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CAWELO WATER DISTRICT

AMENDED GROUNDWATER MANAGEMENT PLAN

July, 2007

CAWELO WATER DISTRICT
AMENDED GROUNDWATER MANAGEMENT PLAN OF 2007

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SECTION 1

CAWELO WATER DISTRICT

Introduction

1.1 Overview

Groundwater management involves the planning, the implementation of the plan, and the operations required to provide an adequate, reliable and acceptable quality of groundwater supply for the landowners of the District.

Groundwater is defined as all water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water which flows in known and definite channels.

A groundwater management program means a coordinated and ongoing activity undertaken for the benefit of a groundwater basin, or a portion of a groundwater basin, pursuant to a document that describes the activities to be undertaken, the "Groundwater Management Plan".

The State of California legislature enacted AB 3030 (Costa), Groundwater Management, during the 1992 session. The Act was codified as Part 2.75 of Division 6 of the California Water Code commencing with Section 10750 and became effective January 1, 1993. The Act applies to all groundwater basins identified in State Bulletin 118-80. The State legislature made a finding and declared that groundwater is a valuable natural resource in California, and should be managed to ensure both its safe production and its quality.

The legislation (AB 3030) § 10753 stated "Any local agency, whose service area includes a groundwater basin, or a portion of a groundwater basin, that is not subject to groundwater management pursuant to other provisions of law or a court order, judgement, or decree, may, by ordinance, or by resolution if the local agency is not authorized to act by ordinance, adopt and implement a Groundwater Management Plan pursuant to this part within all or a portion of its service area."

The Cawelo Water District (CWD) unanimously adopted Resolution No. 442 on May 5, 1993 Declaring Intention to Draft a Groundwater Management Plan pursuant to Part 2.75 of Division 6 of the California Water Code. After holding a properly noticed public hearing thereon, the Groundwater Management Plan was formally adopted by the District on July 21, 1994.

In 2002, California Water Code §10753, et seq. was further amended by the legislature with the passage of SB 1938 (Statutes of 2002, Chapter 603) that added a requirement that certain components of a groundwater management plan must be included in the plan if the agency formulating the plan intends to seek state funding.

1.2 Statutory Authority

The California legislature passed Assembly Bill 255 (AB 255) in 1989. AB 255 was the first statewide legislation allowing local water agencies to prepare and adopt groundwater management plans for their jurisdictions. California Assembly Bill No. 3030 (AB 3030), which became law on January 1, 1993, superceded AB 255, and authorized local agencies that are within groundwater basins, as defined in California Department of Water Resources (DWR) Bulletin 118, to prepare and adopt groundwater management plans. The DWR Bulletin 118-80, Groundwater Basins in California, identified the Kern County Basin, within which Cawelo Water District is situated, to be a basin subject to critical conditions of overdraft. The legislature found and declared that additional study of groundwater is necessary to better understand how to manage groundwater effectively to ensure the safe production, quality and proper storage of groundwater.

The legislature further amended California Water Code § 10750, et seq. with the passage of SB 1938 (Statutes of 2002, Chapter 603) requiring new groundwater management plans to include documentation "describing the manner in which interested parties may participate in developing the groundwater management plan" which may include appointing a technical advisory committee [Water Code § 10753.4(b)]. SB 1938 requires a Groundwater Management Plan to "involve other agencies that enables the local agency to work cooperatively with other public entities whose service area or boundary overlies the groundwater basin" [Water Code § 10753(a)(2)] and prepare a map detailing the area of the groundwater basin, as defined in DWR Bulletin 118, with the area of the local agency subject to the plan, as well as the boundaries of other local agencies that overlie the basin in which the agency is developing a Groundwater Management Plan [Water Code § 10753.7(a)(3)]; establish management objectives for the groundwater basin that is subject to the plan [Water Code Section 10753.7(a)(1)]; include components relating to the monitoring and management of groundwater levels, groundwater quality, inelastic land surface subsidence, and changes in surface water flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping [Water Code § 10753.7(a)(1)]; consider additional components listed in Water Code Section 10753.8(a) through (l); adopt monitoring protocols for the plan components; and develop a monitoring program capable of tracking changes in conditions for the purpose of meeting the management objectives [Water Code Section10753.7(a)(4)].

1.3 Purpose

The purpose of the Groundwater Management Plan is to document the existing groundwater management activities of the Cawelo Water District and formalize other proposed programs in a plan that will be used in implementing a monitoring and management program for the conjunctive use, replenishment and preservation of the quantity and the quality of groundwater of the basin.

1.4 Powers

Pursuant to AB 3030 (Costa) and conditioned upon the adoption of a Groundwater Management Plan, Cawelo Water District may, in addition to those powers enumerated in AB 3030 (commencing with §10750, et seq. of the Water Code), also exercise many of the powers of a Water Replenishment District.

1. The District may do any act necessary to replenish the groundwater of the District (Water Code §60220 and §60221). For example, the District may, for the purpose of replenishing groundwater:
   a. Buy and sell water;
   b. Exchange water;
   c. Distribute water to persons in exchange for ceasing or reducing groundwater extractions;
   d. Spread, sink and inject water into the underground;
   e. Store, transport, recapture, reclaim, purify, treat or otherwise manage and control water for the beneficial use of persons or property within the District; and,
   f. Build the necessary works to achieve groundwater replenishment.

2. The District may take any action needed to protect or prevent interference with water, the quality thereof, or water rights within the District. (Water Code §60222)

3. The District may take any action necessary to put water under its control to beneficial use. (Water Code §60223)

4. The District may take any action needed for the protection and the preservation of ground water supplies within the District for beneficial uses including the prevention of contaminants from entering the groundwater supplies; the removal of contaminants from groundwater supplies of the District; the location and characterizing of contaminants which may enter the ground water supplies of the District; the identification of parties responsible for contamination of the groundwater, and the performance of engineering studies. (Water Code §60224)

5. The District may take any action needed outside of the District if those actions are reasonably necessary to protect the groundwater supplies within the District and there is a direct material relationship between the

groundwater supply where the action is to be taken and the groundwater supply within District. (Water Code §60225)

6. The District may sue and recover the amount of District expenditures for groundwater quality protection from parties responsible for the contamination. (Water Code §60226)

7. The District is granted additional powers of a replenishment district, which allow it, pursuant to Water Code §60230, to:
   a. Construct, purchase, lease or acquire and to operate and maintain waterworks, machinery and facilities, canals, conduits, waters and water rights, spreading grounds and lands needed to replenish the groundwater supplies of the District;
   b. Store water in groundwater basins or reservoirs, to appropriate and acquire water and water rights, import water into the District, and conserve water;
   c. Participate in legal proceedings as required to defend the water rights and water supplies of the District, and to prevent unlawful exportation of water from the District;
   d. Under certain conditions, to exercise the right of eminent domain;
   e. Act jointly with other entities in order to economically perform required activities;
   f. Carry out investigations required to implement the program;
   g. Fix rates for water for replenishment purposes; and
   h. Fix the terms and conditions for contracts for use of surface water in lieu of groundwater.

8. The District shall investigate and consider the use of existing facilities of other agencies to carry out the Groundwater Management Program, and if economically feasible and in the best interest of the District, an attempt shall be made to enter into a contract with the agency for use of their facility. (Water Code §60231)

The District may fix and collect fees for the extraction of groundwater to pay the expenses incurred by the District for purposes of groundwater management including, but not limited to administrative expenses and real costs associated with the acquisition of replenishment water. (Water Code §10759) The District may also levy a water replenishment assessment. (Water Code §10760) However, before any fees may be levied and collected, a majority of the voters in the District must ratify the fees.

1.5 Right to Use Groundwater

The laws governing the right to use groundwater in California was addressed in the Department of Water Resources California's Groundwater, Bulletin 118, Update 203 and have been reproduced and included as **Appendix A** of this Groundwater Management Plan.

1.6 Goals

The District established in 1994, through the adoption of the Groundwater Management Plan, the following goals:

1. Semi-Annually (February and October) monitor groundwater levels by measurement of depths to groundwater of wells within the District.

2. Prepare semi-annually maps of the District of Lines of Equal Elevation of Water in Wells and Lines of Equal Depth of Water in Wells.

3. Publish for the Fall (October) and Spring (February) an updated tabulation of the average depth to groundwater by Township, North and South of Poso Creek and the District.

4. Monitor groundwater quality regularly at 5-year intervals. Collect groundwater samples of a select group of wells and obtain an Irrigation Water Analysis of each sample by an approved laboratory.

5. Prepare maps of the District of groundwater quality consisting of lines of equal electrical conductivity (salinity), equal boron and equal chloride content. Monitor the migration of water quality change.

6. Continue the acquisition and importation of available, supplemental surface water for crop irrigation and in-lieu groundwater recharge.

7. Negotiate and execute a Central Valley Project, Section 215 water service contract with the Bureau of Reclamation for the purchase of surplus San Joaquin River water.

8. Operate and maintain the Poso Creek gauging station above State Highway 65, implement the appropriation of Poso Creek water, and develop Poso Creek as a groundwater recharge facility within the Cawelo Water District.

9. Monitor well construction and abandonment as administered by Kern County.

10. Facilitate conjunctive use operations by the importation and recharge or in-lieu use of supplemental water and the construction and operation of District wells.

These goals remain as the core activities of the Cawelo Water District's Groundwater Management Plan and are enhanced through the provisions of Section 3. Management Programs of this amended plan.

1.7 Basin Management Objectives

The Basin Management Objectives of the Cawelo Water District's amended Groundwater Management Plan are summarized as follows:

1. Provide basin users with a long-term, reliable and affordable high-quality groundwater supply.
2. Maintain the rights and beneficial uses of groundwater users within the basin.
3. Maintain local control over groundwater to the fullest extent possible.
4. Promote public participation and involvement in local groundwater management efforts.
5. Develop an effective dispute-resolution mechanism.
6. Develop funding mechanisms for the groundwater management plan.

1.8 Plan Coverage

The area covered by the Groundwater Management Plan of Cawelo Water District is that portion of the Kern County Basin, identified in the Department of Water Resources Bulletin 118-80, within the exterior boundary of the District as provided in **Groundwater Basins-San Joaquin Basin Hydrologic Study Area, Plate 1-1, page 1-7** and located in the North-Central part of Kern County, California, encompassing nearly 45,000 acres as detailed in **Section 2, Basin Conditions**, of this amended plan.

1.9 Management and Plan Components

The Cawelo Water District's Groundwater Management Plan includes the required and recommended components of a Groundwater Management Plan as established and recommended by the legislature and publications of the State of California.

- California Water Code Section 10753.7, added by SB 1938, (statutes of 2002, Chapter 603) provides that a Groundwater Management Plan shall contain the following components to be eligible for funding administered by the Department of Water Resources for the construction of groundwater projects or groundwater quality projects.

  (1) Prepare and implement a groundwater management plan that includes basin management objectives for the groundwater basin that is subject to the plan. The plan shall include components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping in the basin.

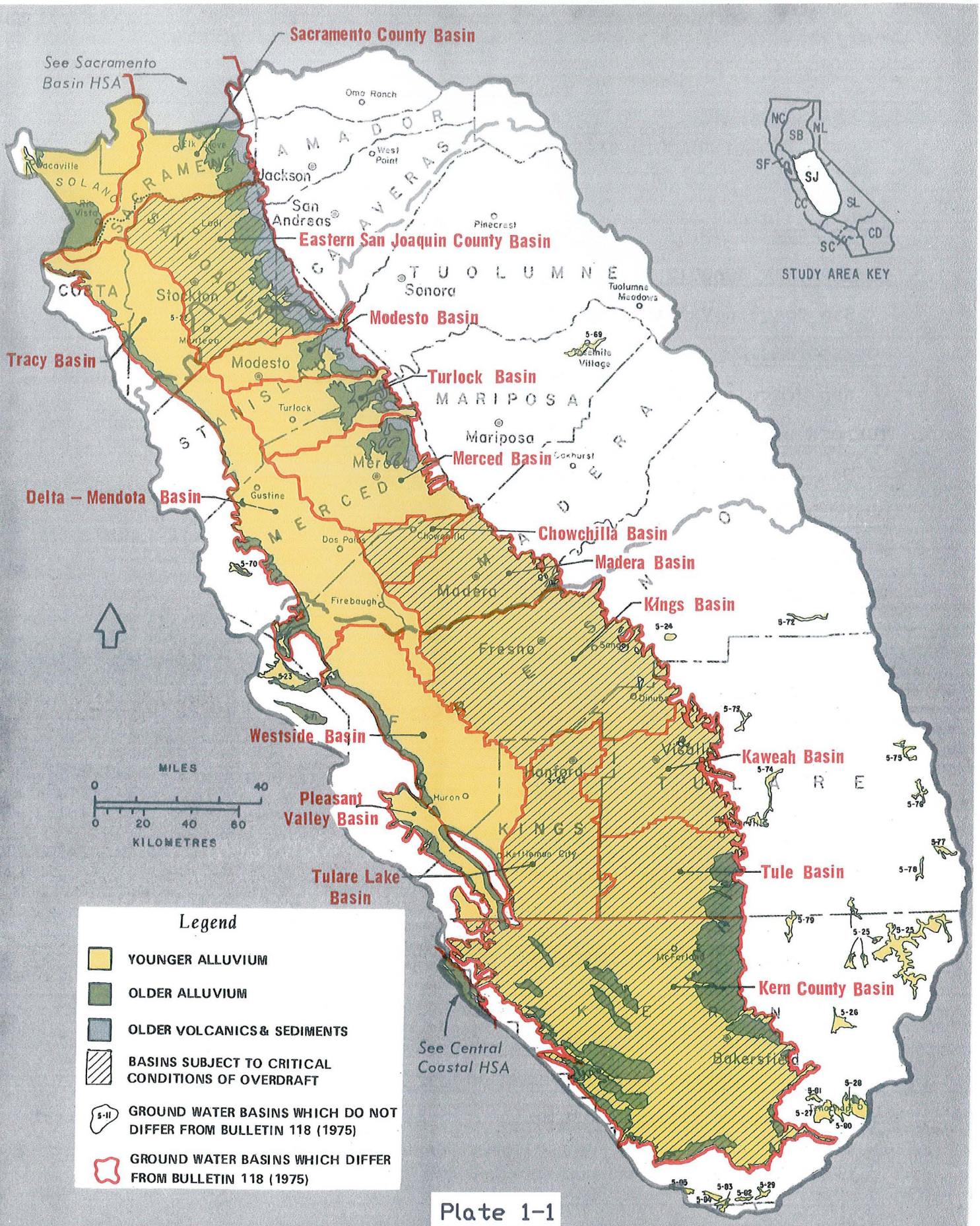


Plate 1-1

GROUND WATER BASINS - SAN JOAQUIN BASIN HYDROLOGIC STUDY AREA

(2) For the purpose of carrying out paragraph (1), the local agency shall prepare a plan to involve other agencies that enables the local agency to work cooperatively with other public entities whose service area or boundary overlies the groundwater basin.

(3) For the purpose of carrying out paragraph (1), the local agency shall prepare a map that details the area of the groundwater basin, as defined in the department's Bulletin No. 118, and the area of the local agency, that will be subject to the plan, as well as the boundaries of other local agencies that overlie the basin in which the agency is developing a groundwater management plan.

(4) The local agency shall adopt monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater pumping in the basin. The monitoring protocols shall be designed to generate information that promotes efficient and effective groundwater management.

- California Water Code Section 10753.8 states a groundwater management plan may include components related to the following:

(1) The control of saline water intrusion.

(2) Identification and management of wellhead protection areas and recharge areas.

(3) Regulation of the migration of contaminated groundwater.

(4) The administration of a well abandonment and well destruction program.

(5) Mitigation of conditions of overdraft.

(6) Replenishment of groundwater extracted by water producers.

(7) Monitoring of groundwater levels and storage.

(8) Facilitating conjunctive use operations.

(9) Identification of well construction policies.

(10) The construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects.

(11) The development of relationships with state and federal regulatory agencies.

(12) The review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.

- California Groundwater, Bulletin 118, Update 2003, Appendix C, Required and Recommended Components of Local Groundwater Management Plans provided a further summary of groundwater management plan components, and have been included as **Appendix B** of this plan.

The components of the Cawelo Water District's Groundwater Management Plan are itemized in **Table 1-1, Groundwater Management Plan Components** along with a section reference.

Table 1-1

Groundwater Management Plan Components

Plan Component	Section Reference
Mandatory Plan Components (CWC § 10753.7(a))	
(1) Basin Management Goals and Objectives	1.6, 1.7
(2) Other Agency Involvement	6.2
(3) Plan Coverage	1.8
(4) Monitoring Protocols	3.2
Optional Plan Components (CWC § 10753.8)	
(a) Saline Water Intrusion	4.4
(b) Wellhead Protection	4.1
(c) Migration of Contaminated Water	4.5
(d) Well Abandonment	4.3
(e) Overdraft Mitigation	3.4
(f) Groundwater Replenishment	5.1
(g) Groundwater Monitoring	3.3
(h) Conjunctive Use	5.3
(I) Well Construction Policies	4.2
(j) Operation of Facilities	3.6
(k) Relationships with Other Agencies	2.5, 6.2
(l) Land Use Planning	2.7, 6.4
Recommended Plan Components (BU 118-2003, Appendix C)	
• Stakeholder Participation	6.3
• Plan Area Description	1.8
• Basin Description and Conditions	2.1-2.8
• Management Plan Objectives	1.6, 1.7
• Mandatory Protocols	3.2
• Monitoring Program	3.1
• Periodic Groundwater Reports	6.5
• Periodic Plan Re-evaluation	6.6

SECTION 2

CAWELO WATER DISTRICT

Basin Conditions

2.1 General

The Cawelo Water District (CWD) is located in the North-Central portion of Kern County, California and encompasses an area of nearly 45,000 acres. CWD lies between State Highway 99 on the West and Highway 65 on the East and extends from the community of McFarland on the North to Oildale on the South. The City of Bakersfield is approximately six miles southeast of the District. Elevations range from 375 feet above mean sea level in the southwest portion of the District to 825 feet above mean sea level in the northeast portion of the District. **Plate 2-1, Vicinity Map, Page 2-2,** shows the general location of the District.

2.2 Organization

The Cawelo Water District was formed on February 16, 1965, under the provisions of Division 13 of the Water Code of the State of California for the purpose of obtaining a "supplemental or partial water supply" for irrigation. At the time the District was formed, approximately 38,200 acres within the District were under full irrigation. Prior to formation of the District, water for irrigation was obtained almost exclusively from groundwater sources, resulting in a decline in groundwater levels averaging about ten feet per year. The District provided a public entity for entering a contract for the importation of supplemental surface water from the State Water Project through the Kern County Water Agency (KCWA). The Kern County Water Agency was formed to contract with the State of California for State Water Project water to be delivered through the California Aqueduct. The Cawelo Water District began surface water deliveries in February of 1976.

