	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	mg/L	0.0001	0.001	ND	ND	ND	ND
Tetrachloroethylene	mg/L	0.00006	0.005	ND	ND	ND	ND
Toluene	mg/L	0.15	0.15	ND	ND	ND	ND
1,2,4-Trichlorobenzene	mg/L	0.005	0.005	ND	ND	ND	ND
1,1,1-Trichloroethane	mg/L	1	0.2	ND	ND	ND	ND
1,1,2-Trichloroethane	mg/L	0.0003	0.005	ND	ND	ND	ND
Trichloroethylene	mg/L	0.0017	0.005	ND	ND	ND	ND
Trichlorofluoromethane	mg/L	1.3	0.15	ND	ND	ND	ND
1,1,2-Trichloro-1,2,2-Trifluoroethane	mg/L	4	1.2	ND	ND	ND	ND
Vinyl Chloride	mg/L	0.00005	0.0005	ND	ND	ND	ND
Xylenes (total)	mg/L	1.8	1.75	ND	ND	ND	ND
Regulated Non-Volatile Synthetic Organic Chemicals							
Alachlor	mg/L	0.004	0.002	ND	ND	ND	ND
Atrazine	mg/L	0.00015	0.001	ND	ND	ND	ND
Bentazon	mg/L	0.2	0.018	ND	ND	ND	ND
Benzo(a)pyrene	mg/L	0.000007	0.0002	ND	ND	ND	ND
Carbofuran	mg/L	0.0017	0.018	ND	ND	ND	ND
Chlordane	mg/L	0.00003	0.0001	ND	ND	ND	ND
Dalapon	mg/L	0.79	0.2	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	mg/L	0.0000017	0.0002	ND	ND	ND	ND
2,4-Dichlorophenoxyacetic acid (2,4-D)	mg/L	0.02	0.07	ND	ND	ND	ND
Di(2-ethylhexyl)adipate	mg/L	0.2	0.4	ND	ND	ND	ND
Di(2-ethylhexyl)phthalate	mg/L	0.012	0.004	ND	ND	ND	ND
Dinoseb	mg/L	0.014	0.007	ND	ND	ND	ND
Diquat	mg/L	0.015	0.02	ND	ND	ND	ND
Endrin	mg/L	0.0018	0.002	ND	ND	ND	ND
Endothall	mg/L	0.094	0.1	ND	ND	ND	ND
Ethylene Dibromide	mg/L	0.00001	0.00005	ND	ND	ND	ND
Glyphosate	mg/L	0.9	0.7	ND	ND	ND	ND
Heptachlor	mg/L	0.000008	0.00001	ND	ND	ND	ND
Heptachlor Epoxide	mg/L	0.000006	0.00001	ND	ND	ND	ND
Hexachlorobenzene	mg/L	0.00003	0.001	ND	ND	ND	ND
Hexachlorocyclopentadiene	mg/L	0.002	0.05	ND	ND	ND	ND
Lindane	mg/L	0.000032	0.0002	ND	ND	ND	ND
Methoxychlor	mg/L	0.00009	0.03	ND	ND	ND	ND
Molinate	mg/L	0.001	0.02	ND	ND	ND	ND
Oxamyl	mg/L	0.026	0.05	ND	ND	ND	ND
Pentachlorophenol	mg/L	0.0003	0.001	ND	ND	ND	ND
Picloram	mg/L	0.5	0.5	ND	ND	ND	ND
Polychlorinated Biphenyls	mg/L	0.00009	0.0005	ND	ND	ND	ND
Simazine	mg/L	0.004	0.004	ND	ND	ND	ND
2,4,5-TP (Silvex)	mg/L	0.003	0.05	ND	ND	ND	ND
2,3,7,8-TCDD (Dioxin)	mg/L	0.00000000005	0.00000003	waived	waived	waived	waived
Thiobencarb	mg/L	0.07	0.07	ND	ND	ND	ND
Toxaphene	mg/L	0.00003	0.003	ND	ND	ND	ND

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***Values identified as MCLs are Notification Levels or Advisory Levels for constituents lacking MCLs
MCL = Maximum Contaminant Level
MFL = million fibers per liter: MCL for fibers exceeding 10 micrometers in length
mg/L = milligrams per liter (parts per million)
mrem/yr = millirems per year

N/A = Not Applicable
ND = Not Detected
NTU = nephelometric turbidity units
pCi/L = picocuries per liter
PHG = Public Health Goal
uS/cm = microsiemens per centimeter

Source Water 2015 - continued

Constituent	Units	PHG*	MCL*	Sample Date			
				Friant Kern	Groundwater	Aqueduct	Kern River
Unregulated Volatile Organic Chemicals							
tert-Amyl methyl ether	mg/L	N/A	N/A	ND	ND	ND	ND
Bromobenzene	mg/L	N/A	N/A	ND	ND	ND	ND
Bromochloromethane	mg/L	N/A	N/A	ND	ND	ND	ND
Bromomethane	mg/L	N/A	N/A	ND	ND	ND	ND
Tertiary butyl alcohol***	mg/L	N/A	0.012	0.058	ND	0.034	0.044
n-Butylbenzene***	mg/L	N/A	0.26	ND	ND	ND	ND
sec-Butylbenzene***	mg/L	N/A	0.26	ND	ND	ND	ND
tert-Butylbenzene***	mg/L	N/A	0.26	ND	ND	ND	ND
Chloroethane	mg/L	N/A	N/A	ND	ND	ND	ND
Chloromethane	mg/L	N/A	N/A	ND	ND	ND	ND
2-Chlorotoluene***	mg/L	N/A	0.14	ND	ND	ND	ND
4-Chlorotoluene***	mg/L	N/A	0.14	ND	ND	ND	ND
Dibromomethane	mg/L	N/A	N/A	ND	ND	ND	ND
1,3-Dichlorobenzene***	mg/L	N/A	0.6	ND	ND	ND	ND
Dichlorodifluoromethane***	mg/L	N/A	1	ND	ND	ND	ND
1,3-Dichloropropane	mg/L	N/A	N/A	ND	ND	ND	ND
2,2-Dichloropropane	mg/L	N/A	N/A	ND	ND	ND	ND
1,1-Dichloropropene	mg/L	N/A	N/A	ND	ND	ND	ND
Diisopropyl ether	mg/L	N/A	N/A	ND	ND	ND	ND
Ethyl tert-butyl ether	mg/L	N/A	N/A	ND	ND	ND	ND
Hexachlorobutadiene	mg/L	N/A	N/A	ND	ND	ND	ND
Isopropylbenzene***	mg/L	N/A	0.77	ND	ND	ND	ND
p-Isopropyltoluene	mg/L	N/A	N/A	ND	ND	ND	ND
Naphthalene***	mg/L	N/A	0.017	ND	ND	ND	ND
Nitrobenzene	mg/L	N/A	N/A	ND	ND	ND	ND
Pentachloroethane	mg/L	N/A	N/A	ND	ND	ND	ND
n-Propylbenzene***	mg/L	N/A	0.26	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	mg/L	N/A	N/A	ND	ND	ND	ND
1,2,3-Trichlorobenzene	mg/L	N/A	N/A	ND	ND	ND	ND
1,3,5-Trichlorobenzene	mg/L	N/A	N/A	ND	ND	ND	ND
1,2,3-Trichloropropane***	mg/L	0.0000007	0.000005	ND	0.0000054	ND	ND
1,2,3-Trimethylbenzene	mg/L	N/A	N/A	ND	ND	ND	ND
1,2,4-Trimethylbenzene***	mg/L	N/A	0.33	ND	ND	ND	ND
1,3,5-Trimethylbenzene***	mg/L	N/A	0.33	ND	ND	ND	ND
Methyl isobutyl ketone***	mg/L	N/A	0.12	ND	ND	ND	ND
Unregulated Non-Volatile Synthetic Organic Chemicals							
Aldicarb***	mg/L	N/A	0.007	ND	ND	ND	ND
Aldicarb Sulfone	mg/L	N/A	N/A	ND	ND	ND	ND
Aldicarb Sulfoxide	mg/L	N/A	N/A	ND	ND	ND	ND
Aldrin***	mg/L	N/A	0.000002	ND	ND	ND	ND
Bromacil	mg/L	N/A	N/A	ND	ND	ND	ND
Butachlor	mg/L	N/A	N/A	ND	ND	ND	ND
Carbaryl***	mg/L	N/A	0.7	ND	ND	ND	ND
Diazinon***	mg/L	N/A	0.0012	ND	ND	ND	ND
Dicamba	mg/L	N/A	N/A	ND	ND	ND	ND
Dieldrin***	mg/L	N/A	0.000002	ND	ND	ND	ND
Dimethoate***	mg/L	N/A	0.001	ND	ND	ND	ND
Diuron	mg/L	N/A	N/A	ND	ND	ND	ND
3-Hydroxycarbofuran	mg/L	N/A	N/A	ND	ND	ND	ND
Methomyl	mg/L	N/A	N/A	ND	ND	ND	ND
Metolachlor	mg/L	N/A	N/A	ND	ND	ND	ND
Metribuzin	mg/L	N/A	N/A	ND	ND	ND	ND
Propachlor***	mg/L	N/A	0.09	ND	ND	ND	ND
2,4,5-T	mg/L	N/A	N/A	ND	ND	ND	ND

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***Values identified as MCLs are Notification Levels or Advisory Levels for constituents lacking MCLs
MCL = Maximum Contaminant Level
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N/A = Not Applicable
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NTU = nephelometric turbidity units
pCi/L = picocuries per liter
PHG = Public Health Goal
uS/cm = microsiemens per centimeter