The Cawelo Water District constructed extensive facilities for the purpose of conveyance and distribution of imported surface water supplies within the District. The facilities are shown on **Plate 2-2, Distribution Facilities Map, Page 2-3**. In order to finance the construction of these facilities, CWD issued long-term general obligation bonds in two series for a total amount of $24,900,000 and obtained two construction loans for an additional amount of $2,767,500. Construction of the conveyance and distribution facilities began in May of 1974 and were essentially completed in December of 1975. However, later additions and improvements to the distribution system have been made.

2.3 Geology

The great Central Valley of California covers approximately 16,000 square miles of the interior of the State extending for nearly 500 miles in a north-northwest direction and having a width of from 20 to 60 miles. The San Joaquin Valley comprises the approximate southerly two-thirds of the Central Valley from the Sacramento-San Joaquin Delta on the North to the Tehachapi Mountains on the South, a distance of over 250 miles. The Cawelo Water District is located on the east side of the southerly portion of the San Joaquin Valley.

The San Joaquin Valley is a long structural trough bounded by the Sierra Nevada Mountains on the East and the Coast Range on the West. The northern half of the San Joaquin Valley drains through the San Joaquin River to the North and to the West into Suisun Bay. The southerly portion of the San Joaquin Valley forms a great sink area known as the Tulare Lake Basin which is separated from the San Joaquin River drainage by a low divide approximately 120 miles north of the southern end of the San Joaquin Valley.

The West side of the San Joaquin Valley is underlain by sedimentary, volcanic and metamorphic rocks of the Coast Ranges which have been folded and faulted. These deposits extend eastward and become thinner near the easterly edge of the San Joaquin Valley which is underlain by a granitic complex of the Sierra Nevada block. The basement rock beneath the San Joaquin Valley floor is asymmetrical, sloping gently to the West with the greatest depth near the western margin.

The bottom of the San Joaquin Valley trough has been filled to a depth up to 3,000 feet with marine and continental deposits. The continental deposits include some volcanic material but contain mostly fluvial deposits of the streams which flowed from the hills and mountains on either side with lesser amounts of inter-bedded lacustrine deposits. The continental deposits consist predominantly of lenses of gravel, sand, silt, and clay and numerous lenses of fine-grained deposits (clay, sandy clay, sandy silt, and silt) distributed throughout the valley, most of which are not widespread. The most notable deposit is the diatomaceous E-Clay (Corcoran Clay) bed which covers an area of approximately 5,000 square miles in the central and western portion of the San Joaquin Valley. The E-Clay layer ranges in thickness from near zero to at least 160 feet near the present bed of Tulare Lake and serves to confine the aquifers below it. The easterly limit of the E-Clay and other clay lenses is West of the westerly boundary of the Cawelo Water District.

Unconsolidated deposits on the East side of the San Joaquin Valley consist of materials derived from the Sierra Nevada and are divided into three stratigraphic units: continental deposits, older alluvium, and younger alluvium. These unconsolidated deposits serve to transmit and store most of the groundwater pumped in the area.

The formations underlying the Cawelo Water District consist of continental deposits of poorly bedded, loosely consolidated sands, gravels, silts and clays. Very deep deposits of old alluvium were deposited by several small intermittent streams that flowed in a westerly direction from the foothills. More recent alluvium is found along Poso Creek which is the largest of the streams in the area. The permeable alluvial deposits which underlie the District form an aquifer system which is naturally replenished by the flow of underground water originating from precipitation in the Greenhorn Mountains to the East of the District. The Kern River channel traverses a portion of Kern County, from East to West, approximately four miles South of the southerly boundary of the Cawelo Water District.

2.4 Soils

The soil types of the lands of the Cawelo Water District as obtained from the publication *"Soil Survey, The Wasco Area, California, 1936"* and prepared by the U. S. Department of Agriculture are shown on **Plate 2-3, Soil Type, Page 2-6.**

The major soil types within the Cawelo Water District were identified by the U. S. Department of Agriculture as follows:

- **Adelanto Loam Sand (Ad)** - The surface soil of Adelanto loamy sand consists of a light grayish-brown neutral to faintly calcareous loamy sand or sandy loam to a depth between 6 and 12 inches where the material changes to a light reddish-brown calcareous loamy sand or sandy loam upper subsoil of soft lumpy or cloddy structure.

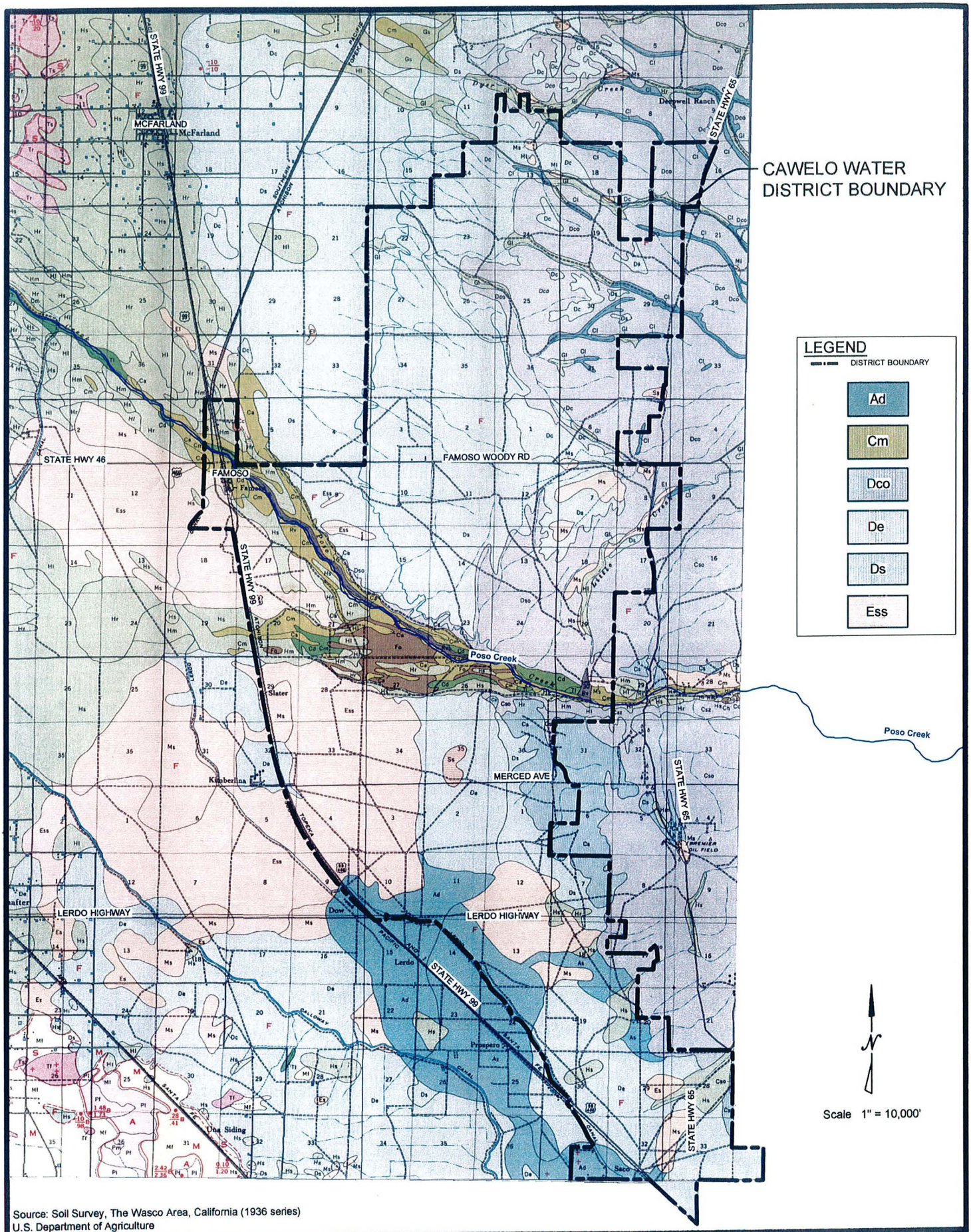
- **Cajon Fine Sandy Loam (Cm)** - The surface soil of Cajon fine sandy loam is grayish-brown or somewhat dull grayish-brown highly micaceous fine sandy loam to a depth ranging from 10 to 14 inches which is underlain by a pale grayish-brown or dull-gray calcareous micaceous laminated fine sandy loam that continues to a depth of about 36 inches.

- **Delano Clay Loam (Dco)** - The surface soil of Delano clay loam, to a depth ranging from 6 to 20 inches, consists of grayish-brown or brown gritty clay loam that may or may not be calcareous at the immediate surface but is calcareous in the lower part.

- **Delano Loamy Sand (De)** - The upper surface soil, to a depth ranging from 10 to 20 inches, is light grayish-brown, brown, or reddish-brown noncalcareous friable loamy sand or sandy loam.

- **Delano Sandy Loam (Ds)** - The surface soil of Delano sandy loam, to a depth ranging from 6 to 24 inches, is a grayish-brown, brown, or reddish-brown friable gritty sandy loam or loam that is generally noncalcareous at the surface.

- **Exeter Sandy Loam (Ess)** - The surface soil of Exeter sandy loam is a brown or light-brown noncalcareous sandy loam, containing considerable subangular mineral particles, but sufficient colloidal material, so that the surface soil bakes hard on



Source: Soil Survey, The Wasco Area, California (1936 series)
U.S. Department of Agriculture

CAWELO WATER DISTRICT 17207 INDUSTRIAL FARM ROAD BAKERSFIELD CA 93308 661-393-6070	GROUNDWATER STORAGE AND CONJUNCTIVE MANAGEMENT PROJECTS	SOIL TYPE PLATE 2-3

DRAWN BY: ST
DATE: 08.25.04
SCALE: 1" = 10,000'
CHECKED: R.L.S.

CHECK AND VERIFY ALL DIMENSIONS ON THE DRAWINGS. COMPARE WITH CONDITIONS AT THE JOB SITE AND REPORT ANY DISCREPANCIES OR VARIATIONS TO THE ENGINEER AND/OR ARCHITECT BEFORE PROCEEDING WITH THE WORK.

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drying. The layer ranges from 6 to 18 inches in thickness and is underlain by a layer of similar to slightly heavier texture, which may be slightly compact but in many places loose, almost single grained.

The soil classifications of the lands of the Cawelo Water District as obtained from the U. S. Department of Interior, Bureau of Reclamation, "Land Classification and Standards" are shown on **Plate 2-4, Soil Classification, Page 2-9**, and are described as follows:

- Class 1 - Arable. These lands are the best suited for irrigation and capable of producing sustained and relatively high yields of a wide range of climatically adapted crops. The soil is mellow and has a good stable structure allowing easy penetration of roots, air, and water, and having adequate internal drainage. The water holding capacity of the soil is adequate for the proposed irrigation system to supply moisture for optimum plant growth. The soil is free from harmful accumulations of soluble salts or, if salts are present, they can be readily leached. Minimum or no specific farm drainage requirements are anticipated, minimal erosion will result from irrigation and land development can be accomplished at a relatively low cost.

- Class 2 - Arable. This class comprises lands of moderate suitability for irrigation farming, being measurably lower than Class 1 in productive capacity, more expensive to prepare for irrigation, or more costly to farm. They are not so desirable nor of such high value as lands of Class 1 because of certain correctable or noncorrectable features. The soil may have a lower available moisture-holding capacity; be more slowly permeable to water, air, and roots; or be moderately saline under irrigation, which may limit productivity or involve moderate costs for leaching. Possible topographic limitations include uneven surface requiring moderate costs for grading, relief which results in smaller fields, or steeper slopes necessitating special care and greater costs to properly irrigate and prevent erosion. Farm drainage may be required at a moderate cost, or loose rock or woody vegetation may have to be removed from the surface. Any one limitation may be sufficient to reduce the lands from Class 1 to Class 2, but occasionally a combination of two or more of them are contributing.

- Class 3 - Arable. These lands are usually of the lowest arable land class. Lands in this class are suitable for irrigation development, but are approaching minimal quality for irrigation and have distinct soil, topographic, or drainage deficiencies which are more severe singly or in combination than those described for Class 2. Because of a severe single deficiency or a combination of two or more less severe deficiencies, Class 3 lands have a lower productive capacity, higher production costs, higher development costs, or any combination of these three than do Class 2 lands. Although a greater risk may be involved in farming Class 3 lands than the better classes of land (1 and 2), they are expected to have adequate payment capacity under proper management and in unites of adequate size. In evaluating this land class, the interaction between deficiencies may be important and should receive close attention.

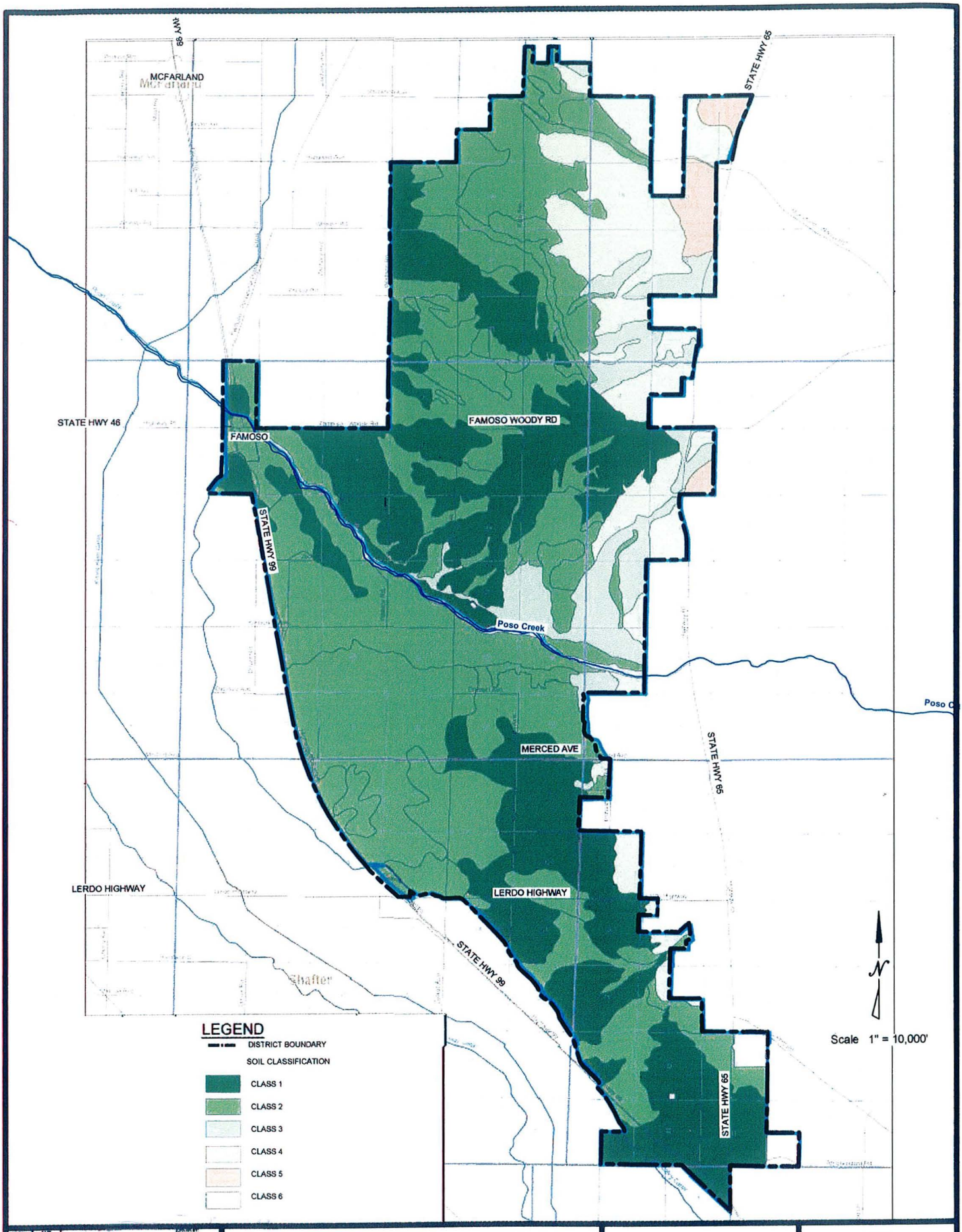
- Class 4 - Arable. Lands designated as Class 4 should be limited to rare or unique situations with a generally high economic return. Class 4 should represent the lowest quality arable land. Lands in this class may have certain excessive deficiencies that result in restrictive utility, but have been shown to meet the minimal requirements for arable land. They may also be similar to lands of other arable classes but have more severe deficiencies. In any case, they would have a lower productivity, higher production costs, higher development costs, or more severe combination of these than Class 3 land. Class 4 should be used only under rate situations where a fourth arable class is needed to adequately identify and characterize lands with marginal arability. It is usually applicable where high income and/or specialized crops are grown.

- Class 5 - Nonarable. The arability of lands in this class cannot be determined under routine land classification procedures, but these lands appear to have potential value sufficient to warrant tentative segregation for special study. The designation of Class 5 is tentative and is normally changed to the proper arable class or Class 6 prior to completion of the land classification. If questions regarding these lands are not resolved, they should be assumed nonarable for formulation purposes. They may have specific soil deficiency such as excessive salinity, very uneven topography, inadequate drainage, excess rock or tree cover, or other severe land deficiency which requires special agronomic, economic, or engineering studies to determine their arability. Class 5 lands usually are segregated when existing conditions require consideration of such lands for the competent appraisal, such as when an abundant supply of water or shortage of better lands exists. Designation of Class 5 lands is also a useful tool for designating problem areas and to encourage the resolution of those problems. Lands should not be placed in this class because of their location or position.

- Class 6 - Nonarable. Lands in this class include those which fail to meet the minimum requirements as required for arable classes of land and Class 5 lands upon which no final arability determination has been made due to a surplus of arable land.

  Generally, Class 6 lands comprise steep, rough, broken, or badly eroded lands; land with soils of very coarse or very fine texture; shallow soils over gravel, shale, sandstone, till or hardpan; and lands that have inadequate drainage and high concentrations of soluble salts or sodium which are infeasible to remove.

There are no Class 5 lands in the Cawelo Water District. There are 806 acres of Class 6 lands in the District as shown on **Plate 2-4, Soil Classification, Page 2-9**, some of which may be classified as marginal.



CAWELO WATER DISTRICT 17207 INDUSTRIAL FARM ROAD BAKERSFIELD CA 93308 661-393-8070	GROUNDWATER STORAGE AND CONJUNCTIVE MANAGEMENT PROJECTS	SOIL CLASSIFICATION PLATE 2-4	DRAWN BY: ST DATE: 01.10.06 SCALE: AS SHOWN CHECKED: R.L.S.