Figure 1 - Groundwater Replenishment

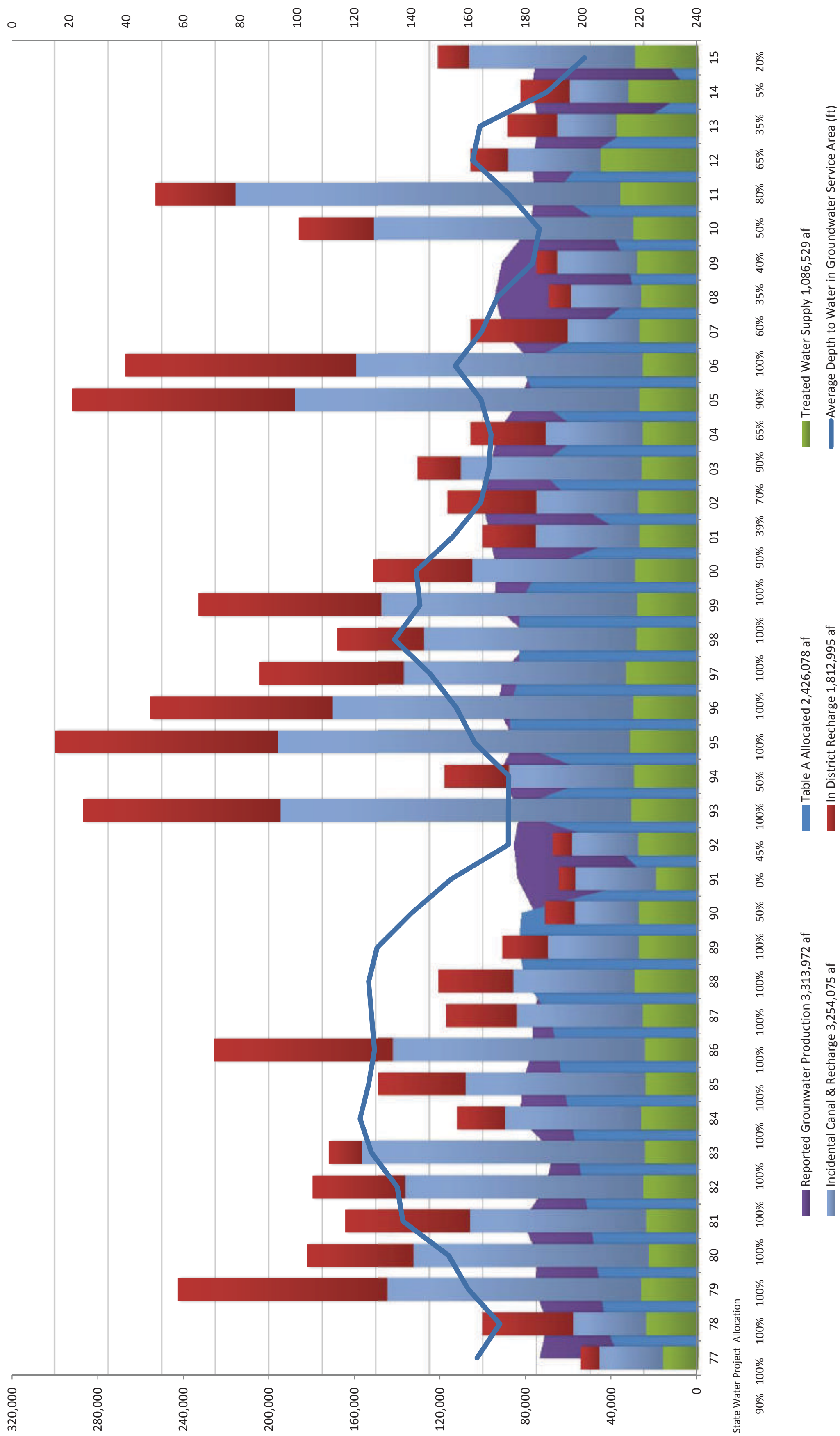


Figure 2 - 29S/27E-08H53

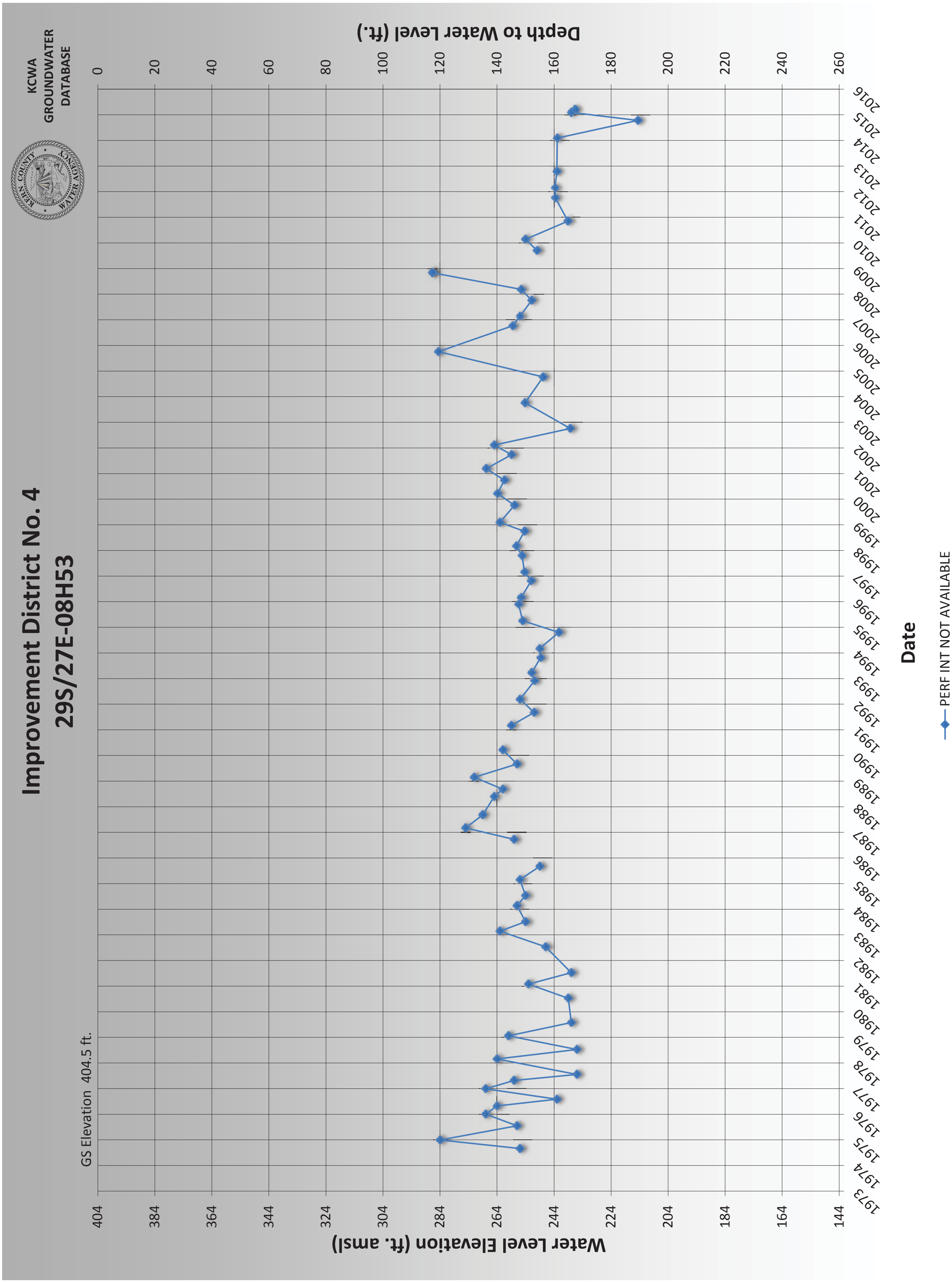


Figure 3 - 29S/28E-18K01

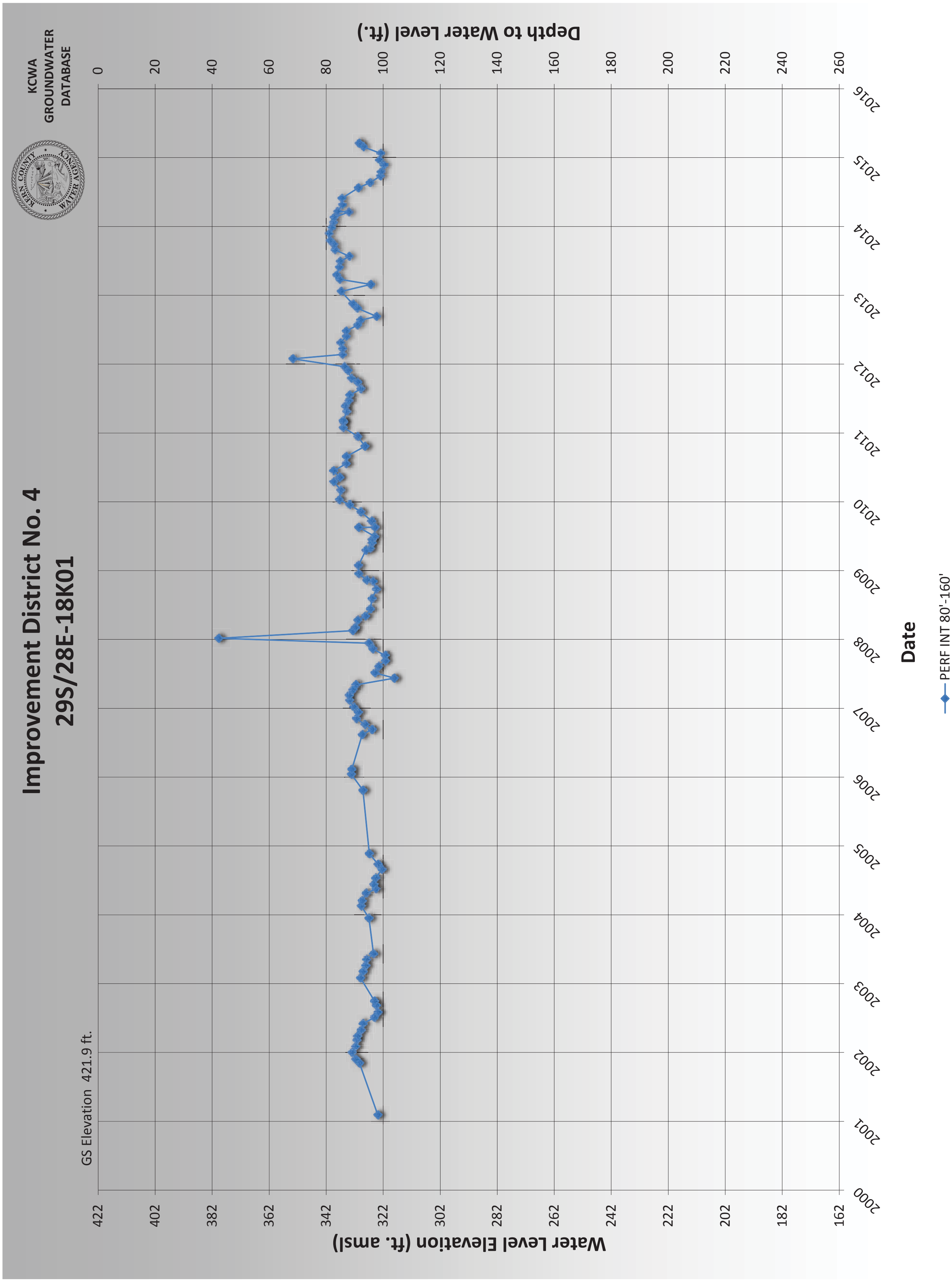


Figure 4 - 30S/27E-05D01

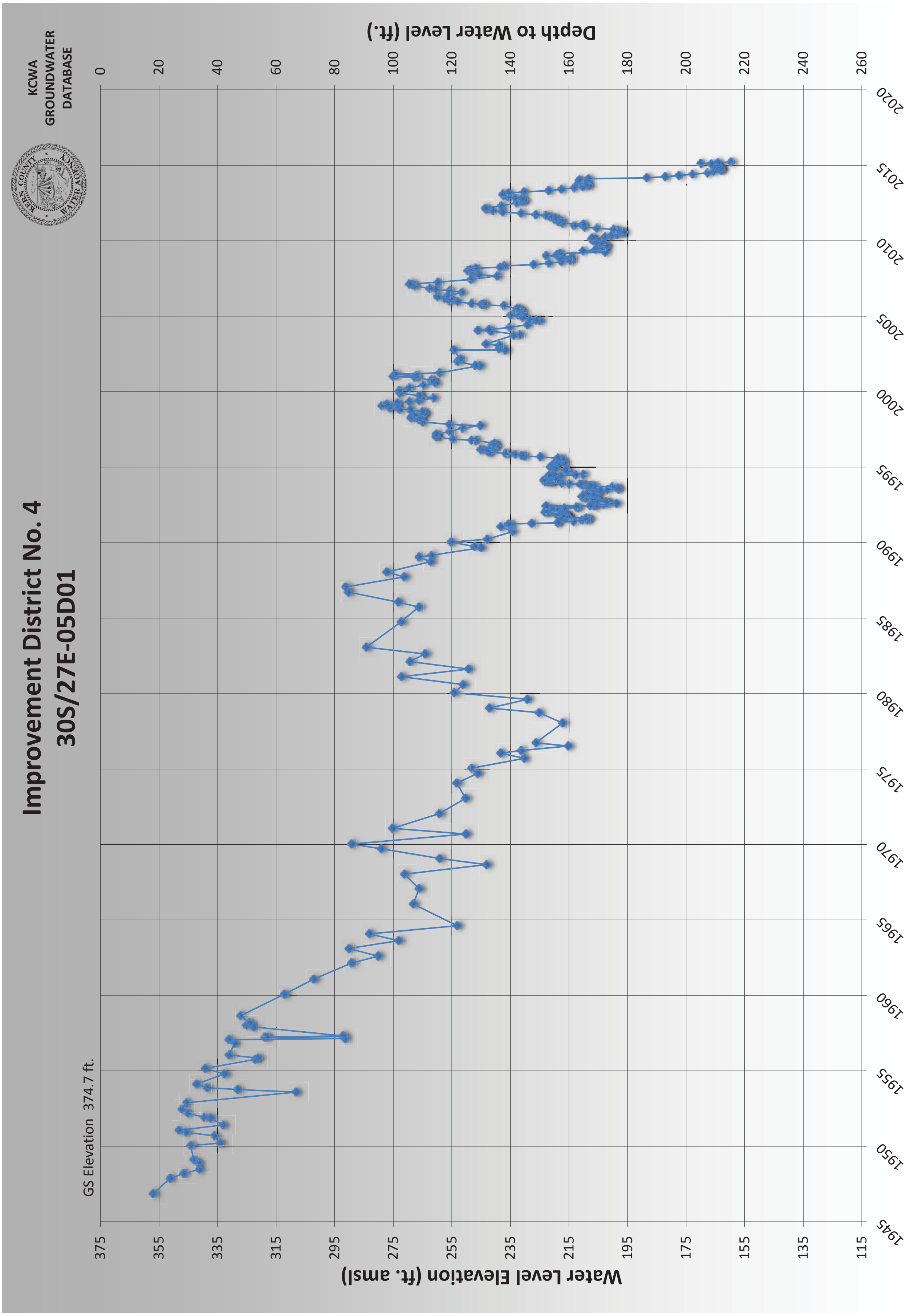
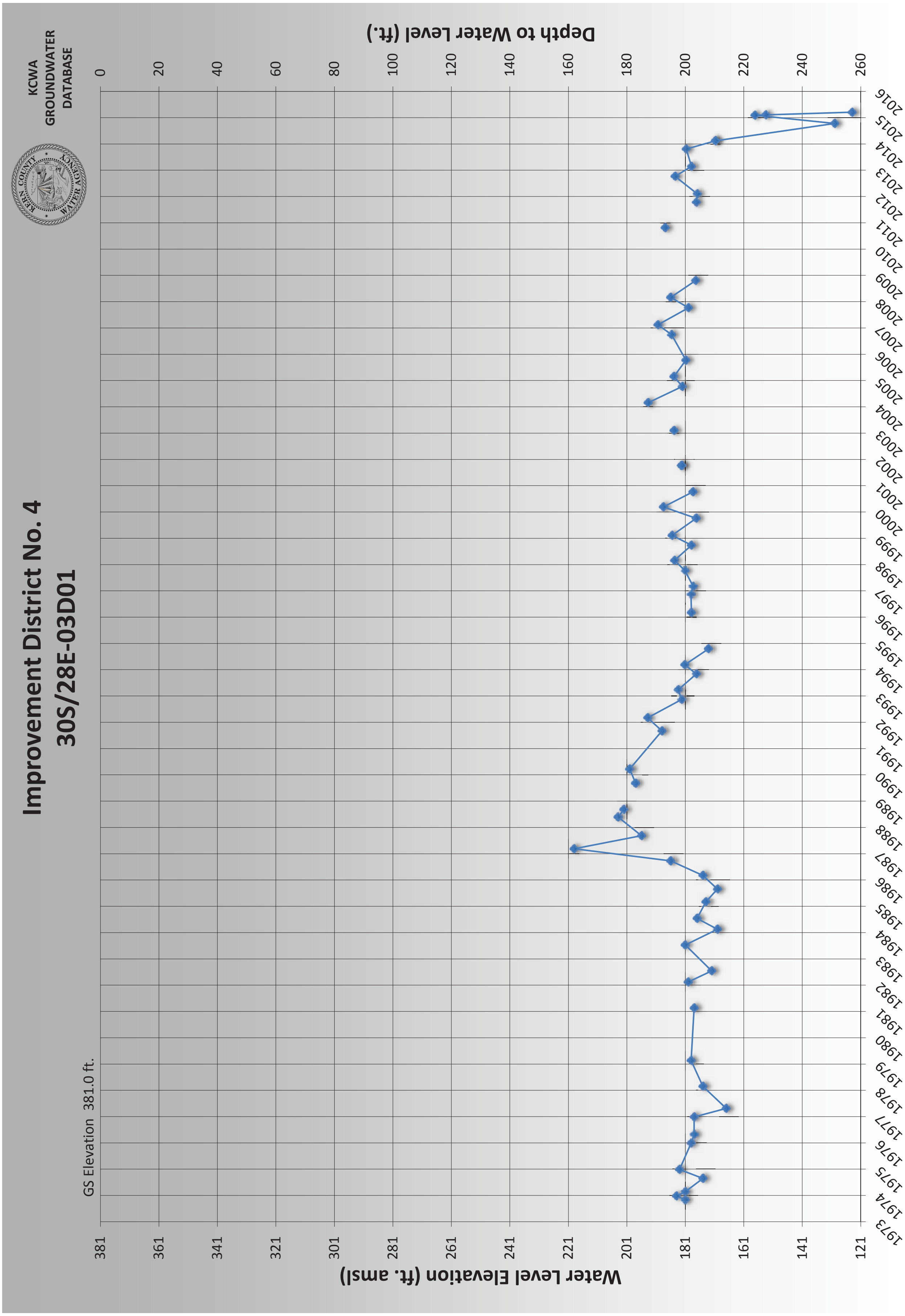
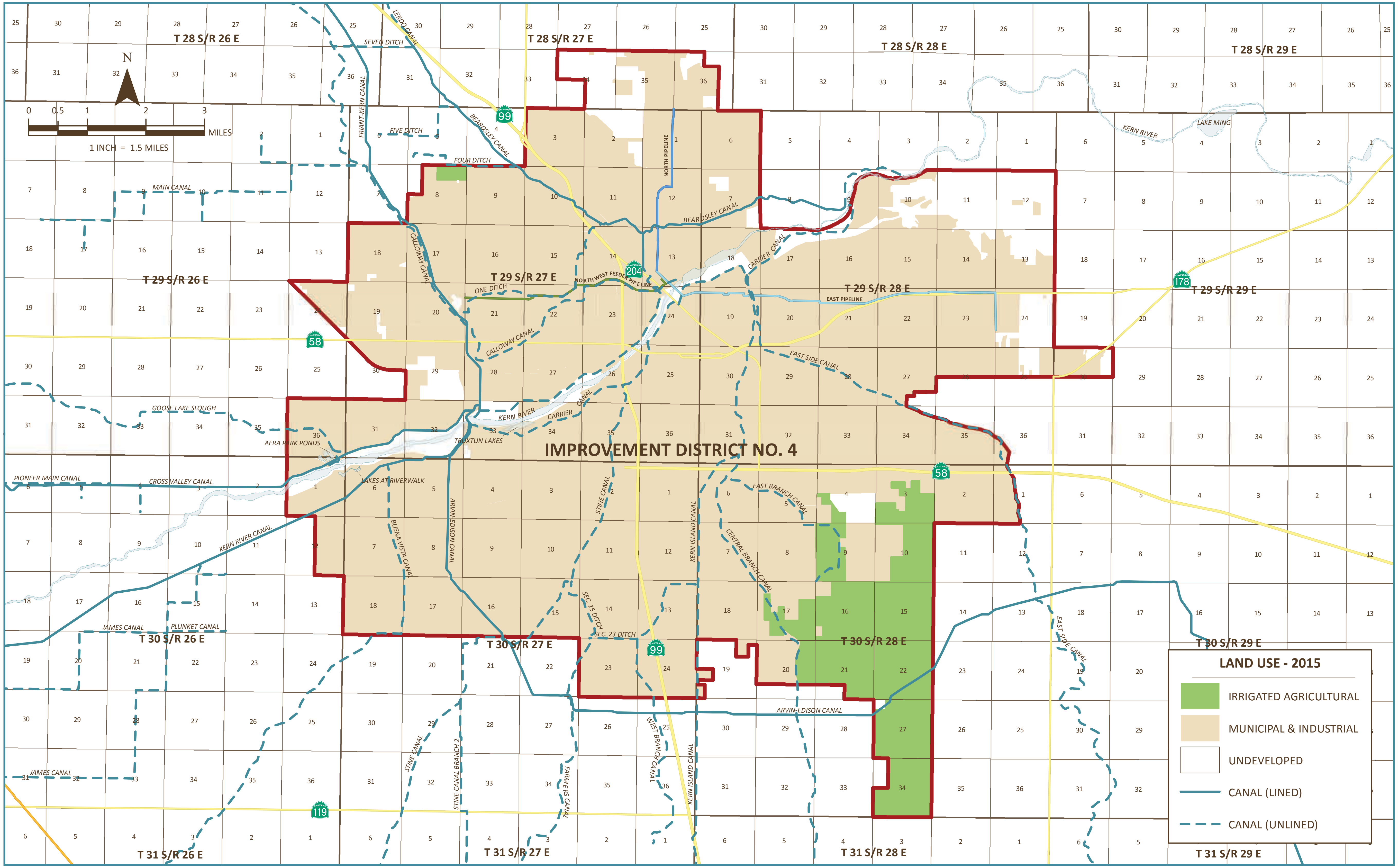