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2.5 Contracts/Agreements

2.5.1 North Kern Water Storage District Agreement

An agreement between the North Kern Water Storage District (NKWSD) and Cawelo Water District (CWD) dated December 21, 1972, with an amendment of April 18, 1974 and a Memorandum of Understanding dated April 18, 1978 allowed CWD to convey water from CWD's Pump Station "A" and from the Kern River by joint use of the Beardsley and Lerdo Canals to CWD's Pump Station "B". Under these arrangements CWD constructed improvements to increase the conveyance capacity of the Beardsley and Lerdo Canals from the Kern River to Pump Station "B". The agreement was extended on a year-to-year basis while a long-term arrangement was negotiated. The two Districts entered into an "Agreement for Transportation of Water, Exchange of Water and System Capacity and for Assignment of Capacity by and between North Kern Water Storage District and Cawelo Water District" on December 19, 1984. On August 1, 1986 an "Agreement for Transportation of Water By and Between North Kern Water Storage District and Cawelo Water District which superseded the 1984 agreement was executed by the two districts with the approval of the City of Bakersfield. The stated goal of the agreement is to achieve the maximum benefit for the common groundwater basin through optimum use of the facilities and water supplies of the Districts. The Agreement will continue in force as long as the CWD agreement with the City of Bakersfield for purchase of Kern River water remains in effect.

The Districts agreed to exchange water supplies which may be surplus to the needs of one or the other. A right to use the Beardsley and Lerdo Canals was granted to CWD and NKWSD gained the benefit of water deliveries through CWD's capacity in the Cross Valley Canal. Water of CWD in the Beardsley and Lerdo Canals which is not used by CWD may be used by NKWSD. If requested by CWD, NKWSD will return the water taken or will pay the cost of the water to CWD. The cost of any additional water which may be secured by CWD for NKWSD will be repaid by NKWSD plus a service charge of $3.00 per acre foot. CWD may use 165 cfs. of flow capacity in the Beardsley and Lerdo Canals from the Kern River or Discharge Conduit "A" to Pump Station "B". The charges to CWD for use of the Beardsley Canal were established as $1.20 per acre foot from the Kern River to Seventh Standard Road and $0.10 per acre foot per mile for use of the Lerdo Canal. Additional conveyance capacity of 75 cfs. for a maximum of 240 cfs. is available to CWD in the Beardsley and Lerdo Canals for which CWD is to pay NKWSD $3.00 per acre foot for all flows in excess of 165 cfs. CWD agreed to reconstruct a measuring station at the head of the lined section of the Beardsley Canal and to make certain improvements in the Lerdo Canal at the Southern Pacific Railroad and Highway 99 crossing about one mile North of Seventh Standard Road.

CWD may use the Lerdo Canal from Pump Station "B" to Famoso Highway for conveyance of flows up to 60 cfs, provided CWD establishes the additional capacity. Additional pumps or pumping plants may be installed by CWD along the Lerdo

Canal at the discretion of NKWSD. CWD is responsible for repayment of NKWSD's costs for review and approval of plans and specifications for such pumping facilities. An annual monitoring fee of $100 per cfs. of pumping capacity must be paid by CWD for pumps installed in the Lerdo Canal other than Pump Station "B" and any additional pump stations downstream of Pump Station "B". The agreement provides for escalation of the charges in accordance with the Producers Price Index.

A separate "Agreement for Conservation and Utilization of Poso Creek Waters" was executed concurrently with the above agreement.

Cawelo Water District and North Kern Water Storage District are currently negotiating an updated transportation agreement.

2.5.2 Kern-Tulare Water District Agreement

Under a ten-year agreement with the Kern-Tulare Water District (KTWD) dated January 1, 1980, CWD wheeled KTWD water from the Lerdo Canal through CWD's pump stations and distribution system to a point near CWD's Reservoir "C" where it was pumped by KTWD into its distribution system. The agreement expired in January of 1990 and has not been renewed.

2.5.3 Buena Vista Water Storage District Exchange

Buena Vista Water Storage District (BVWSD) has water rights on the Kern River and no State Water Project (SWP) entitlement, but is located near the California Aqueduct. CWD has SWP entitlement but is closer to the Kern River supply than is BVWSD; as a result, since 1977, CWD has exchanged part of its SWP water with BVWSD for an equal amount of Kern River water with CWD paying an exchange fee to BVWSD. The contracts for the exchanges have been made for one-year terms. Exchanges have continued each year with a maximum exchange of 33,790 acre-feet water in 1986. It remains the intent of CWD to negotiate a long-term agreement with BVWSD which would extend through year 2039 when CWD's agreement with the Kern County Water Agency for State Water Project water expires.

2.5.4 ChevronTexaco Agreement

An Agreement for the Purchase and Sale of Reclaimed Oilfield Produced Water between Cawelo Water District (CWD) and Texaco Exploration and Production, Inc., Bakersfield Producing Division (TEPI-BPD), for a period ChevronTexaco and now Chevron USA Inc., was entered into as of August 17, 1994 for a term of 15-years from the date of the first delivery of oilfield produced water through an 8.5 mile, 30-inch pipeline from the TEPI-BPD Kern River Field operations pumping plant to CWD's Reservoir "B".

The Central Valley Regional Water Quality Control Board, issued Waste Discharge Requirements for Texaco Exploration and Production, Inc. and Cawelo Water

District, Produced Water Reclamation Project, Kern County, Order No. 95-031, NPDES Permit No. CA 0082295 on 24 February 1995. The permit limits the daily discharge to a maximum of 25.2 mgd (38.98 cfs.). Amended Waste Discharge Requirements for Chevron and Cawelo Water District are currently under development by the Central Valley Regional Water Quality Control Board.

2.5.5 Valley Waste Disposal Company Agreement

The Valley Waste Disposal Company (VWDC) entered an agreement with Cawelo Water District on May 27, 1980 for the delivery of about 3.20 acre-feet (25,000 barrels) per day of oilfield produced water through a 3.4-mile, 20-inch pipeline from the Kern Front No. 2 Oil Production Water Facility to CWD's Reservoir "B" in conformance with the Central Valley Regional Water Quality Control Board's (CVRWQCB) waste discharge requirements (NPDES Permit No. CA 0081311). The permit limits the daily discharge to a maximum of 4.5 mgd (6.96 cfs.). The term of the agreement between VWDC and CWD, which would have expired January 1, 2000, was extended to December 31, 2014.

2.5.6 Schaefer Oil Company Agreement

Schaefer Oil Company was issued Waste Discharge Requirements for the Mount Poso Oil Field, Kern County, Order No. 93-125, (NPDES Permit No. CA 0078859) on 05 August 1993. The permit was reissued as Order No. 98-035 on 27 February 1998. The permit limits the daily discharge to a maximum of 2.16 mgd (3.34 cfs.). The oilfield produced water may be discharged to several unlined reservoirs within the oil field, to Little Creek and to CWD's Reservoir "C".

Schaefer Oil Company renewed the Agreement with Cawelo Water District on 15 May 2003 for the discharge of approximately 3.3 acre-feet per day in Reservoir "C" in conformance with the NPDES Permit No. CA 0078859, Order No. 93-125 and renewals thereof.

2.5.7 Dudley Ridge Water District Exchange Agreement

Cawelo Water District (CWD) and Dudley Ridge Water District (DRWD) entered an agreement entitled "Amended and Restated Agreement for Water Regulation Program Between Cawelo Water District and the Dudley Ridge Water District", dated November 15, 2002. The agreement became effective as of November 15, 2002 and expires January 1, 2046.

Under the terms of the Amended and Restated Agreement DRWD provides funding to CWD and CWD will construct, own, operate and maintain certain facilities (Project Facilities) for implementation and operation of a water regulation program (Water Regulation Program) including, without limitation, groundwater basins, inter-district water conveyance systems, recovery wells, and distribution pipelines. The Project Facilities are intended to enable CWD to capture surface waters from Poso Creek,

Kern River, Central Valley Project (CVP) and the State Water Project (SWP). Based on hydrologic models, Cawelo expects an average annual yield of 7,000 a.f. from implementation of the Water Regulation Program and construction of the Project Facilities.

Project costs are estimated to be $13.9 million. Of this amount, $7.5 million will be provided by DRWD from grant funds available to DRWD through the Department of Water Resources (DWR). DWR has approved the Project as an appropriate expenditure.

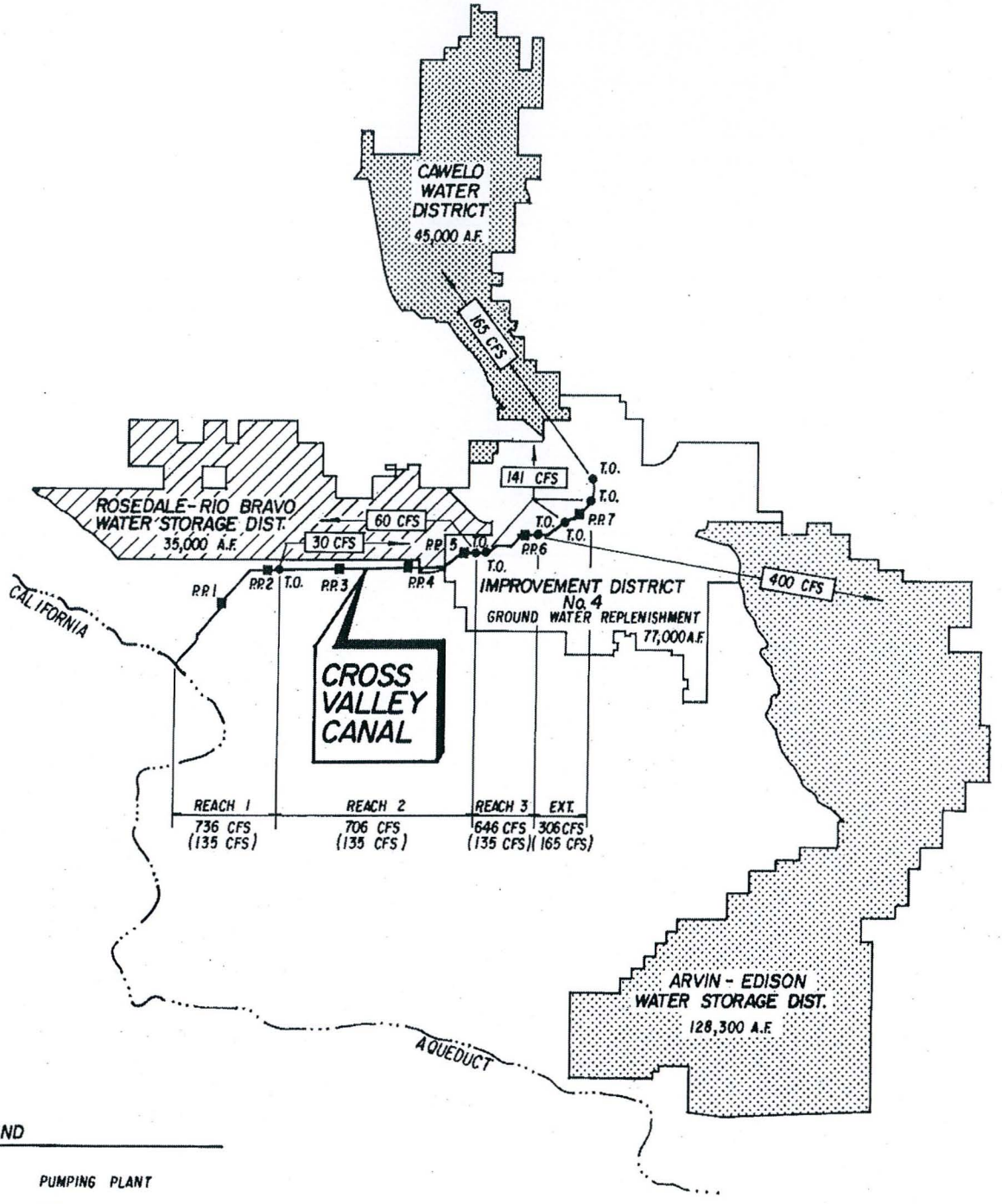
The Water Regulation Program requires CWD to capture and bank a total 29,800 a.f. of water for the benefit and account of DRWD during the term of the Amended and Restated Agreement (DRWD Water). The source of such water will be high flow Poso Creek water (i.e., water that would otherwise leave the county or fail to be put to beneficial use within the county), high flow Kern River water, otherwise unusable oilfield water, imported water, and other waters available to CWD and DRWD. DRWD Water will be returned to DRWD in amounts not exceeding 1,000 a.f. in any one month nor 2,000 a.f. in any one year. Returns of DRWD Water will average 693 a.f./year over the term of the Amended and Restated Agreement.

DRWD Water will be banked within CWD and will be recovered and delivered to CWD landowners for use within CWD. DRWD water will not be delivered directly to the California Aqueduct and no facilities are being constructed for that purpose. Return of DRWD Water will be accomplished by exchange of SWP entitlement water that would otherwise be delivered to CWD pursuant to the CWD's water supply contract with the Kern County Water Agency.

2.6 Construction of Facilities

2.6.1 Cross Valley Canal

The Cross Valley Canal (CVC) and its Extension, operated by the Kern County Water Agency, serves to convey Cawelo Water District's State Water Project water supply from the California Aqueduct near Tupman to the Beardsley and Lerdo Canals, thence to CWD's distribution system. The Cawelo Water District entered into a formal agreement with the Kern County Water Agency on September 29, 1972 for the joint construction, financing and operation of the CVC along with other participants. Construction of the CVC began in 1972 and was completed in 1975. The canal is approximately 16.8 miles in length with seven pump lifts and varies in capacity from 736 cfs. to 646 cfs. depending upon the reach as shown schematically in **Plate 2-5, Cross Valley Canal Schematic Diagram, Page 2-14**. The 306 cfs. Extension is approximately five miles in length. CWD has a right to 135 cfs. of the flow capacity within each reach of the Cross Valley Canal and 165 cfs. of the flow capacity in the canal Extension.



LEGEND

- ■ P.P. PUMPING PLANT
- ● T.O. TURNOUT
- (000 CFS) CAWELO WATER DISTRICT RIGHT

R.L. SCHAFER & ASSOCIATES CIVIL ENGINEERS PLANNERS P.O. BOX 1388 PORTERVILLE, CA.- 93258	CAWELO WATER DISTRICT KERN COUNTY, CALIFORNIA SCALE: DATE:	CROSS VALLEY CANAL SCHEMATIC DIAGRAM Plate 2-5

2.6.2 Cawelo Water District Facilities

The initial facilities constructed by CWD for delivery of supplemental surface water supply within the service area of the District included the enlargement of approximately 10.7 miles of the Beardsley and Lerdo Canals, the construction of Pump Station "A", Pump Station "B" and Pump Station "C", Conduit "A", Conduit "B" and Conduit "C", Regulating Reservoir "B" and Equalizing Reservoir "C", approximately six miles of concrete lined canal, siphons, and ten pipeline laterals (24.39 miles) with related appurtenances. Construction of these facilities began in May, 1974 and were essentially completed in December, 1975.

Pump Station "A", Conduit "A" and the enlargement of Beardsley and Lerdo Canals were necessary to transport the District's water from the Cross Valley Canal Extension and/or the Kern River to the District. The remaining facilities were constructed within the District for distribution of the supplemental water to the lands of the service area of the District.

The delivery of water within the District's distribution system during the period of peak summer irrigation demand (June thru August) has been limited by the pumping capacity of Pump Station "B". The District added storage capacity along the distribution system to aid in alleviating the Pump Station "B" limitation. The additional storage also increases the total quantity of water which can be delivered and adds flexibility to the District's operations.

The Poso Creek Recharge and Regulation Reservoir, with a capacity of 400 acre-feet, was added to the system during the Fall of 1980. Although this reservoir fulfills a minor groundwater recharge function, its primary purposes are to achieve higher maximum delivery rates during periods of peak demand and to provide operational flexibility. During peak irrigation demand periods (usually Monday through Friday during June, July and August), three pumping units with capacities of five, ten and fifteen cfs. can deliver as much as 30 cfs. from the reservoir into the northern portion of the distribution system; thus, a prorated additional quantity of water can be retained in the southern part of the system for distribution. The reservoir is refilled during off-peak demand periods. The reservoir's capacity smooths out variations in flow demands through Pump Station "C", and also provides operational flexibility during contingencies such as a pipeline lateral break.

The 120 acre foot capacity Robertson Reservoir, located South of Poso Creek near the end of the Distribution Canal, was constructed by CWD in 1984. Reservoir "C" was enlarged early in 1990 to increase its capacity to approximately 150 acre-feet.

The storage of Reservoir "B" was increased from an original capacity of 29 acre-feet to 100 acre-feet in 1992.

Lateral EX-1 was constructed in 1985 to connect Pump Station "B" with Lateral S-1 increasing the pumping capacity of Pump Station "B" by 20 second-feet. A 48-inch parallel pipe siphon crossing of Lerdo Highway for the Distribution Canal was constructed in 1989 creating 35 second-feet additional downstream canal capacity.

2.7 Land Use

Of the total area of the Cawelo Water District of 45,305 acres, the surface water service area covered 33,084 acres in 2006. The total District land use as of year 2006, along with the land use within the District since 1980, are set forth in **Table 2-1, Cawelo Water District, Land Use, Total District, Page 2-17**. The land use within the surface water service area of the Cawelo Water District for the period 1980 through 2006 is provided in **Table 2-2, Cawelo Water District, Land Use, Service Area, Page 2-18**.

In year 2006, 34,167 acres (84.4 percent) of the District's irrigable lands were planted in permanent crops, consisting of vineyards, citrus, olives, avocados, almonds, pistachios, walnuts and deciduous fruits. In year 2006, only 525 acres were planted in alfalfa, potatoes, grain, corn and vegetables, 5,803 acres of farmable land was not irrigated and 4,810 acres were identified as non-agricultural.

During the 27-year period, 1980 through 2006, permanent plantings within the District increased 8,877 acres and annual crops, principally cotton, decreased 12,781 acres, with an increase in irrigable land not farmed of 936 acres.

The land area of the District not included within the surface water service area as of year 2006 was 12,221 acres, of which 4,187 acres of irrigable lands (34.3 percent) were planted in permanent crops of citrus, almonds, pistachios, apples, peaches, plums and vineyard, only 61 acres in annual crops of grain, potatoes and irrigated pasture, 3,629 acres of farmable land non-irrigated and 4,344 acres were designated as non-agricultural.

2.8 Poso Creek

The watershed of Poso Creek originates in the Greenhorn Mountains of the Southern Sierra Nevada Mountain Range near Bakersfield at an elevation of about 8,000 feet above mean sea level. The watershed from the mountain ridge to State Highway 99 has an area of 362 square miles. The watershed can be divided into two distinct areas: the upper reach and the foothill reach. The creek flows South in the upper reach then West in the foothill reach and eventually drains to the Tulare Lake Basin valley floor.

The upper reach is the western slope of the Greenhorn Mountain ridge, slopes in a southerly direction, and has an area of 172 square miles above Badger Canyon.