Figure 5 - 30S/28E-03D01



Plates

Plate 1 - Land Use

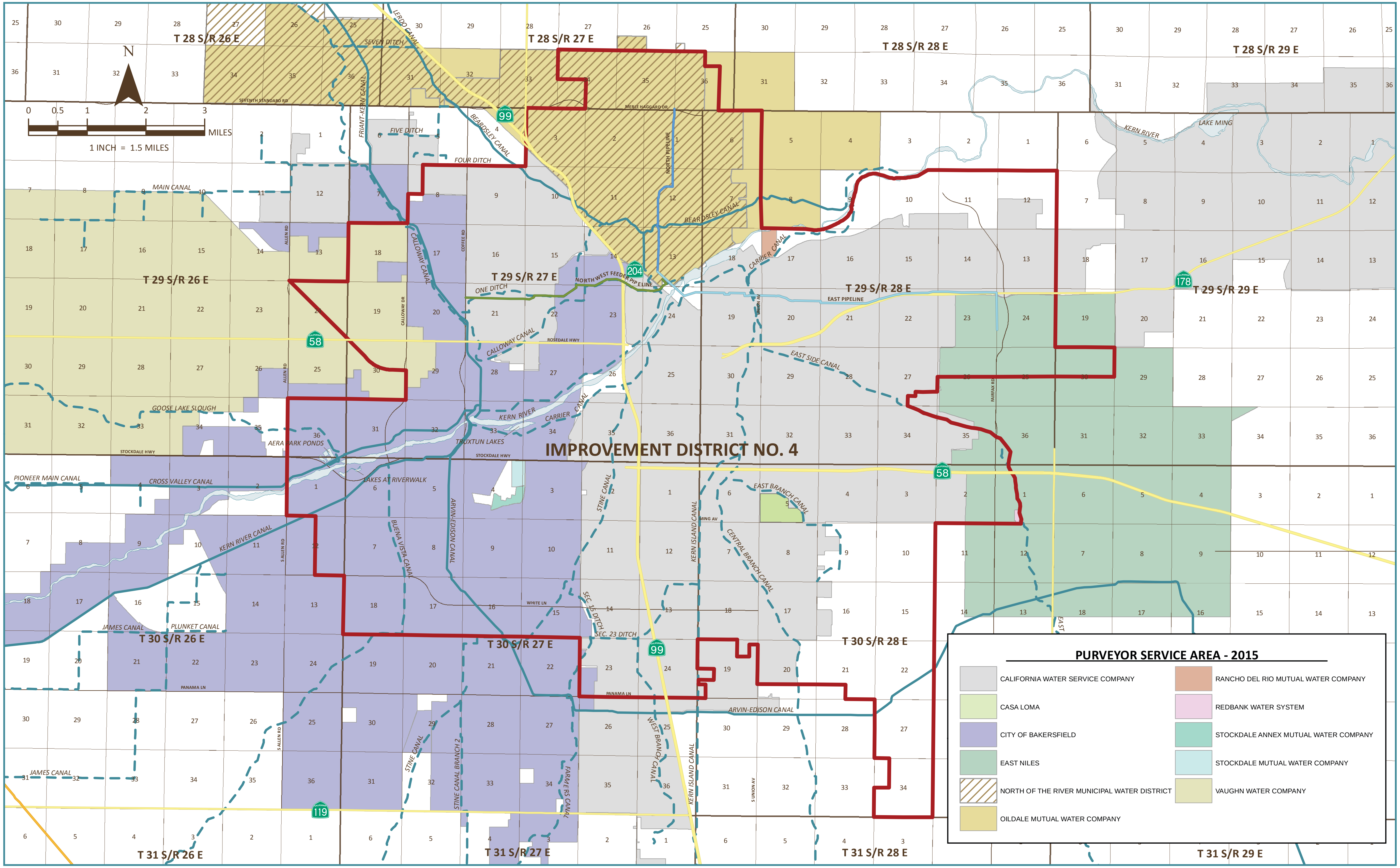


*Previous year Land Use map used General Plan Boundary for designations resulting in minimal undeveloped land.

BY: M. ALLEN
DATE: NOVEMBER 13, 2015
REVIEWED BY: M. VARGA
FILENAME: Plate 1 - Land Use (2015).mxd

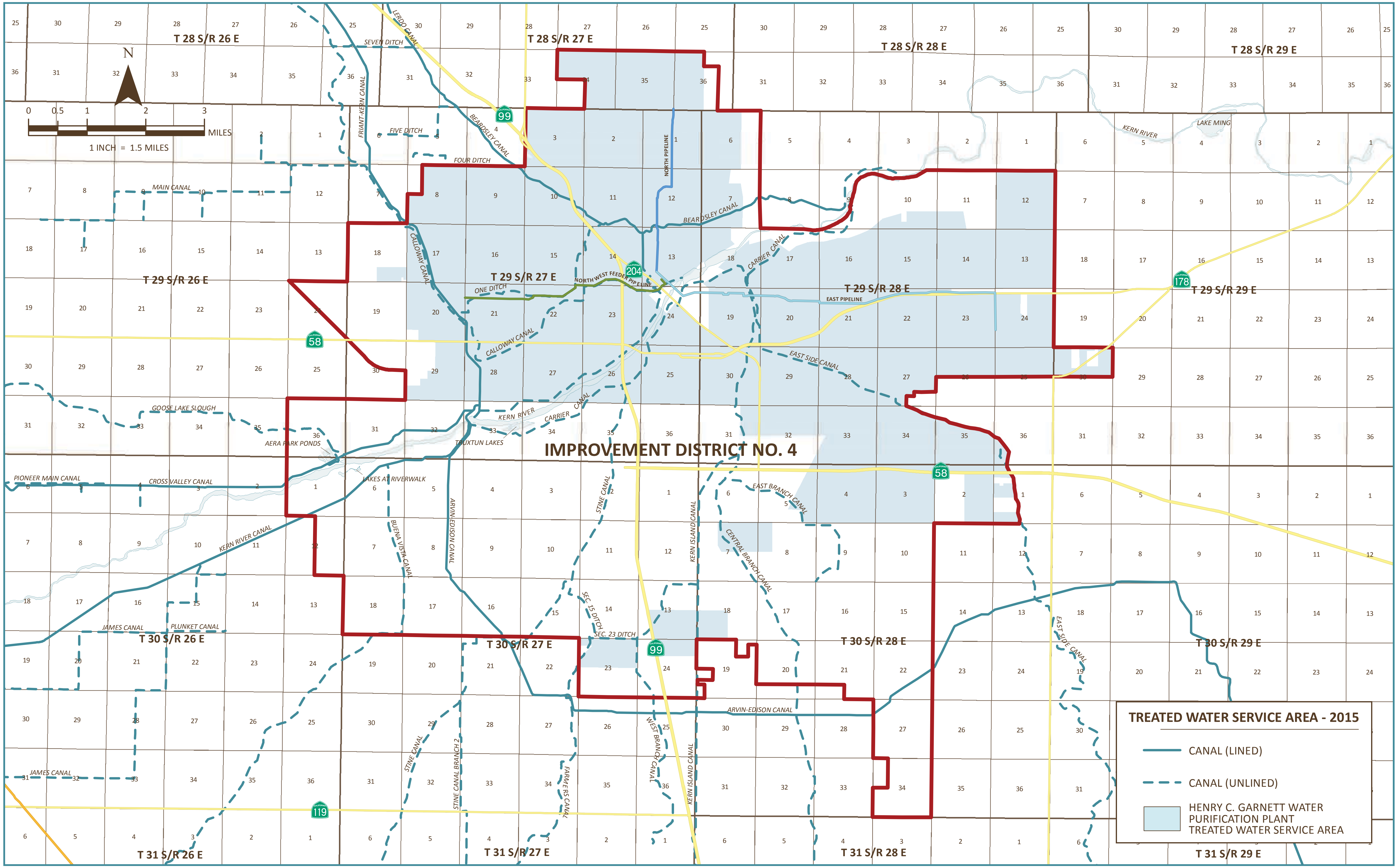
Irrigated agriculture, municipal and industrial areas determined via aerial imagery of Kern County, taken in Spring 2014 and field inspections.

Plate 2 - Purveyor Service Area



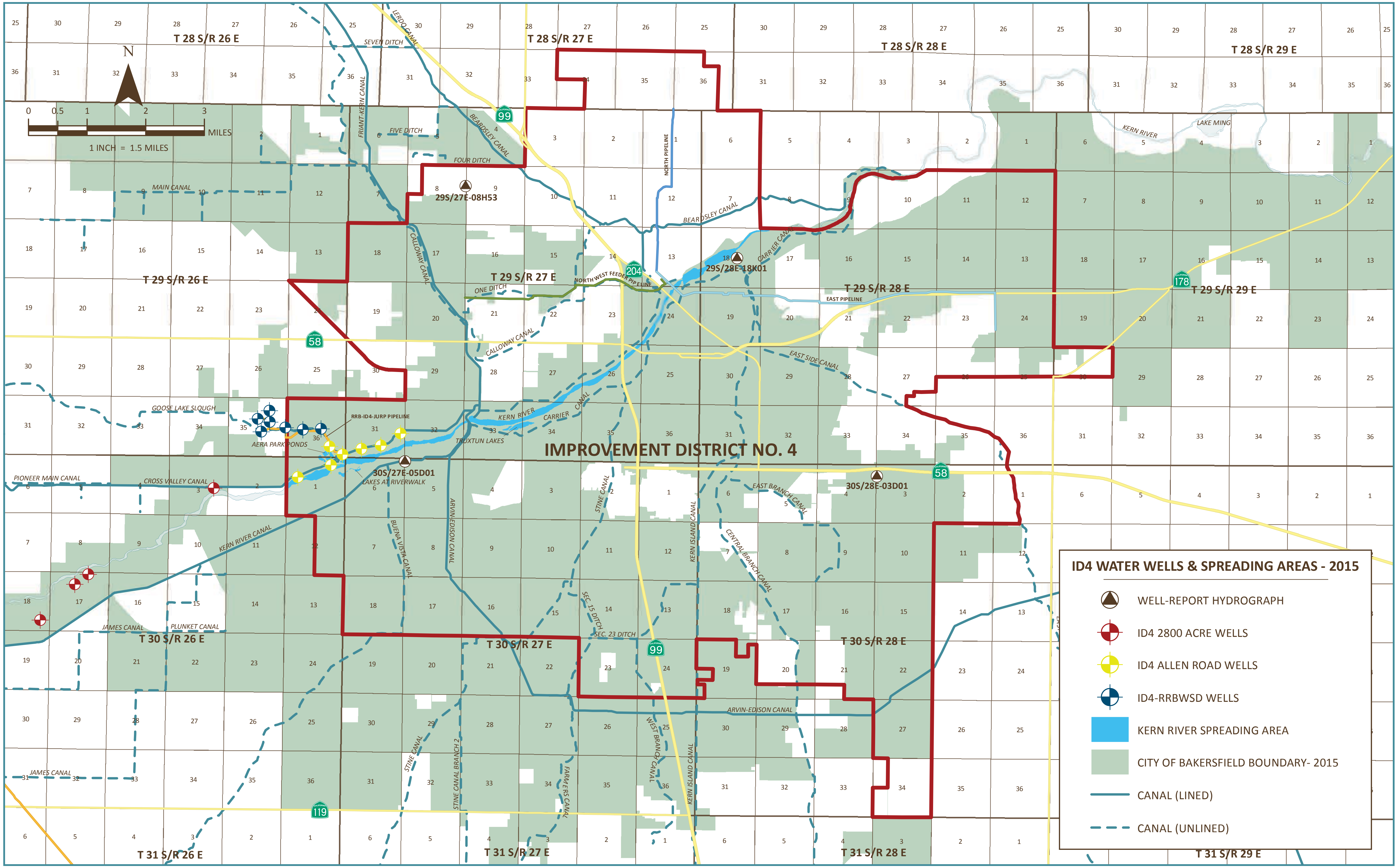
BY: M. ALLEN
DATE: OCTOBER 20, 2015
REVIEWED BY: DRAFT
FILENAME: Plate 2 - Purveyor Service Area (2015).mxd

Plate 3 - Treated Water Service Area



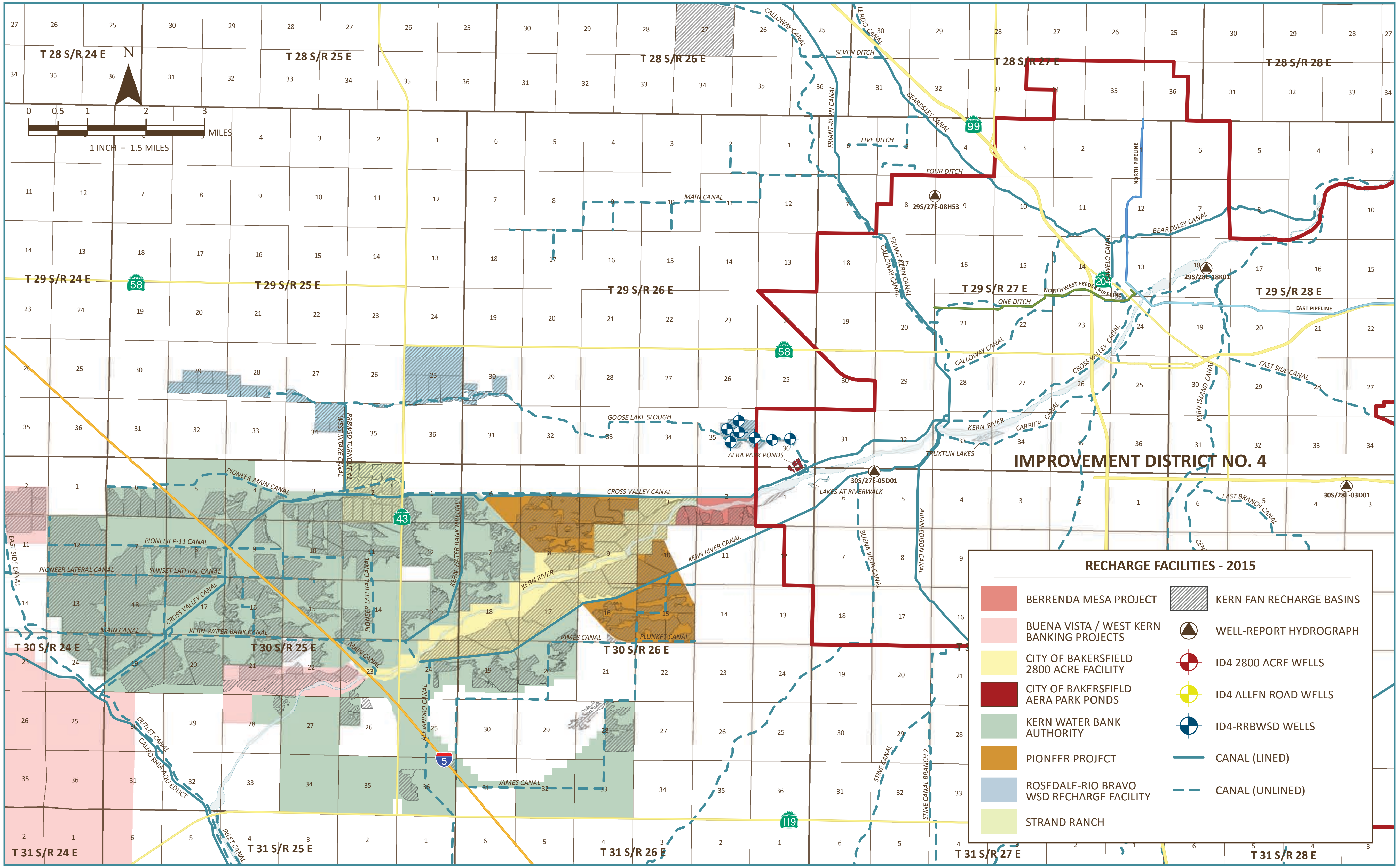
BY: M. ALLEN
DATE: OCTOBER 20, 2015
REVIEWED BY: M. VARGA
FILENAME: Plate 3 - Treated Water Service Area (2015).mxd