TABLE 2-1

CAWELO WATER DISTRICT

LAND USE
TOTAL DISTRICT
In Acres

Crop	Vineyard	Citrus, Olive Avacado	Almond, Pistachio, Walnut, Palm	Deciduous Fruit	Subtotal Permanent	Cotton	Alfalfa, Pasture	Potato	Grain, Corn	Vegetable Melons	Subtotal Irrigated	Irrigable Non-Farmed (b)	Non - Agricultural (c)	Total Area
1980(a)	4,947	9,241	8,953	2,149	25,290	8,426	1,145	359	2,751	625	38,596	4,867	1,227	44,690
1981	6,548	8,715	9,941	2,149	27,353	5,018	1,227	826	2,728	1,430	38,582	4,696	1,412	44,690
1982	7,307	8,510	9,885	2,446	28,148	5,150	1,111	815	2,453	370	38,047	5,212	1,456	44,715
1983	8,648	8,497	10,001	1,413	28,559	3,173	839	1,054	2,604	712	36,941	6,272	1,502	44,715
1984	10,042	8,497	10,086	1,968	30,593	3,597	673	999	1,067	660	37,589	5,596	1,577	44,762
1985	10,387	8,479	10,332	2,199	31,397	2,911	924	773	591	506	37,102	5,800	2,025	44,927
1986	10,019	8,581	10,075	2,240	30,915	2,294	1,008	668	1,269	424	36,578	6,270	2,079	44,927
1987	10,015	8,682	9,509	2,259	30,465	2,424	630	518	488	407	34,932	7,949	2,086	44,967
1988	10,132	8,904	9,367	2,274	30,677	3,040	615	675	114	249	35,370	7,535	2,062	44,967
1989	10,293	9,346	9,422	2,114	31,175	2,154	418	708	114	847	35,416	7,336	2,215	44,967
1990	10,273	9,446	9,231	1,989	30,939	2,448	401	442	220	128	34,578	8,144	2,245	44,967
1991	10,531	10,212	8,657	2,053	31,453	2,136	526	541	248	644	35,548	7,165	2,254	44,967
1992	10,942	10,108	8,385	2,053	31,488	1,779	453	418	288	619	35,045	7,650	2,272	44,967
1993	10,944	10,110	8,380	1,930	31,364	1,880	330	534	443	506	35,057	6,996	2,907	44,960
1994	11,018	10,149	8,507	1,996	31,670	1,375	351	396	675	206	34,673	7,564	2,725	44,962
1995	10,951	10,260	9,341	1,785	32,337	1,089	318	364	146	912	35,166	6,176	3,620	44,962
1996	11,302	10,428	9,681	1,779	33,190	706	263	428	513	1,000	36,100	6,426	2,567	45,093
1997	11,424	10,557	9,507	1,885	33,373	244	572	422	510	493	35,614	6,874	2,622	45,110
1998	11,916	10,594	10,080	1,907	34,497	191	504	348	335	454	36,329	6,119	2,660	45,108
1999	11,933	10,236	10,119	1,841	34,129	0	804	254	209	0	35,396	7,137	2,558	45,091
2000	12,418	10,283	9,785	1,846	34,332	0	500	236	74	30	35,172	7,090	2,817	45,079
2001	12,059	10,802	10,130	1,785	34,776	0	372	255	124	20	35,547	6,481	3,372	45,400
2002	11,286	10,949	8,956	1,711	32,902	477	57	236	6	20	33,698	7,327	4,306	45,331
2003	11,234	10,622	9,475	1,584	32,915	0	27	136	334	3	33,415	7,266	4,642	45,323
2004	10,930	10,383	10,287	1,659	33,259	0	107	180	142	3	33,691	7,060	4,580	45,331
2005	11,101	10,546	10,401	1,470	33,518	0	101	216	176	38	34,049	6,616	4,652	45,317
2006	11,153	10,601	10,956	1,457	34,167	0	27	180	256	62	34,692	5,803	4,810	45,305
Average	10,361	9,768	9,557	1,942	31,566	1,871	530	481	699	421	35,701	6,645	2,632	45,011

(a) First year crop survey available.
(b) Includes dry farmed, fallow, abandoned and undeveloped land.
(c) Includes residential, commercial, other agriculture related businesses, County airport and Poso Creek.

TABLE 2-2

CAWELO WATER DISTRICT
LAND USE
SERVICE AREA
In Acres

Crop	Vineyard	Citrus, Olive Avacado	Almond, Pistachio, Walnut, Palm	Deciduous Fruit	Subtotal Permanent	Cotton	Alfalfa, Pasture	Potato	Grain, Corn	Vegetable Melons	Subtotal Irrigated	Irrigable Non-Farmed (b)	Non - Agricultural (c)	Total Area
1980(a)	3,626	8,226	6,310	839	*19,001*	6,172	300	279	2,171	456	*28,379*	1,330	15	*29,724*
1981	4,931	7,963	6,881	839	*20,614*	3,028	565	826	2,310	1,323	*28,666*	1,348	110	*30,124*
1982	5,869	7,753	6,860	1,159	*21,641*	3,291	525	710	1,786	317	*28,270*	1,761	95	*30,126*
1983	6,647	8,008	6,844	1,313	*22,812*	2,130	477	714	725	569	*27,427*	2,664	135	*30,226*
1984	8,003	8,315	7,055	1,253	*24,626*	1,803	273	654	529	478	*28,363*	1,993	183	*30,539*
1985	8,259	8,309	7,425	1,414	*25,407*	1,574	178	489	318	425	*28,391*	2,002	204	*30,597*
1986	7,939	8,413	7,463	1,414	*25,229*	1,415	199	523	289	224	*27,879*	2,678	239	*30,796*
1987	7,986	8,561	7,568	1,433	*25,548*	1,473	250	424	240	351	*28,286*	2,860	268	*31,414*
1988	8,103	8,704	7,617	1,448	*25,872*	1,753	195	553	114	249	*28,736*	2,709	259	*31,704*
1989	8,416	9,186	7,749	1,410	*26,761*	1,048	195	593	114	823	*29,534*	2,654	319	*32,507*
1990	8,417	9,286	7,582	1,295	*26,580*	1,215	259	374	111	128	*28,667*	3,843	359	*32,869*
1991	8,596	10,052	7,127	1,314	*27,089*	837	306	446	48	452	*29,178*	3,552	360	*33,090*
1992	9,007	9,948	6,861	1,314	*27,130*	751	124	373	0	539	*28,917*	3,813	360	*33,090*
1993	9,015	9,950	6,873	1,191	*27,029*	898	1	349	221	506	*29,004*	3,454	242	*32,700*
1994	9,052	10,031	7,094	1,257	*27,434*	550	1	326	466	152	*28,929*	3,851	238	*33,018*
1995	8,991	4,141	8,020	1,074	*22,226*	666	1	303	6	661	*23,863*	2,964	237	*27,064*
1996	8,951	10,314	8,346	1,050	*28,661*	459	1	371	88	838	*30,418*	2,599	257	*33,274*
1997	9,113	10,442	8,172	1,059	*28,786*	118	167	422	265	358	*30,116*	2,963	217	*33,296*
1998	9,271	10,479	8,593	1,097	*29,440*	191	167	343	6	397	*30,544*	2,602	237	*33,383*
1999	9,248	10,121	8,718	1,113	*29,200*	0	128	249	6	0	*29,583*	3,460	255	*33,298*
2000	9,693	10,194	8,400	1,102	*29,389*	0	1	231	6	30	*29,657*	3,377	285	*33,319*
2001	9,465	10,577	8,750	1,102	*29,894*	0	1	255	6	20	*30,176*	2,746	286	*33,208*
2002	9,186	10,762	7,691	1,078	*28,717*	477	1	231	6	20	*29,452*	3,412	344	*33,208*
2003	9,225	10,448	8,210	917	*28,800*	0	1	131	304	3	*29,239*	3,651	343	*33,233*
2004	8,845	10,241	9,003	942	29,031	0	81	180	137	3	29,432	3,430	384	33,246
2005	8,972	10,405	9,116	918	*29,411*	0	75	211	146	38	*29,881*	2,968	398	*33,247*
2006	9,082	10,411	9,562	925	*29,980*	0	1	175	256	32	*30,444*	2,174	466	*33,084*
Average	8,263	9,263	7,705	1,167	*26,397*	1,148	172	406	401	360	*28,884*	2,872	255	*32,012*

(a First year crop survey available.
(b) Includes dry farmed, fallow, abandoned and undeveloped land.
(c) Includes residential, commercial, other agriculture related businesses, County airport and Poso Creek.

The foothill reach drains an additional 190 square miles. There are deep canyon sections in the foothill reach that flatten at Highway 99 near Famoso.

Generally, the climate is temperate and semiarid. The area is characterized by hot dry summers and cool damp winters. The temperature extremes recorded in Bakersfield range from 115°F maximum and 20°F minimum. Winter temperatures in the mountains occasionally fall below 0°F.

2.8.1 Stream and Precipitation Gages

There are two stream flow gages located on Poso Creek. The major gage is Coffee Canyon. It is located on the downstream side of the bridge opposite the mouth of Hillvale Canyon, 10 miles northeast of Oildale and 12 miles northeast of Bakersfield. The gage has a drainage area of 230 square miles.

The gage record spans from July 1959 to present. The U.S. Geological Survey (USGS) published the streamflow records of the gage at Coffee Canyon from 1959 to 1985. The USGS referred to the gage as Poso Creek near Oildale. The Kern County Water Agency reported the record from 1985 to the present. **Table 2-3, Poso Creek Discharge at Oildale (Coffee Canyon), page 2-20** provides discharges for the period water years 1961 through 2006.

The second gage is located upstream of State Highway 65. The Cawelo Water District currently monitors the gage. The drainage area for the State Highway 65 gage is 320 square miles. The actual streamflow records for the gage began in 1982 and flows for water years 1961 through 1981 were derived from the Coffee Canyon gaging station **Table 2-4, Poso Creek Discharge at State Highway 65, page 2-21** provides discharges for the period water years 1961 through 2006.

The 46 year period (water years 1961-2006) of record indicates that less than one percent (1%) of the flows exceed 700 cfs., and only 13 days during 6 years of the period did the flow exceed 1,000 cfs. at the gaging station as provided in **Table 2-5, Poso Creek Days of Flow at State Highway 65, page 2-22.**

2.8.2 Storm Characteristics

The average annual precipitation varies from 40 inches in the mountains and 7 inches at Highway 99. Most of the precipitation occurs during the months of December through April. Snow falls above 6,000 feet elevation, roughly 5 percent of the watershed area, during the winter. The snow melts during the spring months of March and April. The average annual precipitation is shown in **Figure 2-1, Average Annual Isohyetal Map, page 2-23** and the 100-year, 24-hour Isohyetal Map is shown in **Figure 2-2, 100-Year 24-Hour Isohyetal Map, page 2-24**.

TABLE 2-3

POSO CREEK DISCHARGE AT OILDALE (COFFEE CANYON)
Flows in Acre-Feet

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Total
1960-61	245	320	343	377	315	226	192	186	125	96	110	135	2670
1961-62	198	236	304	352	1661	2733	1638	609	191	170	172	189	8453
1962-63	294	328	335	326	259	549	1843	1115	368	164	154	203	5938
1963-64	292	361	348	478	429	1202	2063	1348	331	186	166	185	7389
1964-65	33	188	3031	1539	485	221	2661	4267	2623	217	71	47	15383
1965-66	219	259	571	1178	1503	1470	605	262	160	176	188	207	6798
1966-67	200	221	9019	2150	1505	1519	10183	8541	2093	323	229	168	36151
1967-68	235	270	668	1131	1434	1640	1660	412	169	183	174	179	8155
1968-69	234	297	308	12723	30988	22285	20059	8243	3326	884	232	185	99764
1969-70	304	662	1240	6663	1825	3386	1406	775	210	158	151	167	16947
1970-71	214	254	1334	2614	1359	1640	1648	2525	679	131	125	134	12657
1971-72	169	193	1567	1166	1299	725	478	198	155	174	106	64	6294
1972-73	118	258	1490	8166	6208	15043	10544	6191	1613	351	47	51	50080
1973-74	455	1243	3112	6734	2469	5726	10207	3195	1091	306	21	48	34607
1974-75	324	897	1232	1581	2630	5520	5006	4017	930	112	0	0	22249
1975-76	133	566	902	702	770	1747	1150	359	22	0	0	835	7186
1976-77	36	197	301	563	394	478	153	195	0	0	0	0	2317
1977-78	0	0	74	2952	14489	13615	11248	4990	1273	323	0	149	49113
1978-79	119	479	1079	1712	2912	8866	5006	2456	498	51	0	0	23178
1979-80	40	533	677	9757	7970	12329	4951	3773	1682	558	4	5	42279
1980-81	73	321	703	901	2049	3602	3382	1168	118	0	0	0	12317
1981-82	0	0	1789	3324	4529	7535	19690	4717	1863	708	31	126	44312
1982-83	609	1991	7819	10342	25331	46027	22404	14773	7539	3336	2233	858	143262
1983-84	1791	7275	13968	7440	5284	4538	3864	2350	1053	199	3	0	47765
1984-85	371	1309	1924	2003	2305	2739	2293	628	288	0	0	0	13860
1985-86	158	1632	2364	2518	5896	13440	4570	2798	1101	0	0	0	34477
1986-87	0	729	5	2770	3016	4270	3488	1763	233	0	0	0	16274
1987-88	0	0	2	3359	2721	2325	0	0	0	0	0	0	8407
1988-89	0	0	0	2614	3401	6668	3485	2355	45	0	0	0	18568
1989-90	0	0	0	0	986	3345	1991	214	0	0	0	0	6536
1990-91	0	0	0	0	0	3177	3118	912	11	0	0	0	7218
1991-92	0	0	0	63	231	539	125	0	0	0	0	0	958
1992-93	0	0	0	1630	4467	5551	3621	950	618	0	0	0	16837
1993-94	0	0	0	1312	3669	4137	3059	3927	629	0	0	0	16733
1994-95	0	0	0	7112	5435	18885	7440	10838	4114	1284	6	0	55114
1995-96	0	0	571	3426	17016	12142	5211	2303	859	19	0	0	41547
1996-97	0	884	7454	29591	12744	9344	6736	4949	4963	0	0	0	76665
1997-98	0	520	4935	13919	49098	18842	24738	16588	7455	3723	2508	2518	144844
1998-99	3143	3578	4191	4353	6656	4894	5673	3125	975	155	0	0	36743
1999-2000	0	0	1258	1298	3964	5899	1377	685	40	0	0	0	14521
2000-2001	0	0	0	115	890	1012	1202	254	40	0	0	0	3513
2001-2002	0	0	0	1302	1472	3452	2200	755	0	0	0	0	9181
2002-2003	0	0	1289	3983	3295	4674	4770	5086	405	0	0	0	23502
2003-2004	0	0	0	0	577	616	108	0	0	0	0	0	1301
2004-2005	0	0	0	727	441	2647	3924	4709	445	9	0	0	12902
2006-2006	0	0	0	195	168	2752	6955	2248	223	0	0	0	12541
46-Year Total	10007	26001	76207	167161	246545	293972	238125	141752	50556	13996	6731	6453	1277506
46-Year Average	222	578	1693	3710	5475	6472	5137	3100	1119	311	150	143	28110

TABLE 2-4

POSO CREEK DISCHARGE AT STATE HIGHWAY 65
Flows in acre-feet

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Total
1960-61	0	0	0	0	0	0	0	0	0	0	0	0	0
1961-62	0	0	0	0	1031	1840	889	56	0	0	0	0	3816
1962-63	0	0	0	0	0	177	1062	421	8	0	0	0	1668
1963-64	0	0	0	30	3	496	1274	618	0	0	0	0	2421
1964-65	0	48	2614	796	15	0	1931	3269	1885	0	0	0	10558
1965-66	0	0	170	466	799	712	44	0	0	0	0	0	2191
1966-67	0	0	8109	1311	795	740	9002	7358	1293	5	0	0	28613
1967-68	0	0	163	417	717	864	912	0	0	0	0	0	3073
1968-69	0	0	0	11031	29530	20749	18611	7052	2410	276	0	0	89659
1969-70	0	0	502	5687	1069	2442	661	228	0	0	0	0	10589
1970-71	0	0	649	1738	668	847	883	1652	216	0	0	0	6653
1971-72	0	0	1020	434	595	121	42	0	0	0	0	0	2212
1972-73	0	34	764	7039	5175	13559	9340	5127	879	0	0	0	41917
1973-74	0	557	2176	5615	1666	4606	9021	2281	407	0	0	0	26329
1974-75	0	234	510	803	1817	4465	3969	3043	339	0	0	0	15180
1975-76	0	0	224	69	153	956	450	4	0	0	0	635	2491
1976-77	0	0	0	0	0	0	0	0	0	0	0	0	0
1977-78	0	0	0	2204	13335	12228	10013	3985	575	6	0	0	42346
1978-79	0	0	367	906	2077	7581	4070	1607	73	0	0	0	16681
1979-80	0	0	28	8672	6905	11036	3929	2801	928	99	0	0	34398
1980-81	0	0	79	246	1295	2632	2503	452	2	0	0	0	7209
1981-82	0	0	0	1745	4030	8224	13351	5026	1361	337	0	0	34074
1982-83	0	974	5589	8277	17361	49460	24004	15544	6776	2855	2356	1499	134695
1983-84	1076	6540	10765	8234	5630	4225	3138	1848	535	0	0	0	41991
1984-85	0	722	1506	1640	2250	2691	2634	695	141	0	0	0	12279
1985-86	0	0	866	1157	6251	11722	5804	2218	273	0	0	0	28291
1986-87	0	0	0	606	1503	2539	1498	124	0	0	0	0	6270
1987-88	0	0	0	0	0	334	152	81	0	0	0	0	567
1988-89	0	0	0	0	96	2978	955	162	0	0	0	0	4191
1989-90	0	0	0	0	0	0	0	0	0	0	0	0	0
1990-91	0	0	0	0	0	426	1291	127	0	0	0	0	1844
1991-92	0	0	0	0	0	0	0	0	0	0	0	0	0
1992-93	0	0	0	0	2354	5241	3369	641	314	0	0	0	11919
1993-94	0	0	0	0	0	435	247	472	0	0	0	0	1154
1994-95	0	0	0	1262	3172	12663	7311	8858	3244	363	0	0	36873
1995-96	0	0	0	1176	7831	10684	5199	1524	136	0	0	0	26550
1996-97	0	0	3623	18000	9050	5672	2792	1043	79	0	0	0	40259
1997-98	0	0	0	4460	28076	18130	24225	18171	11538	4141	750	400	109891
1998-99	556	1094	1453	2655	4579	2470	4143	1993	491	0	0	0	19434
1999-2000	0	0	0	0	1738	4675	1233	324	0	0	0	0	7970
2000-01	0	0	0	0	0	7	500	91	0	0	0	0	598
2001-02	0	0	0	0	0	189	203	14	0	0	0	0	406
2002-03	0	0	0	0	0	565	1104	1736	0	0	0	0	3405
2003-04	0	0	0	0	0	241	15	0	0	0	0	0	256
2004-05	0	0	0	0	229	2339	2884	3799	420	0	0	0	9671
2005-06	0	0	0	0	0	1179	7200	1614	30	0	0	0	10023
46-Year Average	35	222	895	2102	3517	5068	4171	2306	747	176	68	55	19361
20-Year Average	28	55	254	1408	2931	3538	3216	2039	813	225	38	20	14564

Table 2-5

POSO CREEK DAYS OF FLOW AT STATE HIGHWAY 65

Water Year	Days [1] of Flow	Days at and Exceeding 1000 cfs.	900 cfs.	800 cfs.	700 cfs.	600 cfs.	500 cfs.	400 cfs.	300 cfs.	200 cfs.	100 cfs.
1960-61	0	0	0	0	0	0	0	0	0	0	0
1961-62	89	0	0	0	0	0	0	0	0	0	0
1962-63	56	0	0	0	0	0	0	0	0	0	0
1963-64	86	0	0	0	0	0	0	0	0	0	0
1964-65	111	0	0	0	0	0	0	1	2	2	11
1965-66	99	0	0	0	0	0	0	0	0	0	0
1966-67	211	1	1	1	2	2	3	3	6	16	45
1967-68	132	0	0	0	0	0	0	0	0	0	0
1968-69	186	4	6	9	11	18	23	32	51	74	115
1969-70	166	0	0	1	1	1	3	3	3	3	4
1970-71	189	0	0	0	0	0	0	0	0	0	0
1971-72	104	0	0	0	0	0	0	0	0	0	2
1972-73	195	0	0	0	0	1	1	2	7	29	84
1973-74	214	0	0	0	1	1	2	2	3	7	24
1974-75	226	0	0	0	0	0	0	0	2	2	7
1975-76	141	0	0	0	0	0	0	0	0	1	2
1976-77	0	0	0	0	0	0	0	0	0	0	0
1977-78	178	1	2	2	2	4	5	8	11	26	80
1978-79	191	0	0	0	0	0	0	0	2	4	22
1979-80	200	1	1	1	2	2	3	6	10	23	51
1980-81	162	0	0	0	0	0	0	0	0	0	6
1981-82	193	0	0	0	0	0	1	2	4	23	65
1982-83	331	4	10	19	25	31	40	49	79	124	159
1983-84	271	0	0	0	0	0	0	4	6	15	70
1984-85	207	0	0	0	0	0	0	0	0	0	4
1985-86	191	0	0	0	0	0	0	1	3	21	51
1986-87	124	0	0	0	0	0	0	0	0	0	1
1987-88	40	0	0	0	0	0	0	0	0	0	0
1988-89	77	0	0	0	0	0	0	0	0	0	0
1989-90	0	0	0	0	0	0	0	0	0	0	0
1990-91	53	0	0	0	0	0	0	0	0	0	0
1991-92	0	0	0	0	0	0	0	0	0	0	0
1992-93	125	0	0	0	0	0	0	0	0	1	15
1993-94	73	0	0	0	0	0	0	0	0	0	0
1994-95	183	0	0	0	1	1	1	2	3	18	87
1995-96	140	0	0	0	0	0	0	0	0	0	53
1996-97	180	0	0	1	1	1	1	4	12	32	79
1997-98	294	2	2	2	3	3	10	36	66	126	163
1998-99	266	0	0	0	0	0	0	0	0	0	14
1999-2000	100	0	0	0	0	0	0	0	0	0	11
2000-2001	38	0	0	0	0	0	0	0	0	0	0
2001-2002	39	0	0	0	0	0	0	0	0	0	0
2002-2003	75	0	0	0	0	0	0	0	0	0	1
2003-2004	0	0	0	0	0	0	0	0	0	0	0
2004-2005	122	0	0	0	0	0	0	0	0	0	9
2005-2006	81	0	0	0	0	0	0	0	0	2	20
46-Year Total [2]	6139	13	22	36	49	65	93	155	270	549	1255
Percent	100.0%	0.2%	0.4%	0.6%	0.8%	1.1%	1.5%	2.5%	4.4%	8.9%	20.4%

(1) Based on flow of 1 cfs. or greater.

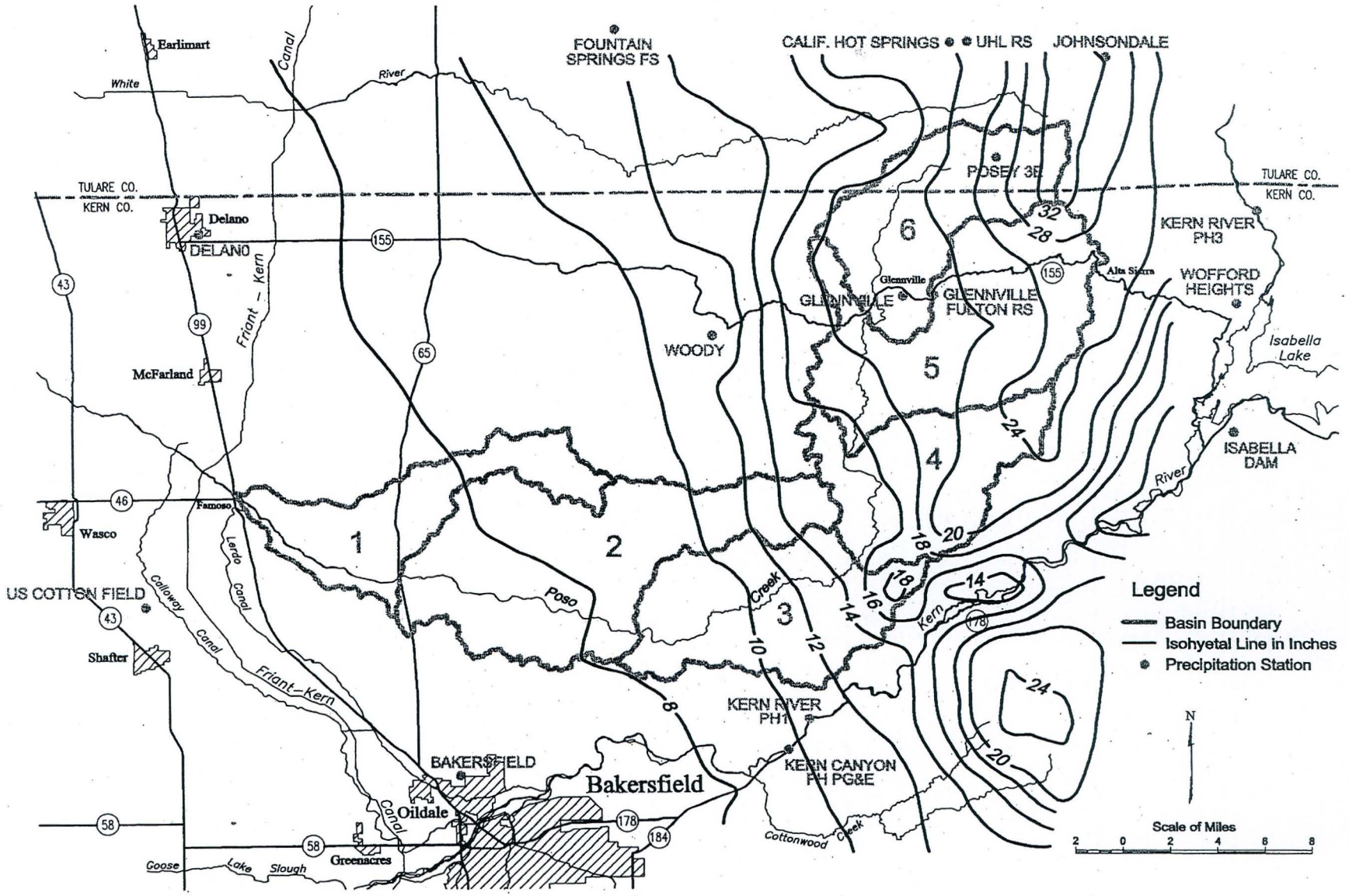


Figure 2-1 Average Annual Isohyetal Map

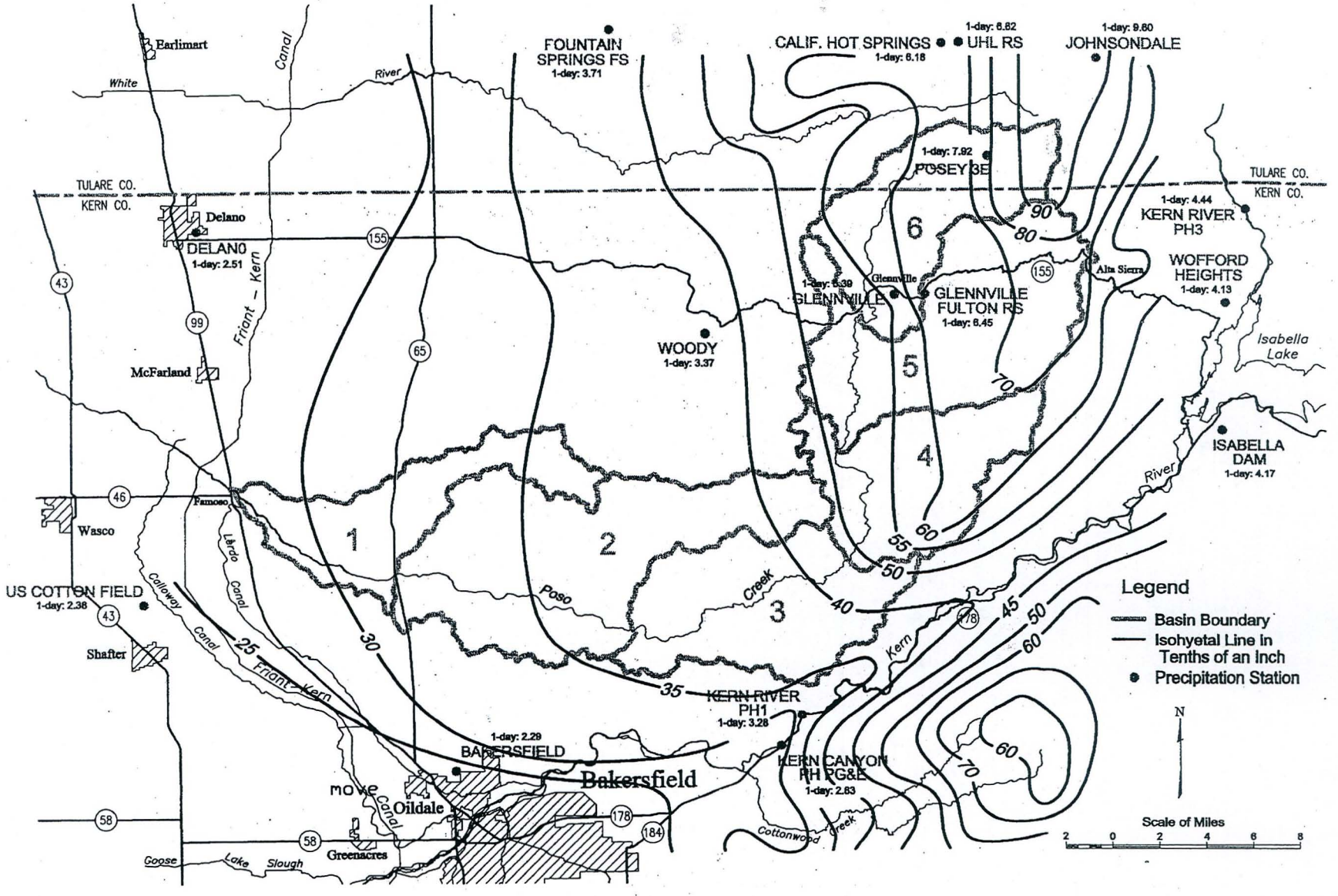


Figure 2-2 100-Year 24-Hour Isohyetal Map

2.8.3 Flood Characteristics

The major floods on Poso Creek have occurred during the winter and early spring as a result of heavy general rainstorms. The orientation of the watershed is north-south, because this parallels the direction of the lateral motion of most storms, the creek has a tendency toward having either usually high or very low peaks. Depending upon whether the storm is moving in a down-basin or up-basin direction, the floods are characterized by sharp peaks and relatively rapid recession to low flows. Contributions of runoff from the upper basin above 3,000 feet make up a majority of the peak flow. Very little runoff comes from the lower elevation due to the low rainfall and highly permeable soils. Snowmelt alone is not a major flood hazard because of the small area that is above 5,000 feet elevation.

The most recent large storms occurred in 1983 and 1998. 1983 was a wet year with consistent flow in the channel for twelve months. The mean daily flow at the Coffee Canyon gage for the year was 197.9 cubic feet per second compared to the long term average of 38.8 cubic feet per second. The maximum peak flow reported at the Coffee Canyon gage for the year was 3,350 cubic feet per second (cfs) which occurred on 07 February 1983. On February 22, 1998 the reported peak flow was 4,930 cubic feet per second. The mean daily flow for the year was 200.0 cfs. The peak flow of record at the Coffee Canyon gage was on February 25, 1969 which was estimated at 6,700 cfs.

2.8.4 Hydrology

The State of California, Resources Agency, Department of Water Resources, San Joaquin District prepared a Poso Creek Hydrology Report, dated 03 October 2002.

The Poso Creek Hydrology Report provided peak flows, 72-hour volumes and 30-day volumes for 500, 200, 100, 50, 25, 10 and 2 year return periods at three locations Oildale (Coffee Canyon), State Highway 65 and State Highway 99 as set forth in **Table 2-6, Poso Creek Hydrology.**

Table 2-6

Poso Creek Hydrology

Return Period (Year)	Oildale (Coffee Canyon)			State Highway 65			State Highway 99		
	Peak Flow cfs.	3-Day Volume a.f.	30-Day Volume a.f.	Peak Flow cfs.	3-Day Volume a.f.	30-Day Volume a.f.	Peak Flow cfs.	3-Day Volume a.f.	30-Day Volume a.f.
500	32,600	46,500	98,700	34,700	50,100	107,800	34,600	51,500	111,400
200	23,000	32,800	77,800	24,400	35,300	85,000	24,400	36,300	87,800
100	17,100	24,400	63,300	18,200	26,200	69,200	18,100	27,000	71,500
50	11,000	19,900	50,000	11,700	21,400	54,600	11,700	22,100	56,500
25	7,370	13,400	38,000	8,020	14,600	41,500	8,060	15,100	42,900
10	3,570	7,730	23,500	3,830	8,330	25,700	3,860	8,520	26,500
2	480	1,210	5,780	520	1,300	6,310	520	1,330	6,520

2.8.5 Water Quality

Poso Creek flow occurs only intermittently and samplings for water quality have not been obtained regularly. However, fifteen samples have been collected and analyzed during the period July of 1993 and March 2005. The water quality of Poso Creek is consistent with the Kern River, the nearest stream to the South. A summary of the water quality of Poso Creek for the period 1993 through 2005 is set forth in **Table 2-7, Poso Creek Water Quality**.

Table 2-7

CAWELO WATER DISTRICT
POSO CREEK
WATER QUALITY
1993 - 2005

Constituent	Unit	Limit[1]	Range[3]	Median[3]
Salinity (EC)	µmhos/cm	700[1]	158 - 381	243.7
Chloride (Cl)	ppm	140[1]	4.0 - 48.8	9.4
Nitrate (NO3)	ppm	30[2]	1.3 - 7.5	4.0
Boron (B)	ppm	0.7	.02 - .08	0.05
Total Dissolved Solids (TDS)	ppm	450[1]	103.0-195.5	138.0
Sodium (Na)	ppm	70[1]	14.7 - 32.2	18.6
pH		6.5-8.3[1]	6.6 - 8.2	7.5

(1) Desirable limit for irrigation of crops.
(2) Drinking water desirable limit.
(3) Compilation of 15 samples randomly selected from the discharge of Poso Creek . The Water Quality Analysis Reports from BC Laboratories, Inc. and Oilwell Research Inc., Bakersfield, CA, are available upon request.

2.8.6 Channel Loss

The **Poso Creek Channel Loss in Cubic Feet Per Second (cfs.) Per Mile, Table 2-8,** was developed based upon historical measurements, records and current meter measurements.

Table 2-8

Poso Creek Channel Loss in Cubic Feet Per Second (cfs.) Per Mile

Length-mi / Date	Disch. at Coffee Canyon/ Hwy. 65 cfs.	Coffee Canyon to Hwy. 65 11.5 cfs.	Hwy. 65 to Cawelo Siphon 2.2 cfs.	Cawelo Siphon to Zerker Road 2.5 cfs.	Zerker Road to Famoso 4.8 cfs.	Hwy. 65 to Famoso 9.5 cfs.	Coffee Canyon to Famoso 21.0 cfs.	Famoso to Calloway Canal 3.6 cfs.	Calloway Canal to Whistler Road 1.7 cfs.	Whistler Road to Hwy. 43 3.8 cfs.	Famoso to Hwy. 43 9.1 cfs.	Hwy. 43 to Scofield Road 4.5 cfs.
1/26-31/56	530						4.51				5.10	
2/26-27/58	231						5.37				13.49	
3/5/58	232						2.07				12.67	
1/24-27/65	76						1.39				5.72	
4/10-20/65	240						2.81				21.06	
4/26/82	152*		8.69	1.34	9.31	7.03			3.38	4.81		1.14
4/28/82	139*		8.06		11.80	7.49			6.98	5.88		8.45
5/5/82	122*		10.40	1.13	2.26	3.85				4.79		5.35
2/24/84	98*					5.79		5.42	8.23	8.23		2.02
1982		2.47										
1983		1.13										
1984		0.76										
1985		.26										
Average		1.16	9.05	1.24	7.79	6.04	3.23		6.20	5.93	11.61	4.24
1949	100	2.67					2.67				4.88	
	200	2.72					2.72				10.0	
	500	2.77					2.77				11.40	
	1000	2.77					2.77				12.56	
	2000	2.82					2.82				13.72	
					Zerker Road to Calloway Canal				Calloway Canal to Scofield Road			
Length-mi			2.2	2.5				8.4				10.0
Used/mi.			9.0	2.0				8.3				6.5
Total-cfs.			20.0	5.0				71.0				65.0

* at Hwy. 65.