Plate 4 - ID4 Water Wells and Spreading Areas



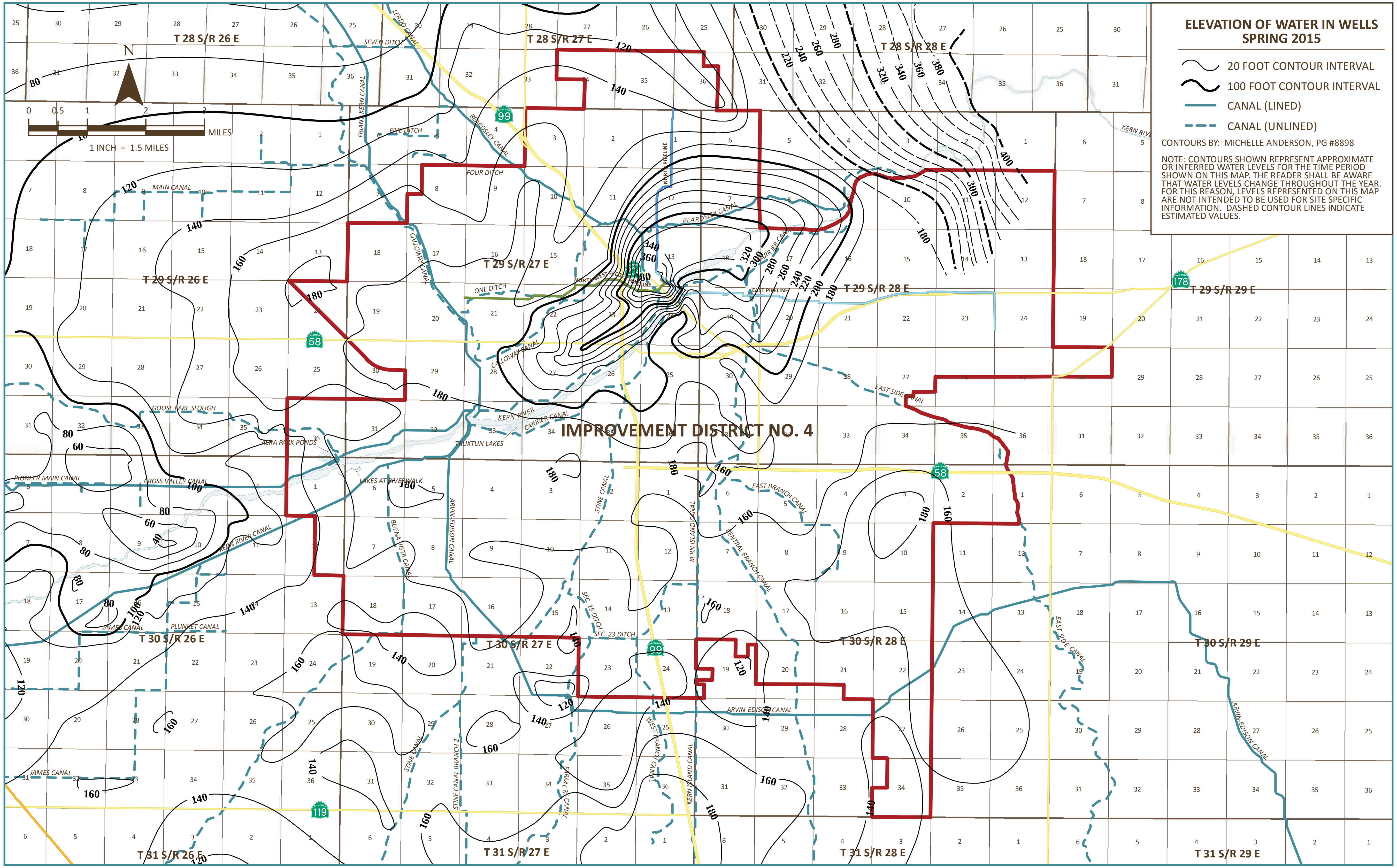
BY: M. ALLEN
DATE: NOVEMBER 13, 2015
REVIEWED BY: M. VARGA
FILENAME: Plate 4 - Water Wells and Spreading Areas (2015).mxd

Plate 5 - Recharge Facilities



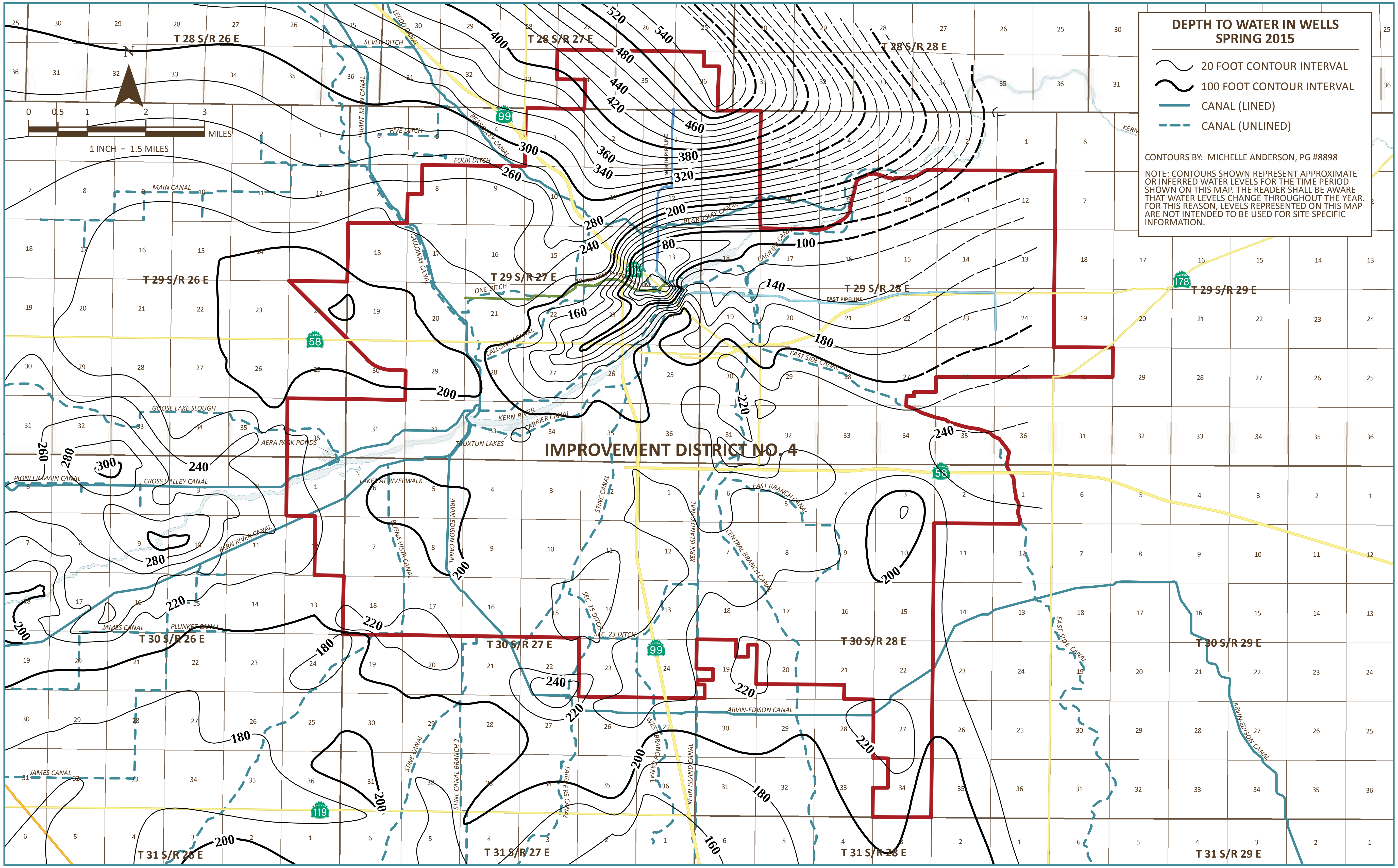
BY: M. ALLEN
DATE: OCTOBER 20, 2015
REVIEWED BY: M. VARGA
FILENAME: Plate 5 - Recharge Facilities (2015).mxd

Plate 6 - Elevation of Water in Wells



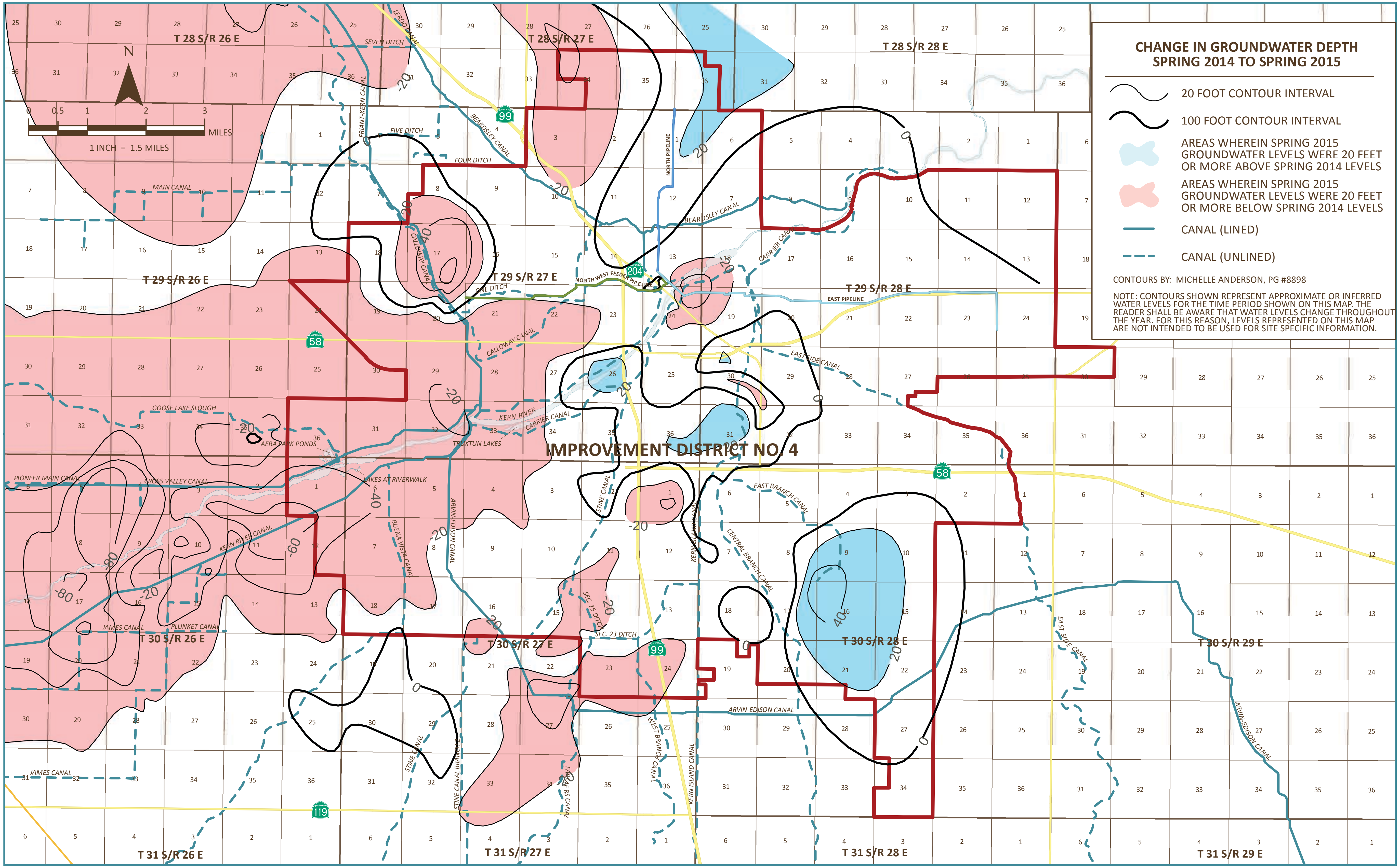
BY: M. ALLEN
DATE: November 2, 2015
REVIEWED BY: M. VARGA
FILENAME: Plate 6 - Elevation of Water in Wells (2015).mxd