A compilation of the data set forth in **Table 2-8, Page 2-27** as averaged for each reach of the Poso Creek channel is further summarized in **Table 2-9, Channel Loss.**

Table 2-9

Channel Loss

Reach	Miles	Loss/Mile in cfs.	Total Loss cfs.
Coffee Canyon to State Highway 65(1)	11.5	1.1	12
Coffee Canyon to Famoso	21.0	3.4	72
State Highway 65(1) to Cawelo Siphon	2.2	9.1	20
Cawelo Siphon to Zerker Rd.	2.5	2.0	5
Zerker Rd. to Famoso	4.8	7.3	35
State Highway 65(1) to Famoso	9.5	6.3	60
Famoso to Calloway Canal(2)	3.6	9.7	35
Calloway Canal to Scofield Rd.(3)	10.0	6.5	65
State Highway 65(1) to Scofield Road	23.1	6.9	160
Scofield Rd. to Kern National Wildlife Refuge	11.2	4.9	55
State Highway 65(1) to Kern National Wildlife Refuge	34.3	6.3	215
Kern National Wildlife Refuge to Goose Lake Canal	2.7	5.5	15
State Highway 65(1) to Goose Lake Canal & Tulare Lake	37.0	6.2	230

(1) Cawelo Water District gaging station.
(2) North Kern's point of diversion.
(3) Semitropic's first point of diversion (total of six).

2.8.7 Riparian Lands in Cawelo Water District

An independent title search of riparian lands within Cawelo Water District was determined by Alliance Appraisal Company in 1981.

A determination of the extent of riparian land is based upon three criteria:

a. The lands must be contiguous to or abut on the stream, except under certain reservations;

b. The riparian right extends only to the smallest tract held under one title in the chain of title leading to the present owner;

c. The land must be within the watershed of the stream.

The title search identified lands riparian to Poso Creek in Cawelo Water District as set forth on **Plate 2-6, Page 2-30,** containing 2,375 acres.

2.8.8 Appropriation Applications and Permits

A. Semitropic Water Storage District filed on 27 July 1976 Application No. 25117 for appropriation of Poso Creek flows. A permit 17538 was issued on 14 February 1979 with the following conditions:

1. Points of Diversion:

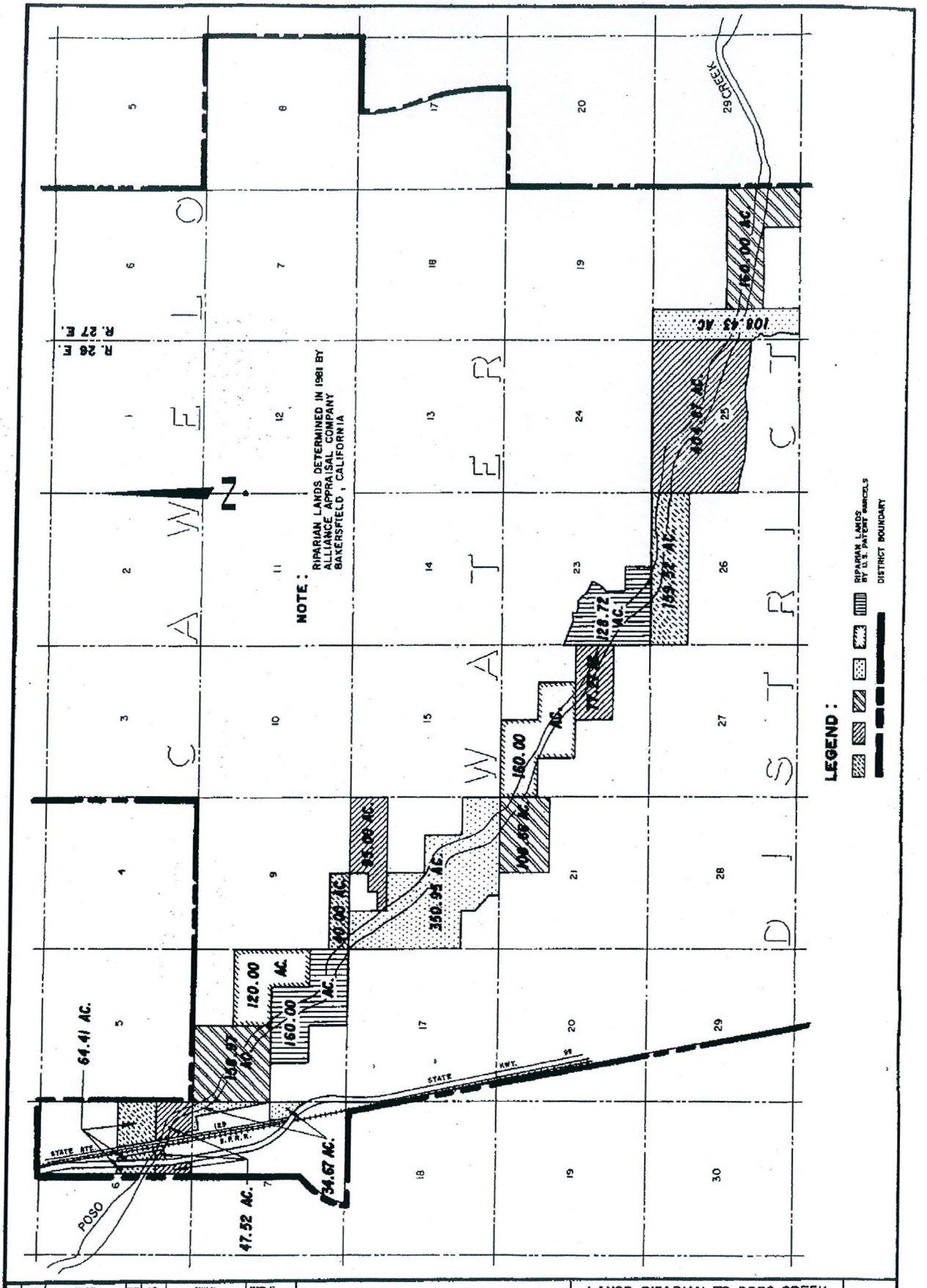
   W^4 Corner (SW^4 NW^4) Section 9, T26S, R24E, MDB&M
   E^4 Corner (SE^4 NE^4) Section 12, T26S, R23E, MDB&M
   W^4 Corner (SE^4 NE^4) Section 10, T26S, R23E, MDB&M
   E^4 Corner (SE^4 NE^4) Section 8, T26S, R23E, MD&BM
   1000 feet South NE Corner (NE^4 NE^4) Section 1, T26S, R22E, MDB&M
   SE Corner (SE^4 SE^4) Section 27, T25S, R22E, MDB&M

2. Purpose & Place of Use:

   Irrigation of 15,000 acres of Pond-Poso Improvement District within T25-29S, R22-24E, MDB&M.

   Recreational duck ponds T25 & 26S, R22-24E, MDB&M.

3. Appropriation limited to beneficial use not exceeding 320 cfs. direct diversion, 15,000 acre-feet per annum for off-stream surface storage for recreation at a maximum rate of 250 cfs. and 25,000 acre-feet per annum to underground storage for irrigation at a maximum rate of 250 cfs. The season of diversion for both direct diversion and storage shall be from November 1 of each year to May 31 of the succeeding year. Total amount of water to be taken from the source shall not exceed 66,000 acre-feet per water year of October 1 to September 30.



R. L. SCHAFER & ASSOCIATES INC. CIVIL ENGINEERS PLANNERS P.O. BOX 1338 PORTERVILLE, CALIFORNIA 93258 P.O. BOX 3339 VISALIA, CALIFORNIA 93278	LANDS RIPARIAN TO POSO CREEK WITHIN CAWELO WATER DISTRICT	Plate 2-6

B. North Kern Water Storage District filed on 14 May 1980 Application No. 26351 for appropriation of Poso Creek flows. The State Water Resources Control Board issued Permit 21051 on 06 July 2000 with the following Conditions:

1. Point of Diversion

   SE^4 SW^4 Section 26, T26S, R25E, MDB&M

2. Purpose & Place of Use:

   Irrigation within Sections 7, 8, 16 through 23 and 26 through 36, T26S, R25E, MDB&M; Sections 1 through 10, 16, 17 and 21, T27S, R25E, MDB&M, and Section 25, T27S, R24E, MDB&M.

3. Appropriation limited to beneficial use and shall not exceed 175 cfs. by direct diversion, not exceed total of 15,000 acre-feet per annum, and 10,000 acre-feet per annum by underground storage from December 1 of each year to May 31 of the succeeding year. The total amount to be taken shall not exceed 25,000 acre-feet per water year.

C. Cawelo Water District filed on 15 July 1980 Application No. 26454 for appropriation of Poso Creek flows. The State Water Resources Control Board issued Permit 21032 on 11 May 2000 with the following conditions:

1. Points of Diversion:

   NW^4 Section 8, T27S, R26E, MD&BM
   SE^4 Section 8, T27S, R26E, MD&BM
   SW^4 Section 16, T27S, R26E, MD&BM
   NE^4 Section 21, T27S, R26E, MD&BM
   NE^4 Section 22, T27S, R26E, MD&BM
   SW^4 Section 23, T27S, R26E, MD&BM
   NE^4 Section 26, T27S, R26E, MD&BM
   NE^4 Section 25, T27S, R26E, MD&BM

2. Purpose and Place of Use:

   Irrigation and stockwatering within T26S, T27S & T28S and R26E & 27E, MDB&M.

3. Appropriation limited to beneficial use not to exceed 110 cfs. direct diversion, 50 acre-feet per annum by storage and 17,899 acre-feet per annum collected to underground storage at a maximum rate of 40 cfs. The season of diversion limited to November 1 to June 14 of the succeeding year. The total amount to be taken shall not exceed 30,000 acre-feet per water year. The storage capacity of the surface water reservoir shall not exceed 50 acre-feet.

2.8.9 Poso Creek Flow Allocation

The Poso Creek flows at the State Highway 65 gaging station have been distributed to Cawelo Water District, North Kern Water Storage District and Semitropic Water Storage District as set forth in **Table 2-10, Poso Creek Flow Allocations.**

Table 2-10

Poso Creek Flow Allocations

Flow @ State Highway 65 Gaging Station cfs.	Cawelo cfs.	North Kern cfs.	Semitropic cfs.
0-100	0-100[1]		
100-270	135[1][2]	135[2]	
270-370	135[1][2]	235[2][3]	
370-810	135[1][2]	235[2][3]	440[4]
810-1000[5]			

(1.) The channel loss from State Highway 65 to Famoso within Cawelo has been computed to be 60 cfs. and the channel loss from State Highway 65 to the Cawelo Concrete Diversion Structure computed to be 55 cfs. The Vignolo riparian diversion has been determined to be 25 cfs. with a limit of 6500 a.f. annually. The right of all riparian lands within Cawelo Water District has been computed to be 40 cfs.

79.3 percent of flows of Poso Creek at State Highway 65 are less than 100 cfs.

(2.) The Cawelo sand dams have been estimated to divert 35 cfs. to groundwater storage. The channel loss from Famoso to the Calloway Canal has been computed to be 35 cfs. and the channel loss from the Cawelo Concrete Diversion Structure to the Calloway Canal has been computed to be 40 cfs. North Kern has reported a pre-1914 diversion right of 100 cfs. for the Calloway Canal.

91.8 percent of Poso Creek flows at State Highway 65 are less than 200 cfs.

(3.) Diversion of North Kern of 100 cfs. pre-1914 appropriative right to recharge basins and groundwater storage.

95.5 percent of Poso Creek flows at State Highway 65 are less than 300 cfs.

(4.) Channel losses from the Calloway Canal to diversions of Semitropic at Scofield Road (SW^4NW^4 Section 9, T26S, R24E), Wildwood Road (SE^4NE^4 Section 12, T26S, R23E), Bell Road (SE^4NE^4 Section 10, T26S, R23E), Gun Club Road (SE^4NE^4 Section 8, T26S, R23E), Range 22 (NE^4NE^4 Section 1, T26S, R22E), and Kern National Wildlife Refuge (SE^4SE^4 Section 27, T25S, R22E) in 21.2 miles of 120 cfs. and 320 cfs. diversion entitlement of Permit No. 17538.

99.4 percent of flows of Poso Creek and State Highway 65 are less than 800 cfs.

(5.) Flows from 810 cfs. to 1000 cfs. to Kern National Wildlife Refuge. Flows above 1000 cfs. to Tulare Lake Basin. During the past thirty-five (46) years of record only thirteen (13) days of six (6) years, flows exceeded 1000 cfs. Maximum flows of record include 3,140 cfs. on 25 February 1969 and 4,000 cfs. on 24 February 1998.

SECTION 3

CAWELO WATER DISTRICT

Management Programs

3.1 Monitoring Programs

The Cawelo Water District's groundwater monitoring programs as established by the 1994 Groundwater Management Plan Goals (Section 1.6) of (1.) monitoring groundwater levels semi-annually; (2.) preparing District maps semi-annually of Lines of Equal Elevation of Water in Wells and Lines of Equal Depth of Water in Wells; (3.) publishing an updated tabulation of the average depth to groundwater; (4) monitoring groundwater quality annually in lieu of 5-year intervals; (5.) preparing maps of the District's groundwater quality for electrical conductivity, boron and chloride content; (6.) acquisition and importation of available supplemental surface water; (7.) negotiate and execute Central Valley Project, Section 215 water service contracts with the Bureau of Reclamation for the purchase of surplus San Joaquin River water; (8.) operate and maintain the Poso Creek gauging station above State Highway 65, implement the appropriation of Poso Creek water and develop Poso Creek as a groundwater recharge facility; (9.) monitor well construction and abandonment; and (10.) facilitate conjunctive use operations by the importation and recharge or in-lieu use of supplemental water and the construction and operation of District wells, have all been implemented and the results thereof provided in various Sections of this Amended Groundwater Management Plan.

3.2 Monitoring Protocols

Monitoring protocols are interpreted to mean developing a monitoring program capable of tracking changes in conditions for the purpose of meeting the groundwater management plan objectives. Consistency should be reflected in factors such as location and reference elevation at sample points, sampling procedures, testing procedures, time of year and frequency of sample collection. Consequently, uniform data gathering procedures are required to provide the reliability of analyses. Specific protocols for water level and water quality monitoring are set forth below:

General protocols for the groundwater level-measurement program include:

- Perform all groundwater level measurements in as short a time period as possible.

- Perform the semi-annual groundwater measurements at the same time of the year each year.
- Document the measurement reference point for each well.
- Document the date and time of each measurement.
- Measure each well twice, or more if needed, until consistent results are obtained.
- If there is reason to suspect groundwater contamination, water level measuring equipment shall be decontaminated after the measurement.
- Landowners will be contacted for permission to access their property for field measurement of their well.

General protocols for the groundwater quality monitoring program include:

- Adequate well pumping time prior to sample collection with documentation of stabilized parameters.
- Proper sample containers, preservatives, and holding time.
- Secure chain-of-custody procedures.
- Testing shall be performed by an accredited, state-certified laboratory that uses proper quality control and quality assurance procedures.
- Samples shall be given a quality assurance code, which represents the relative confidence in the sample.
- Certain tests shall include spiked, duplicate and field-blank samples for comparison to genuine samples.
- Proper handling procedures (e.g. placing the containers in an ice chest immediately after collection).
- Documentation of all protocols and procedures that are used.
- Uniform time of year for sampling.
- Document the name, contact information, and qualifications of the individuals taking the sample.
- Landowners will be contacted for permission to access their property and sample the groundwater pumped from their well.

These protocols and new protocols may be adopted and implemented as required by the District.

3.3 Groundwater Monitoring

In 1980 approximately 55 wells within the District were selected for monitoring and mapping of groundwater levels on a semi-annual basis. The monitoring program was expanded in 1985 and currently groundwater levels are measured in approximately 250 wells semiannually. The data obtained in the spring (normally February) reflects the "seasonal high" water table as measurements are made prior to significant pumping. The data obtained in the fall (normally October), after a full season of agricultural irrigation pumping, indicates the "seasonal low" water levels.

3.3.1 Groundwater Levels

Average groundwater levels as recorded within the District for the period of 1980 through 2006 are shown in **Table 3-1, Cawelo Water District, Summary of Depth in Feet to Unconfined Static Groundwater, Spring, page 3-4**. A typical groundwater map of Cawelo Water District showing **Lines of Equal Depth of Water in Wells, Spring 2006 is provided as Plate 3-1, page 3-5**.

The District average groundwater level from year 1980 to year 1981 showed a decline of 7.1 feet. From the spring of 1981 to the spring of 1987 (six years), the District average groundwater level rose by 49.0 feet. The increase of groundwater level during that period is a reflection of surface flows in Poso Creek and groundwater underflow from the above-normal hydrologic conditions of water years 1978 through 1986. In-lieu groundwater recharge was augmented by the increased quantities of surface water which were available for delivery within the District during the years of 1984 through 1986. In the four-year period from the spring of 1987 to the spring of 1991, the District average groundwater level dropped 37.3 feet or 9.3 feet per year which reflected the "drought" conditions that prevailed during that period. As the availability of surface water from the Kern River and SWP increases or decreases, along with the effect of local hydrologic conditions, a similar but later response is reflected in the District average groundwater level.

3.3.2 Groundwater Yield

The CWD is underlain by deposits of the Kern River formation consisting of continental deposits of poorly bedded, loosely consolidated sands, gravels, silts and clays. Very deep deposits of old alluvium have been deposited by several small streams that flowed intermittently in a westerly direction from the Sierra Nevada foothills. These alluvial deposits consist of interlaced layers of material with varying permeability. More recent alluvium is found along Poso Creek which is the largest of the Sierra streams that traverses the CWD. The permeable alluvial deposits which underlie the District form an aquifer system which is naturally replenished by the flow of underground water originating from precipitation in the hills and mountains to the east of the District. The Kern River channel passes from east to west three to four miles south of the southerly boundary of the District. The groundwater basin beneath the District is hydraulically continuous with surrounding areas and flows of groundwater occur across the District boundary.