Plate 7 - Depth to Water in Wells



BY: M. ALLEN
DATE: NOVEMBER 4, 2015
REVIEWED BY: M. VARGA
FILENAME: Plate 7 - Depth to Water in Wells (2015).mxd

Plate 8 - Change in Groundwater Depth



BY: M. ALLEN
DATE: NOVEMBER 12, 2015
REVIEWED BY: M. VARGA
FILENAME: Plate 8 - Change in Groundwater Depth (2015).mxd

Kern County Water Agency
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Bakersfield, CA 93308 / 93302-0058
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www.kcwa.com

Appendix G: Supplemental Water Supply Information

- DWR Groundwater Bulletin 118

Tulare Lake Hydrologic Region

Figure 37 Tulare Lake Hydrologic Region

Basins and Subbasins of Tulare Lake Hydrologic Region

Basin/subbasin	Basin name
5-22	San Joaquin Valley
5-22.08	Kings
5-22.09	Westside
5-22.10	Pleasant Valley
5-22.11	Kaweah
5-22.12	Tulare Lake
5-22.13	Tule
5-22.14	Kern County
5-23	Panoche Valley
5-25	Kern River Valley
5-26	Walker Basin Creek Valley
5-27	Cummings Valley
5-28	Tehachapi Valley West
5-29	Castaic Lake Valley
5-71	Vallecitos Creek Valley
5-80	Brite Valley
5-82	Cuddy Canyon Valley
5-83	Cuddy Ranch Area
5-84	Cuddy Valley
5-85	Mil Potrero Area

Description of the Region

The Tulare Lake HR covers approximately 10.9 million acres (17,000 square miles) and includes all of Kings and Tulare counties and most of Fresno and Kern counties (Figure 37). The region corresponds to approximately the southern one-third of RWQCB 5. Significant geographic features include the southern half of the San Joaquin Valley, the Temblor Range to the west, the Tehachapi Mountains to the south, and the southern Sierra Nevada to the east. The region is home to more than 1.7 million people as of 1995 (DWR, 1998). Major population centers include Fresno, Bakersfield, and Visalia. The cities of Fresno and Visalia are entirely dependent on groundwater for their supply, with Fresno being the second largest city in the United States reliant solely on groundwater.

Groundwater Development

The region has 12 distinct groundwater basins and 7 subbasins of the San Joaquin Valley Groundwater Basin, which crosses north into the San Joaquin River HR. These basins underlie approximately 5.33 million acres (8,330 square miles) or 49 percent of the entire HR area.

Groundwater has historically been important to both urban and agricultural uses, accounting for 41 percent of the region's total annual supply and 35 percent of all groundwater use in the State. Groundwater use in the region represents about 10 percent of the State's overall supply for agricultural and urban uses (DWR 1998).

The aquifers are generally quite thick in the San Joaquin Valley subbasins with groundwater wells commonly exceeding 1,000 feet in depth. The maximum thickness of freshwater-bearing deposits (4,400 feet) occurs at the southern end of the San Joaquin Valley. Typical well yields in the San Joaquin Valley range from 300 gpm to 2,000 gpm with yields of 4,000 gpm possible. The smaller basins in the mountains surrounding the San Joaquin Valley have thinner aquifers and generally lower well yields averaging less than 500 gpm.

The cities of Fresno, Bakersfield, and Visalia have groundwater recharge programs to ensure that groundwater will continue to be a viable water supply in the future. Extensive groundwater recharge programs are also in place in the south valley where water districts have recharged several million acre-feet for future use and transfer through water banking programs.

The extensive use of groundwater in the San Joaquin Valley has historically caused subsidence of the land surface primarily along the west side and south end of the valley.

Groundwater Quality

In general, groundwater quality throughout the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are high TDS, nitrate, arsenic, and organic compounds.

The areas of high TDS content are primarily along the west side of the San Joaquin Valley and in the trough of the valley. High TDS content of west-side water is due to recharge of stream flow originating from marine sediments in the Coast Range. High TDS content in the trough of the valley is the result of concentration of salts because of evaporation and poor drainage. In the central and west-side portions of the valley, where the Corcoran Clay confining layer exists, water quality is generally better beneath the clay than above it. Nitrates may occur naturally or as a result of disposal of human and animal waste products and fertilizer. Areas of high nitrate concentrations are known to exist near the town of Shafter and other isolated areas in the San Joaquin Valley. High levels of arsenic occur locally and appear to be associated with lakebed areas. Elevated arsenic levels have been reported in the Tulare Lake, Kern Lake and Buena Vista Lake bed areas. Organic contaminants can be broken into two categories, agricultural and industrial. Agricultural pesticides and herbicides have been detected throughout the valley, but primarily along the east side where soil permeability is higher and depth to groundwater is shallower. The most notable agricultural contaminant is DBCP, a now-banned soil fumigant and known carcinogen once used extensively on grapes. Industrial organic contaminants include TCE, DCE, and other solvents. They are found in groundwater near airports, industrial areas, and landfills.

Water Quality in Public Supply Wells

From 1994 through 2000, 1,476 public supply water wells were sampled in 14 of the 19 groundwater basins and subbasins in the Tulare Lake HR. Evaluation of analyzed samples shows that 1,049 of the wells, or 71 percent, met the state primary MCLs for drinking water. Four-hundred-twenty-seven wells, or 29 percent, exceeded one or more MCL. Figure 38 shows the percentages of each contaminant group that exceeded MCLs in the 427 wells.

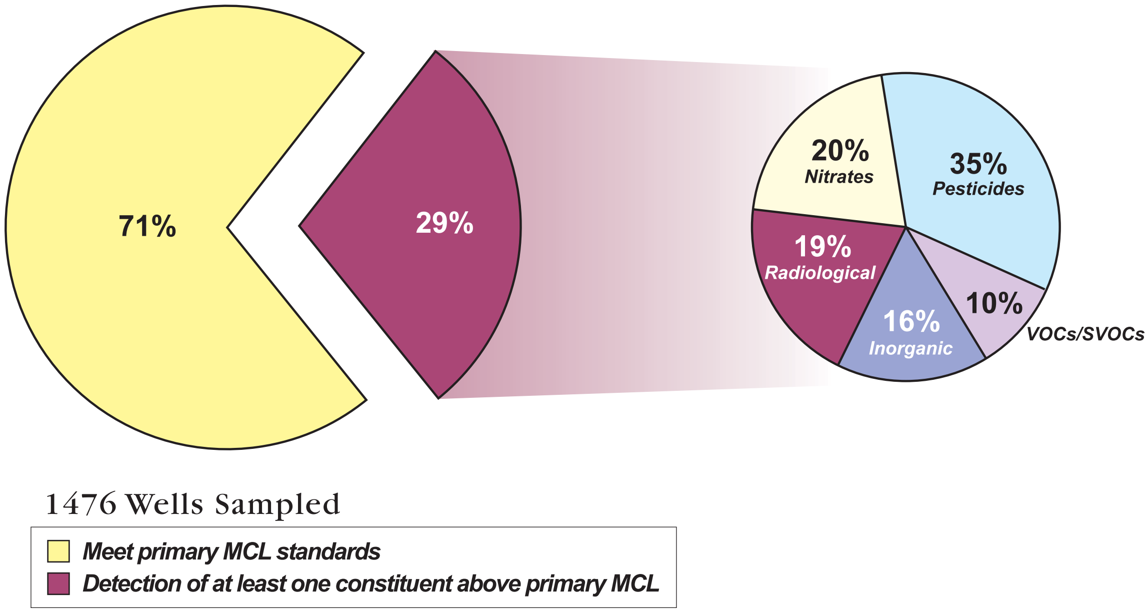

Figure 38 MCL exceedances by contaminant group in public supply wells in the Tulare Lake Hydrologic Region

Table 31 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 31 Most frequently occurring contaminants by contaminant group in the Tulare Lake Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics - Primary	Fluoride – 32	Arsenic – 16	Aluminum – 13
Inorganics - Secondary	Iron – 155	Manganese – 82	TDS – 9
Radiological	Gross Alpha – 74	Uranium – 24	Radium 228 – 8
Nitrates	Nitrate(as NO_3) – 83	Nitrate + Nitrite – 14	Nitrite(as N) – 3
Pesticides	DBCP – 130	EDB – 24	Di(2-Ethylhexyl)phthalate – 7
VOCs/SVOCs	TCE – 17	PCE – 16	Benzene – 6 MTBE – 6

DBCP = Dibromochloropropane
EDB = Ethylenedibromide
TCE = Trichloroethylene
PCE = Tetrachloroehylene
VOC = Volatile organic compound
SVOC = Semivolatile organic compound

Changes from Bulletin 118-80

There are no newly defined basins since Bulletin 118-80. However, the subbasins of the San Joaquin Valley, which were delineated as part of the 118-80 update, are given their first numeric designation in this report (Table 32).

Table 32 Modifications since Bulletin 118-80 of groundwater basins and subbasins in Tulare Lake Hydrologic Region

Subbasin name	New number	Old number
Kings	5-22.08	5-22
Westside	5-22.09	5-22
Pleasant Valley	5-22.10	5-22
Kaweah	5-22.11	5-22
Tulare Lake	5-22.12	5-22
Tule	5-22.13	5-22
Kern County	5-22.14	5-22
Squaw Valley	deleted	5-24
Cedar Grove Area	deleted	5-72
Three Rivers Area	deleted	5-73
Springville Area	deleted	5-74
Templeton Mountain Area	deleted	5-75
Manache Meadow Area	deleted	5-76
Sacator Canyon Valley	deleted	5-77
Rockhouse Meadows Valley	deleted	5-78
Inns Valley	deleted	5-79
Bear Valley	deleted	5-81

Several basins have been deleted from the Bulletin 118-80 report. In Squaw Valley (5-24) all 118 wells are completed in hard rock. Cedar Grove Area (5-72) is a narrow river valley in Kings Canyon National Park with no wells. Three Rivers Area (5-73) has a thin alluvial terrace deposit but 128 of 130 wells are completed in hard rock. Springville Area (5-74) is this strip of alluvium adjacent to Tule River and all wells are completed in hard rock. Templeton Mountain Area (5-75), Manache Meadow Area (5-76), and Sacator Canyon Valley (5-77) are all at the crest of mountains with no wells. Rockhouse Meadows Valley (5-78) is in wilderness with no wells. Inns Valley (5-79) and Bear Valley (5-81) both have all wells completed in hard rock.