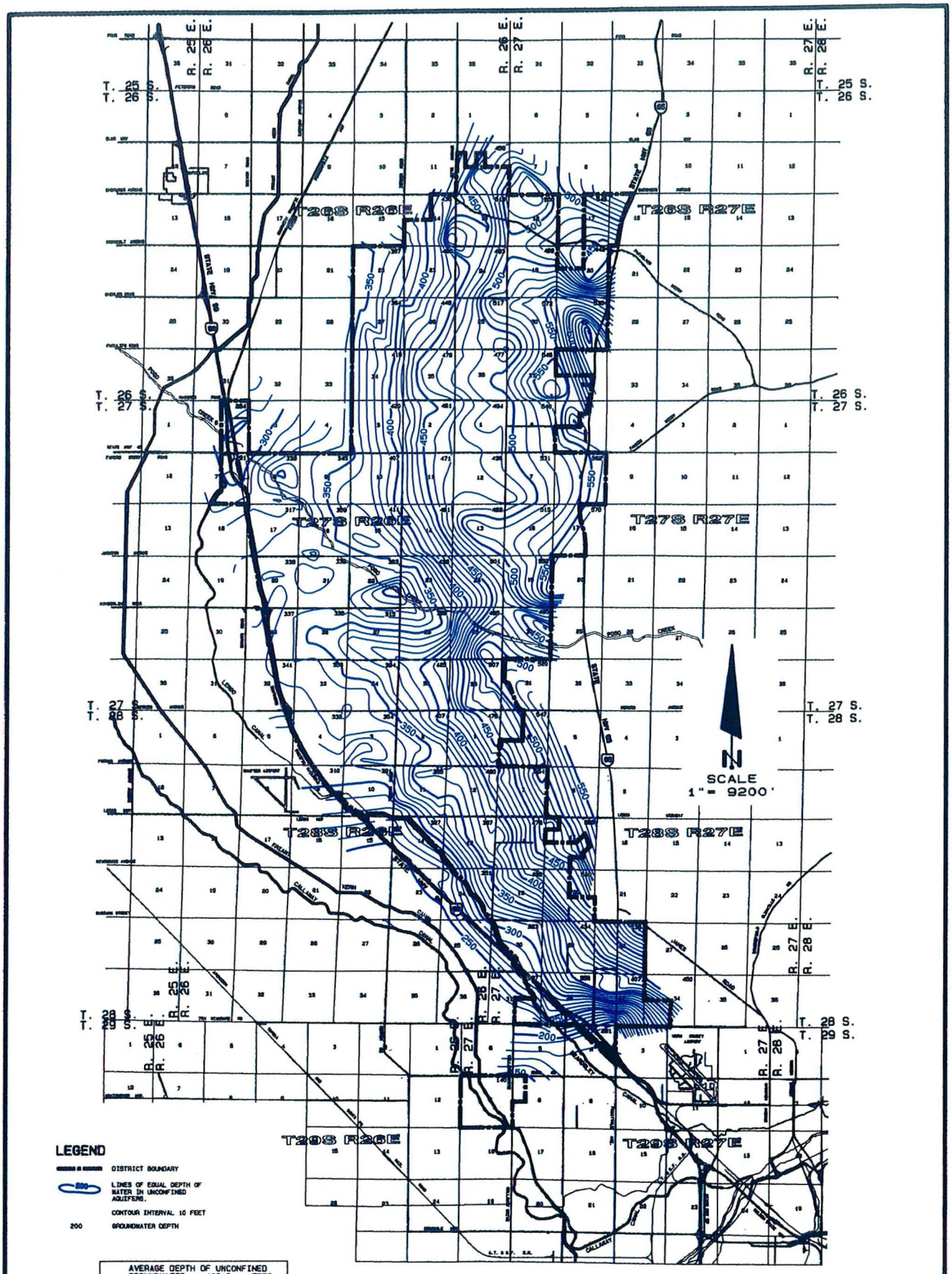
It can be concluded from maps of groundwater elevations that groundwater flows both into and out of the groundwater mass beneath the CWD. Generally larger flow enter the CWD groundwater basin from the Poso Creek and the Little Creek sub-areas along the eastern boundary of the District than the underground flow through the southern portion of the District from the Kern River fan. In nearly all years, except under drought conditions, more subsurface groundwater flow enters than leaves the District, however, the pumping of groundwater within the District some years exceeds the net groundwater inflow and the basin is in overdraft that year.

TABLE 3-1

CAWELO WATER DISTRICT
SUMMARY OF DEPTH IN FEET TO UNCONFINED STATIC GROUNDWATER

SPRING

YEAR	DISTRICT			NORTH OF POSO CREEK			SOUTH OF POSO CREEK		
	DEEPEST	SHALLOWEST	AVERAGE	DEEPEST	SHALLOWEST	AVERAGE	DEEPEST	SHALLOWEST	AVERAGE
1980	565	168	452.3	565	312	494.7	548	168	401.6
1981	691	171	459.4	691	251	510.7	553	171	398.6
1982	688	171	456.0	688	292	506.1	571	171	396.2
1983	719	155	447.1	719	271	497.8	561	155	386.5
1984	575	169	431.2	575	250	473.6	573	169	380.6
1985	579	149	422.1	579	246	466.6	543	149	368.9
1986	580	149	423.2	580	250	473.4	538	149	363.3
1987	588	130	410.4	588	234	459.5	518	130	351.7
1988	585	130	412.6	585	232	461.8	533	130	353.8
1989	622	133	421.3	622	272	469.4	517	133	363.8
1990	665	156	429.7	665	273	472.3	517	156	379.1
1991	627	150	447.7	627	304	489.7	581	150	397.9
1992	583	148	444.5	575	296	480.6	583	148	401.7
1993	591	143	446.9	573	300	482.7	591	143	404.4
1994	576	170	441.0	575	294	474.4	576	170	401.3
1995	606	146	448.3	579	292	483.0	606	146	407.0
1996	550	200	432.1	550	293	466.5	500	200	390.2
1997	585	150	430.1	585	282	464.2	540	150	388.7
1998	560	200	427.2	560	272	463.1	520	200	383.5
1999	570	176	425.1	570	272	461.5	500	176	380.8
2000	603	143	419.0	603	248	458.2	541	143	371.4
2001	675	143	424.0	675	267	468.2	490	143	370.3
2002	585	133	428.4	585	289	463.1	547	133	386.2
2003	571	131	435.0	574	284	469.9	554	131	392.9
2004	575	134	430.9	575	282	466	553	134	388.5
2005	666	138	442.4	666	307	480.68	560	138	396.15
2006	572	140	428.3	572	284	462.5	556	140	389.7



R. L. SCHAFER AND ASSOCIATES 2904 West Main Street Visalia, California 93291 209-734-1348	CAWELO WATER DISTRICT 17207 INDUSTRIAL FARM ROAD BAKERSFIELD, CALIFORNIA - 93308 661-393-6070	LINES OF EQUAL DEPTH OF WATER IN WELLS SPRING 2006	PLATE 3-1

DATE	REVISION	DATE	REVISION

Cawelo Water District maintains a tabulation of the annual water demand and imported water supply for calculation of the net groundwater pumped and determination of the subsurface groundwater inflow or net yield of the groundwater basin, which is based upon the annual change in the average depth to groundwater within the District, as set forth in **Table 3-2, Cawelo Water District, Annual Water Demand and Supply Inventory, 1980-2006, Page 3-7.**

3.3.3 Groundwater in Storage

It is known that saline water occurs beneath much of the San Joaquin Valley below the fresh water. Geological Survey Professional Paper 437-B, "Land Subsidence due to Ground-Water Withdrawal, Tulare-Wasco Area, California", shows the base of the fresh water to be at about 1,000 feet below mean sea level near the Kern-Tulare County line approximately seven miles to the north of the District boundary (Figure 5, page B11). That depth is approximately 1,400 to 1,600 feet beneath the Cawelo Water District. The District has drilled six water wells with depths between 1,200 and 1,400 feet. It is known that there is fresh water to at least these depths. The average depth to static ground-water in the District as of the Spring of 2006 was 428.3 feet (**Table 3-1, page 3-4**).

U.S.G.S. Open File Report 85-345, "Groundwater Flow in the Central Valley, California", lists specific yield of 9.4% for the North Kern area near the basin (Table 7, page 141). Specific yields for the White-Poso Storage Unit were estimated in Geological Survey Water Supply Paper 1618, "Use of Ground-Water Reservoirs for Storage of Surface Water in the San Joaquin Valley, California" (Table 1, page 21), as follow:

Depth in Feet	Specific Yield
10-50	9.5%
50-100	8.6%
100-200	9.1%
All zones	9.1%

Specific yield is defined as the amount of water which will drain freely from an aquifer expressed as a percentage of the total volume. It is frequently taken as equivalent to the storage coefficient which is identified as the amount of water which can be stored in an aquifer. An average storage coefficient equal to the average specific yield of 9.1% was selected for the CWD. From construction of deep wells by CWD, it is known that useable groundwater to a depth of 1,400 feet is available for pumping. The current area of the District is about 45,000 acres as shown in **Table 2-1, page 2-17**. Thus, the volume of groundwater is storage below the CWD between the average depth of 428.3 feet to groundwater, Spring 2006, and the 1,400 feet groundwater level is approximately 3,979,110 acre feet.

TABLE 3-2

CAWELO WATER DISTRICT
ANNUAL WATER DEMAND AND SUPPLY INVENTORY
1979-2006

Year	Irrigated Area	Residential and Commercial Area	Irrigation Demand	Other Demand	Surface Water	Pumped Groundwater	Poso Creek Discharge	Net Groundwater Removed	Depth to Groundwater	Change in Depth to Groundwater	Change in Groundwater Storage	Subsurface Inflow Net Yield
	acres	acres	acre-feet	acre-feet	acre-feet	acre-feet	acre-feet	feet	feet	feet	acre-feet	acre-feet
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1979	37,586	877		2631			1425					
1980	38,596	938	116,790	2814	58,287	61,317	1,211	42,226	452.3	-7.1	-29,049	13,177
1981	38,582	1,036	113,748	3108	67,194	49,662	0	32,134	459.4	3.4	13,911	46,044
1982	38,047	1,041	114,219	3123	58,985	58,357	96	40,665	456.0	8.9	36,413	77,078
1983	36,941	1,070	107,795	3210	50,693	60,312	21	43,641	447.1	15.9	65,053	108,694
1984	37,589	1,108	111,943	3324	76,753	38,514	5	21,219	431.2	9.1	37,231	58,451
1985	37,102	1,042	111,910	3126	75,344	39,692	24	22,414	422.1	-1.1	-4,500	17,913
1986	36,578	1,045	109,897	3135	76,027	37,005	13	20,038	423.2	12.8	52,369	72,407
1987	34,932	1,050	105,701	3150	79,458	29,393	1	13,064	410.4	-2.2	-9,001	4,063
1988	35,370	1,069	107,797	3207	76,020	34,984	0	18,333	412.6	-8.7	-35,595	-17,261
1989	35,416	1,089	106,330	3267	82,518	27,079	0	10,639	421.3	-8.4	-34,367	-23,728
1990	34,578	1,089	105,118	3267	64,012	44,373	0	28,115	429.7	-18.0	-73,644	-45,529
1991	35,548	1,098	107,533	3294	53,562	57,265	0	40,641	447.7	3.2	13,092	53,733
1992	35,045	1,116	105,902	3348	57,915	51,335	0	34,948	444.5	-2.4	-9,819	25,128
1993	35,057	1,253	105,526	3759	73,500	35,785	0	19,392	446.9	5.9	24,139	43,531
1994	34,673	1,266	104,668	3798	69,075	39,391	0	23,121	441.0	-7.3	-29,867	-6,746
1995	35,166	1,232	105,217	3696	71,511	37,402	0	21,065	448.3	16.2	66,280	87,345
1996	36,100	1,295	107,094	3885	80,905	30,074	3,999	9,628	432.1	2.0	8,183	17,811
1997	35,614	1,284	107,027	3852	85,016	25,863	5,854	3,670	430.1	2.9	11,865	15,535
1998	36,329	1,229	109,244	3687	68,946	43,985	10,486	17,084	427.2	2.1	8,592	25,676
1999	35,396	1,274	107,704	3822	82,880	28,646	3,314	8,769	425.1	6.1	24,957	33,726
2000	35,172	1,318	106,697	3954	85,545	25,106	3,077	5,585	419.0	-5.0	-20,457	-14,872
2001	35,547	1,436	107,621	4308	76,480	35,449	3,171	15,647	424.0	-4.4	-18,002	-2,355
2002	33,698	1,673	102,177	5019	79,993	27,203	3,039	8,237	428.4	-6.6	-27,003	-18,766
2003	33,415	1,758	100,570	5274	80,669	25,175	3,246	6,215	435.0	4.1	16,775	22,989
2004	33,691	1,755	101,604	5265	78,730	28,139	5,503	6,881	430.9	-11.4	-46,642	-39,761
2005	34,049	1,812	102,346	5436	81,047	26,735	6,434	4,455	442.3	14.0	57,279	61,734
2006	34,692	2,369	103,930	7107	79,399	31,638	8,498	6,909	428.3			
Total	1,000,509	35,622	2,896,108	106,866	1,970,464	1,029,879	59,417	524,735	11,716	24	98,193	616,018
Average	35,732	1,272	107,263	3,817	72,980	38,144	2,122	19,435	434	1	3,777	23,693

Notes:

Column:

(1) Calendar Year.
(2) From District crop survey.
(3) Includes residential, commercial, feed lot, golf course and detention facility.
(4) Irrigation water requirement calculated from crop pattern.
(5) Estimated groundwater pumping for domestic, commercial and other uses.
(6) Water deliveries to landowners within the CWD service area.
(7) Pumped groundwater is equal to the total of irrigation and other water requirements minus surface water deliveries.
(8) Discharge to Poso Creek for groundwater recharge; losses of 5% are assumed.
(9) Net groundwater removed, calculated as pumped groundwater minus 15% of the irrigation and other demand (assumed to percolate to the groundwater basin) minus 95% of the water discharged into Poso Creek
(10) Average Spring depth to static unconfined groundwater in CWD.
(11) Change in average groundwater level from Spring of the current year to Spring of the following year.
(12) Calculated change in groundwater storage using a specific yield of 9.1% for the District area of 44,960 acres.
(13) Net groundwater yield calculated as net groundwater removed plus the change in groundwater storage.

3.3.4 Groundwater Quality

Groundwater Quality Analyses 1980-1993

From time to time, during the period 1980 through 1993, the District obtained groundwater samples, and had such samples analyzed by a commercial laboratory, for determination of the quality of the groundwater being pumped from wells within the District. The results of those samplings show that wells in certain areas of the District contained levels of total dissolved solids and chlorides above the limits normally desired for the irrigation of salt sensitive crops.

A summary of the principal constituents of groundwater sampled from 1980 through 1993 is set forth in **Table 3-3, Cawelo Water District, Groundwater Quality, 1980-1993**:

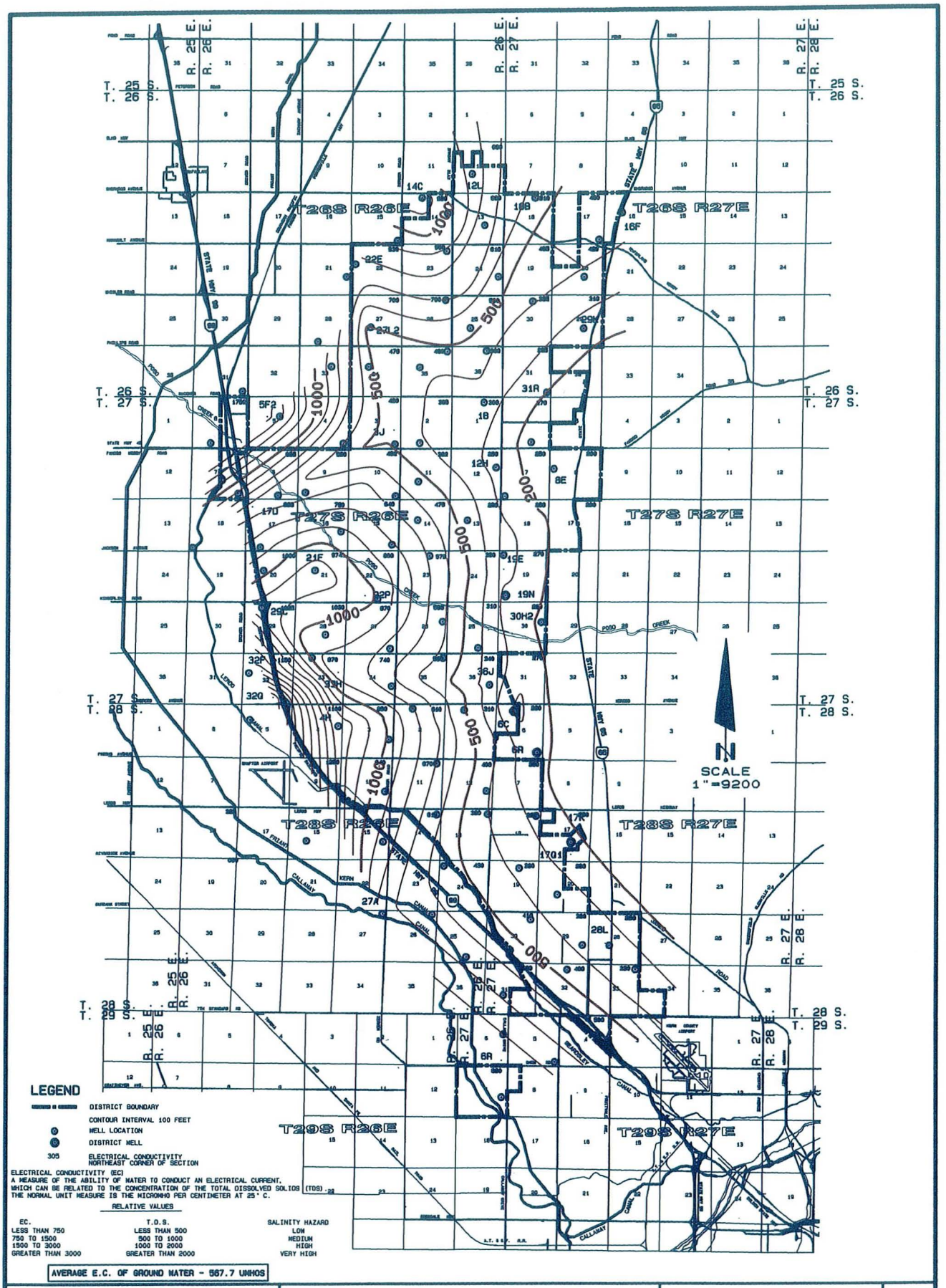
TABLE 3-3

CAWELO WATER DISTRICT
GROUNDWATER QUALITY
1980 - 1993

Constituent	Unit	Limit	Range[3]	Median[3]
Salinity (EC)	µmhos/cm	700[1]	35-3400	611
Chloride (Cl)	ppm	140[1]	2.8-496	88.5
Nitrate (NO3)	ppm	30[2]	0-177	14.1
Boron (B)	ppm	0.7[1]	0-0.8	0.09
Total Dissolved Solids (TDS)	ppm	450[1]	33-2320	403

(1) Desirable limit for irrigation of crops.
(2) Drinking water desirable limit.
(3) Based on 133 samples from 92 wells, 1980 through 1993.

Of the wells sampled, 19 contained water with EC exceeding 1,000 µmhos/cm. and 17 contained water exceeding 200 ppm chloride. Several of those wells have been abandoned and sealed and only small quantities of water are pumped from other wells with poorer water quality. Greater availability of better quality surface water has discouraged the use of wells which produce water of poor quality.



R. L. SCHAFER AND ASSOCIATES
2904 West Main Street Visalia, California 93291
209-734-1348

Drawn BY	da	DATE	1/2007	SCALE	As Shown	CHECKED BY	RLS
DATE	REVISION			DATE	REVISION		

CAWELO WATER DISTRICT

17207 INDUSTRIAL FARM ROAD
BAKERSFIELD, CALIFORNIA - 93308
661-393-6070

LINES OF EQUAL ELECTRICAL CONDUCTIVITY 2006

PLATE 3-2

3.4 Surface Water Monitoring

3.4.1 Surface Water Sources

A description of the sources of imported surface water of the Cawelo Water District are set forth as follows:

Kern County Water Agency/State Water Project Water

The principal contractual source of imported surface water of Cawelo Water District is the firm entitlement of 38,200 acre-feet and the surplus water entitlement of 6,800 acre-feet from the State Water Project. Cawelo Water District contracted with the Kern County Water Agency for the purchase of State Water Project water 28 September 1972, simultaneously with the execution of the construction and operation agreements for the Cross Valley Canal. The contract became effective as of the date of execution and remains in effect throughout the term of the Kern County Water Agency master contract of 2039.