Table 33 Tulare Lake Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-22	SAN JOAQUIN VALLEY									
5-22.08	KINGS	976,000	C	3,000	500-1,500	909	-	722	200-700	40-2000
5-22.09	WESTSIDE	640,000	C	2,000	1,100	960	-	50	520	220-35,000
5-22.10	PLEASANT VALLEY	146,000	B	3,300	-	151	-	2	1,500	1000-3000
5-22.11	KAWEAH	446,000	B	2,500	1,000-2,000	568	-	270	189	35-580
5-22.12	TULARE LAKE	524,000	B	3,000	300-1,000	241	-	86	200-600	200-40,000
5-22.13	TULE	467,000	B	3,000	-	459	-	150	256	200-30,000
5-22.14	KERN COUNTY	1,950,000	A	4,000	1,200-1,500	2,258	249	476	400-450	150-5000
5-23	PANOCHE VALLEY	33,100	C	-	-	48	-	-	1,300	394-3530
5-25	KERN RIVER VALLEY	74,000	C	3,650	350	-	-	92	378	253-480
5-26	WALKER BASIN CREEK VALLEY	7,670	C	650	-	-	-	1	-	-
5-27	CUMMINGS VALLEY	10,000	A	150	56	51	-	15	344	-
5-28	TEHACHAPI VALLEY WEST	14,800	A	1,500	454	64	-	19	315	280-365
5-29	CASTAC LAKE VALLEY	3,600	C	400	375	-	-	3	583	570-605
5-71	VALLECITOS CREEK VALLEY	15,100	C	-	-	-	-	0	-	-
5-80	BRITE VALLEY	3,170	A	500	50	-	-	-	-	-
5-82	CUDDY CANYON VALLEY	3,300	C	500	400	-	-	3	693	695
5-83	CUDDY RANCH AREA	4,200	C	300	180	-	-	4	550	480-645
5-84	CUDDY VALLEY	3,500	A	160	135	3	-	3	407	325-645
5-85	MIL POTRERO AREA	2,300	C	3,200	240	7	-	7	460	372-657

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

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San Joaquin Valley Groundwater Basin
Kaweah Subbasin

- Groundwater Subbasin Number: 5-22.11
- County: Tulare, Kings
- Surface Area: 446,000 acres (696 square miles)

Basin Boundaries and Hydrology

The San Joaquin Valley is surrounded on the west by the Coast Ranges, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. The northern portion of the San Joaquin Valley drains toward the Delta by the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern Rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern Lakes.

The Kaweah subbasin lies between the Kings Groundwater Subbasin on the north, the Tule Groundwater Subbasin on the south, crystalline bedrock of the Sierra Nevada foothills on the east, and the Kings River Conservation District on the west. The subbasin generally comprises lands in the Kaweah Delta Water Conservation District. Major rivers and streams in the subbasin include the Kaweah and St. Johns Rivers. The Kaweah River is the primary source of recharge to the area. Average annual precipitation is seven to 13 inches, increasing eastward.

Hydrogeologic Information

The San Joaquin Valley represents the southern portion of the Great Central Valley of California. The San Joaquin Valley is a structural trough up to 200 miles long and 70 miles wide. It is filled with up to 32,000 feet of marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains, respectively. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins toward the axis of the structural trough. This depositional axis is below to slightly west of the series of rivers, lakes, sloughs, and marshes, which mark the current and historic axis of surface drainage in the San Joaquin Valley.

Water Bearing Formations

The sediments that comprise the Kaweah Subbasin aquifers are unconsolidated deposits of Pliocene, Pleistocene, and Holocene age. On the east side of the subbasin, these deposits consist of arkosic material derived from the Sierra Nevada and are divided into three stratigraphic units: continental deposits, older alluvium and younger alluvium. In the western portion of the subbasin, near Tulare Lake bed, unconsolidated deposits consisting of flood-subbasin and lacustrine and marsh deposits interfinger with east side deposits.

The continental deposits of Pliocene and Pleistocene age are divided into oxidized and reduced deposits based on depositional environment. The oxidized deposits, which crop out along the eastern margin of the valley, consist of deeply weathered, poorly permeable, reddish-brown sandy silt and clay with well-developed soil profiles. The reduced deposits are moderately permeable and consist of micaceous sand, silt, and clay that extend across the trough in the subsurface to the west side of the valley.

Older alluvium, which overlies the continental deposits, is moderately to highly permeable and is the major aquifer in the subbasin. Younger alluvium consists of arkosic beds, moderately to highly permeable consisting of sand and silty sand. Flood-basin deposits consist of poorly permeable silt, clay, and fine sand. Ground water in the flood-basin deposits is often of poor quality. Lacustrine and marsh deposits consist of blue, green, or gray silty clay and fine sand and underlie the flood-subbasin deposits. Clay beds of the lacustrine and marsh deposits form aquitards that control the vertical and lateral movement of ground water. The most prominent clay bed is the Corcoran clay which underlies the western half of the Kaweah Subbasin at depths ranging from about 200 to 500 feet (DWR 1981). In the eastern portion of the subbasin, ground water occurs under unconfined and semi-confined conditions. In the western half of the subbasin, where the Corcoran Clay is present, ground water is confined below the clay.

Land subsidence of up to 4 feet due to deep compaction of fine-grained units has occurred in separate areas of the southern and western portion of the Subbasin (Ireland and others 1984). The estimated average specific yield for this subbasin is 10.8 percent (based on DWR internal data and Davis 1959).

Restrictive Structures

Groundwater flow is generally southwestward. Small groundwater depressions occurred to the north and south of Visalia and at the subbasin's northwest corner, and a groundwater mound was present in the central western subbasin during 1999 (DWR 2000). Based on current and historical groundwater elevation maps, horizontal groundwater barriers do not appear to exist in the Subbasin.

Groundwater Level Trends

Changes in groundwater levels are based on annual water level measurements by DWR and cooperators. Water level changes were evaluated by quarter township and computed through a custom DWR computer program using geostatistics (kriging). On average, the subbasin water level has declined about 12 feet from 1970 through 2000. The period from 1970 through 1978 showed steep declines totaling about 25 feet. The ten-year period from 1978 to 1988 saw stabilization and rebound of about 50 feet, bringing water levels above the 1970 water level by 25 feet. 1988 through 1995 again showed steep declines, bottoming out in 1995 at nearly 35 feet below the 1970 level. Water levels then rose about 22 feet from 1996 to 2000, bringing water levels to approximately 12 feet below 1970 levels.

Groundwater Storage

Estimations of the total storage capacity of the subbasin and the amount of water in storage as of 1995 were calculated using an estimated specific yield of 10.8 percent and water levels collected by DWR and cooperators.

According to these calculations, the total storage capacity of this subbasin is estimated to be 15,400,000 af to a depth of 300 feet and 107,000,000 af to the base of fresh groundwater. These same calculations give an estimate of 11,600,000 af of groundwater to a depth of 300 feet stored in this subbasin as of 1995 (DWR 1995). According to published literature, the amount of stored groundwater in this subbasin as of 1961 is 34,000,000 af to a depth of ≤ 1000 feet (Williamson 1989).

Groundwater Budget (Type B)

Although a detailed budget was not available for this subbasin, an estimate of groundwater demand was calculated based on the 1990 normalized year and data on land and water use. A subsequent analysis was done by a DWR water budget spreadsheet to estimate overall applied water demands, agricultural groundwater pumpage, urban pumping demand and other extraction data.

Natural recharge is estimated to be 62,400 af. Artificial recharge was not determined for all entities, but Lakeside Irrigation District has recharged about 7,000 af per year and in wet years may recharge up to 30,000 af (Cartwright 2001). There is approximately 286,000 af of applied water recharge into the subbasin. Subsurface inflow was not determined. Annual urban and agricultural extraction is estimated to be 58,800 af and 699,000 af, respectively. Other extractions and subsurface inflow were not determined.

Groundwater Quality

Characterization. The groundwater in this basin is generally of a calcium bicarbonate type, with sodium bicarbonate waters near the western margin. TDS values range from 35 to 1,000 mg/L, with a typical range of 300 to 600 mg/L. The Department of Health Services, which monitors Title 22 water quality standards, reports TDS values in 153 wells ranging from 35 to 580 mg/L, with an average value of 189 mg/L.

Impairments. There are localized areas of high nitrate pollution on the eastern side of the basin. There is also high salinity water between Lindsay and Exeter (Edwards 2001).

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	157	1
Radiological	158	8
Nitrates	165	13
Pesticides	167	16
VOCs and SVOCs	165	5
Inorganics – Secondary	157	25

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.

[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: 100 – 2,500	Average: 1,000 – 2,000
	Total depths (ft)	
Domestic		
Municipal/Irrigation	Range: 100 - 500	

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR (incl. Cooperators)	Groundwater levels	568 Semi-annually
Department of Health Services (inc. cooperators)	Title 22 water quality	270 Varies

Basin Management

Groundwater management:	Kings County Water District promulgated a Ground Water Management Plan under AB 255 during 1992, and the Kaweah Delta Water Conservation District passed a Ground Water Management Plan under AB 3030 in 1995.
Water agencies	
Public	Exeter I.D., Ivanhoe I.D., Kaweah-Delta Water Conservation District, Kings River Conservation District, Lakeside Irrigation Water District, Lindmore I.D., Lindsay-Strathmore I.D., St. Johns W.D., Tulare I.D., and Stone Corral W.D.
Private	California Water Service – Visalia; Melga Canal Company; Settlers Ditch Company; Corcoran Irrigation Company.

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Errata

Changes made to the basin description will be noted here.