The District receives the delivery of State Water Project water at the state aqueduct, transports the water through the Cross Valley Canal and extension to the District's Pump Station A for discharge to the Beardsley Canal. The State Water Project water is wheeled through the Beardsley and Lerdo Canals under an agreement with the North Kern Water Storage District to the Cawelo Water District's Pump Station B, pumped to Reservoir B and delivered to the users through the District's distribution system.

City of Bakersfield/Kern River Water

Cawelo Water District entered a contract with the City of Bakersfield on 25 May 1976 for the purchase of Kern River water. Under the terms of the contract, which became effective on 01 January 1977, the City sells Kern River water to the District at an cumulative average annual quantity of 27,000 acre-feet for 35 years, with a provision for an extension of the contract on a year to year basis to provide time for the delivery of the cumulative total, if required. Additional quantities of water may be purchased by the District under the contract depending on the availability of Kern River water.

The contract's basic delivery schedule calls for 2,700 acre-feet per month to be delivered during the months of March and April, and 5,400 acre-feet per month during the months of May through August. Deficiencies are allowed in years of below normal hydrologic conditions, with additional deliveries during years of above normal hydrologic conditions on the Kern River. Deficiency deliveries may be made at a maximum rate of 3,200 acre-feet per month in March and April, and 6,400 acre-feet per month during May through August. The contract also provides for the sale and delivery of miscellaneous water to the District as available, from time to time, in addition to the contract commitments.

The District pays $540,000 per year, or $20 per acre-foot, for the contract basic quantity of water in quarterly payments of $135,000, the payments are made irrespective of the delivery actually achieved. If additional water is purchased, the price is determined by mutual agreement; the price of miscellaneous water has ranged from $8 to $22 per acre-foot.

Oilfield Produced Water

- ChevronTexaco Water

  The Agreement with ChevronTexaco, now Chevron USA Inc. (Chevron), provides for the delivery of up to 64 acre-feet per day, and a maximum of 23,400 acre-feet annually. The agreement commenced 19 August 1994 with a term of 15 years subsequent to the date of first delivery of produced water to Cawelo Water District. The agreement provides for multiple 5 years extensions beyond the initial term of 15 years.

  A revised "Agreement for the Delivery of Oilfield Produced Water" between Chevron and Cawelo Water District, dated 19 September 2006, provides Chevron the right but not the obligation to delivery 29,405 acre-feet per year to Cawelo.

  The oilfield produced water is pumped by Chevron to the District's Reservoir "B" through an eight-mile 30-inch pipeline, constructed by the District in 1995. The oilfield produced water is blended with other waters of the District and delivered to the users through the distribution system.

  The District and Chevron prepare and transmit an annual report to the Central Valley Regional Water Quality Control Board (CVRWQCB) entitled Produced Water Reclamation Project, Kern County, Monitoring and Reporting Program, in conformance with NPDES Permit No. CA 0082295.

  The record of direct delivery of oilfield produced water from ChevronTexaco which began in 1996, and averaged 18,980 acre-feet annually during the 10-year period, 1997 through 2006, is provided in **Table 3-5, Cawelo Water District, Surface Water Supply Summary, page 3-14.**

- Valley Waste Disposal Company Water

  The Agreement with Valley Waste Disposal Company commenced 27 May 1980 for the delivery of 3.22 acre-feet (25,000 barrels) per day of oilfield produced water through a 3.4-mile 20-inch pipeline from the Kern Front No. 2 Oil Production Water Facility to Cawelo Water District's Reservoir "B" in conformance with the Central Valley Regional Water Quality Control Board's (CVRWQCB) waste discharge requirements (NPDES Permit No. CA 0081311). The permit limited the daily maximum discharge to 4.5 mgd. The term of the agreement with the District was extended on 14 March 2000 to 31 December 2014.

The record of annual delivery of oilfield produced water from Valley Waste Disposal Company, which began in 1981 and averaged 1323 acre-feet annually for the 26-year period, is provided in **Table 3-5, Cawelo Water District, Surface Water Supply Summary, page 3-14.**

- Schaefer Oil Company Water

Schaefer Oil Company was issued Waste Discharge Requirements for the Mount Poso Oil Field, Kern County, Order No. 93-125, (NPDES Permit No. CA 0078859) on 05 August 1993. The permit was reissued as Order No. 98-035 on 27 February 1998. The permit limited the daily maximum discharge to 2.16 mgd. The oilfield produced water may be discharged to several unlined reservoirs within the oilfield, to Little Creek and to CWD's Reservoir "C".

Schaefer Oil Company renewed the Agreement with Cawelo Water District on 15 May 2003 for the discharge of approximately 3.3 acre-feet per day in Reservoir "C" in conformance with the NPDES Permit No. CA 0078859, Order No. 93-125 and renewals thereof.

The record of annual delivery of oilfield produced water from Schaefer Oil Company, which began in 1992 and averaged 1155 acre-feet annually during the 15 year period 1994 through 2006, is provided in **Cawelo Water District, Surface Water Supply Summary, Table 3-5, page 3-14.**

Central Valley Project Water

The U. S. Bureau of Reclamation generally provides an annual "Contract for Temporary Water Service Between the United State and Cawelo Water District" for the sale and purchase of Section 215, unstorable and unmanaged flood flows of short duration, Central Valley Project (CVP) water.

The availability of CVP Section 215 water depends on the hydrologic conditions of the San Joaquin River.

The CVP Section 215 water is delivered from the Friant-Kern Canal, through the Cross Valley Canal Extension, the District's Pump Station "A", the Beardsley and Lerdo Canals and Pump Station B, to Reservoir "B" and the District's distribution system.

TABLE 3-5

CAWELO WATER DISTRICT
SURFACE WATER SUPPLY SUMMARY
in Acre-Feet

Year	State Project Water	Kern River Water	Misc./ Other Water	NKWSD Exchange Water	Various Exchanges	Poso Creek Water	Oilfield-Produced Water: District Wells	Oilfield-Produced Water: Landowner Well	Oilfield-Produced Water: Chevron/ Texaco	Oilfield-Produced Water: Valley Waste	Oilfield-Produced Water: Schaefer	K-TWD Water	TOTAL
1980	20,000	42,060	0	0	0	0	0	0	0			1,569	**63,629**
1981	46,645	29,826	1,000	-10,484	0	184	0	0	1,277	1,200		1,929	**71,577**
1982	23,169	31,191	2,715	0	0	439	0	0	1,522	1,519		4,318	**64,873**
1983	10,000	29,187	4	12,071	0	2,498	0	0	0	1,074		1,036	**55,870**
1984	29,795	38,084	2,510	0	0	2,135	0	0	3,445	1,128		1,904	**79,001**
1985	29,000	38,936	540	991	0	1,773	0	0	3,909	1,349		1,011	**77,509**
1986	33,790	34,492	1,203	2,127	0	1,542	0	0	4,025	853		643	**78,675**
1987	52,160	28,218	6,716	-9,955	0	753	0	0	3,128	778		0	**81,798**
1988	41,678	14,731	15,449	-45	0	0	0	0	3,080	769		0	**75,662**
1989	52,658	23,942	7,539	919	0	0	0	0	0	798		0	**85,856**
1990	28,306	18,689	13,010	1,212	0	0	0	0	3,031	939		0	**65,187**
1991	2,111	25,820	11,927	0	5,448	0	5,759	3,044	0	1,195		0	**55,304**
1992	17,064	15,389	22,779	749	-7,179	0	8,024	4,590	0	422	422	0	**62,260**
1993	34,000	37,482	3,962	0	0	0	2,093	0	0	981	998	0	**79,516**
1994	20,173	25,251	8,149	0	4,438	0	13,703	0	0	1,113	1,124	0	**73,951**
1995	38,200	32,000	5,706	74	1,297	0	2,706	0	0	827	1,054	0	**81,864**
1996	38,200	32,000	8,125	0	0	0	2,472	0	10,994	1,286	1,036	0	**94,113**
1997	38,200	32,903	3,221	0	0	0	2,414	0	17,558	1,630	1,131	0	**97,057**
1998	29,221	31,801	643	0	0	0	1,055	0	17,437	1,516	1,108	0	**82,781**
1999	15,328	30,717	819	-986	24,309	0	2,122	0	19,232	1,061	1,298	0	**93,900**
2000	34,805	27,242	201	305	0	0	6,870	76	22,265	1,151	1,163	0	**94,078**
2001	16,629	16,389	14,811	544	0	0	9,802	3,256	21,654	927	1,177	0	**85,189**
2002	35,641	12,821	5,440	0	1,843	0	8,787	1,478	19,988	585	1,274	0	**87,857**
2003	32,622	27,788	738	897	5,856	0	5,231	194	17,910	1,065	1,457	0	**93,758**
2004	20,477	17,664	0	370	15,303	0	10,051	1,152	20,181	2,853	1,441	0	**89,492**
2005	27,000	32,000	6,857	2,630	472	0	2,432	228	17,096	3,812	1,293	0	**93,820**
2006	33,230	32,200	0	0	10,001	0	4,202	92	16,480	3,577	1,354	0	**101,136**
TOTAL	800,102	758,823	144,064	1,419	61,788	9,324	87,723	14,110	224,212	34,408	17,330	12,410	**2,165,713**
AVG	29,633	28,105	5,336	53	2,288	345	3,249	523	8,304	1,323	1,155	460	78,386
10-YEAR AVG.	28,315	26,153	3,273	376	5,778	0	5,297	648	18,980	1,818	1,270	0	91,907

(1) Includes Mis. Kern River, Oilfield and banked water from City of Bakersfield, KCWA wells, Bureau of Reclamation CVP water; BVWSD, NKWSD, & Brenda Mesa WSD water; George Nickel and Pool A and Pool B water.

3.4.2 Surface Water Quality

Kern County Water Agency/State Water Project Water

The State Water Project water for Cawelo Water District is transported through the Cross Valley Canal and the extension, through Pump Station "A" and discharged into the Beardsley Canal for further conveyance through the Lerdo Canal to Pump Station "B" and the District's distribution system. The District may also exchange a portion of its SWP entitlement with Buena Vista Water Storage District (BVWSD) for Kern River water, as BVWSD is located near the California Aqueduct and has Kern River water rights.

The quality of the water conveyed through Pump Station "A", principally SWP water, but may include Central Valley Project water and groundwater obtained from the Kern River fan through the City of Bakersfield, has been sampled, and analyzed by a commercial laboratory since 1980. A summary of the quality of water discharged through Pump Station "A" for the period 1993 through 2006 is set forth in **Table 3-6, Cawelo Water District, Pump Station "A", Water Quality, 1993-2006 :**

TABLE 3-6

CAWELO WATER DISTRICT
PUMP STATION "A"
WATER QUALITY
1993 - 2006

Constituent	Unit	Limit[1]	Range[3]	Median[3]
Salinity (EC)	µmhos/cm	700[1]	53 - 614	308.5
Chloride (Cl)	ppm	140[1]	2.4 - 135	39.3
Nitrate (NO3)	ppm	30[2]	0.0 - 10.2	0.0
Boron (B)	ppm	0.7	.00 - .24	0.13
Total Dissolved Solids (TDS)	ppm	450[1]	25.8 - 337.4	173.1
Sodium (Na)	ppm	70[1]	5.3 - 92.0	32.9
pH		6.5-8.3[1]	6.4 - 10.0	7.2

(1) Desirable limit for irrigation of crops.
(2) Drinking water desirable limit.
(3) Compilation of 38 samples randomly selected from the discharge of Pump Station "A" and Conduit "A" into the Beardsley Canal . The Water Quality Analysis Reports from BC Laboratories, Inc. and Oilwell Research Inc., Bakersfield, CA, are available upon request.

City of Bakersfield/Kern River Water

The water purchased from the City of Bakersfield is diverted from the Kern River into the Beardsley Canal and transported through the Beardsley and Lerdo Canals, under agreement with the North Kern Water Storage District, to the District's Pump Station "B".

The quality of Kern River water as sampled in the Beardsley Canal has been summarized in **Table 3-7, Cawelo Water District, Kern River Water Quality, 1993-2006:**

TABLE 3-7
CAWELO WATER DISTRICT
KERN RIVER WATER QUALITY
1993 - 2006

Constituent	Unit	Limit	Range[3]	Median[3]
Salinity (EC)	µmhos/cm	700[1]	61.0-211.7	130.0
Chloride (Cl)	ppm	140[1]	2.3-27.2	7.5
Nitrate (NO3)	ppm	30[2]	0.0-1.8	0.0
Boron (B)	ppm	0.7[1]	0.0-0.3	0.1
Total Dissolved Solids (TDS)	ppm	450[1]	37.5-146.0	73.9
Sodium (Na)	ppm	70[1]	4.3-25.7	12.6
pH		6.5-8.3[1]	6.1-7.9	7.0

(1) Desirable limit for irrigation of crops.
(2) Drinking water desirable limit.
(3) Compilation of 31 samples randomly selected from Kern River diversions at the head of the Beardsley Canal. The Water Quality Analysis Reports from BC Laboratories, Inc. and Oilwell Research Inc., Bakersfield, CA, are available upon request.

Pump Station "B" Water

The Cawelo Water District's Pump Station "B" is situated adjacent to the Lerdo Canal of North Kern Water Storage District. All imported water, other than oilfield produced water, of the District is delivered through the Lerdo Canal, Pump Station "B", Conduit "B" and Reservoir "B" for conveyance through the canal and pipeline distribution system for irrigation in the service area of the District.

A summary of the quality of water discharged through Pump Station "B" for the period 1993 through 2006 has been provided in **Table 3-8, Cawelo Water District, Pump Station "B", Water Quality, 1993-2006:**

TABLE 3-8
CAWELO WATER DISTRICT
PUMP STATION "B"
WATER QUALITY
1993 - 2006

Constituent	Unit	Limit	Range[3]	Median[3]
Salinity (EC)	µmhos/cm	700[1]	65.0 - 504.3	182.6
Chloride (Cl)	ppm	140[1]	2.0 - 81.9	12.8
Nitrate (NO3)	ppm	30[2]	0.0 - 22.0	0.0
Boron (B)	ppm	0.7[1]	0.00 - .3	0.1
Total Dissolved Solids (TDS)	ppm	450[1]	38.5 - 256.9	98.4
Sodium (Na)	ppm	70[1]	4.6 - 58.3	18.8
pH		6.5-8.3[1]	6.1 - 8.2	7.0

(1) Desirable limit for irrigation of crops.
(2) Drinking water desirable limit.
(3) Compilation of 50 samples randomly selected from the discharge of Pump Station "B" and Conduit "B" in Reservoir "B". The Water Quality Analysis Reports from BC Laboratories, Inc. and Oilwell Research Inc., Bakersfield, CA, are available upon request.

Oilfield Produced Water

- Chevron

A summary of the quality of the TEPI-BPD/ChevronTexaco, now Chevron USA Inc., oilfield produced water discharged in CWD's Reservoir "B" for the period 1996 through 2006 is provided in **Table 3-9, Cawelo Water District, Chevron, Water Quality, 1996-2006:**

TABLE 3-9
CAWELO WATER DISTRICT
CHEVRON
WATER QUALITY
1996 -2006

Constituent	Unit	Limit	Range[4]	Median[4]
Salinity (EC)	µmhos/cm	1200[1]	730.0-1193.0	921.4
Chloride (Cl)	ppm	200[1]	33.5-188.3	138.9
Nitrate (NO3)	ppm	30[2]	0.0-1.9	0.0
Boron (B)	ppm	1.6[1]	0.70-1.20	1.0
Total Dissolved Solids (TDS)	ppm	450[3]	278.3-690.0	484.4
Sodium (Na)	ppm	70[3]	116.3-200.0	161.0
pH		6.5-8.3[1]	5.9-8.0	6.5

(1) CRWQCB NPDES Permit No. 0082295 daily maximum limit.
(2) Drinking water desirable limit.
(3) Desirable limit for irrigation of crops.
(4) Compilation of 48 samples randomly selected from the ChevronTexaco discharge in Reservoir "B". The Water Quality Analysis Reports from BC Laboratories, Inc. and Oilwell Research Inc., Bakersfield, CA, are available upon request.

- Valley Waste Disposal Company

A summary of the quality of the Valley Waste Disposal Company oilfield produced water discharged in CWD's Reservoir "B" for the period 1993 through 2006 is set forth in **Table 3-10, Cawelo Water District, Valley Waste Disposal Company, Water Quality, 1993-2006:**

TABLE 3-10

CAWELO WATER DISTRICT
VALLEY WASTE DISPOSAL COMPANY
WATER QUALITY
1993 - 2006

Constituent	Unit	Limit	Range[4]	Median[4]
Salinity (EC)	µmhos/cm	1200[1]	754-1226	1008.0
Chloride (Cl)	ppm	100[1]	52.1 - 101.8	66.4
Nitrate (NO3)	ppm	30[2]	0.0 - 3.8	0.0
Boron (B)	ppm	1.2[1]	0.5 - 1.2	0.8
Total Dissolved Solids (TDS)	ppm	450[3]	374.1-753.6	577.6
Sodium (Na)	ppm	70[3]	162 - 281	228.0
pH		6.5-8.3[3]	6.5 - 11.4	7.8

(1) CRWQCB NPDES Permit No. CA 0081311 daily maximum limit.
(2) Drinking water desirable limit.
(3) Desirable limit for irrigation of crops.
(4) Compilation of 51 samples randomly selected from the Valley Waste Disposal discharge in Reservoir "B". The Water Quality Analysis Reports from BC Laboratories, Inc. and Oilwell Research Inc., Bakersfield, CA, are available upon request.

- Schaefer Oil Company

A summary of the quality of the Schaefer Oil Company oilfield produced water discharged in CWDs Reservoir "C" for the period 1993 through 2006 is set forth in **Table 3-11, Cawelo Water District, Schaefer Oil Company, Water Quality, 1993-2006:**

TABLE 3-11

CAWELO WATER DISTRICT
SCHAEFER OIL COMPANY
WATER QUALITY
1993 - 2006

Constituent	Unit	Limit	Range[4]	Median[4]
Salinity (EC)	µmhos/cm	1000[1]	568.3-1084	938.0
Chloride (Cl)	ppm	175[1]	70.8 - 220.9	108.7
Nitrate (NO3)	ppm	30[2]	0.0 - 24.0	0.0
Boron (B)	ppm	1.0[1]	0.00 - 0.9	0 .7
Total Dissolved Solids (TDS)	ppm	450[3]	353.8-678.3	554.0
Sodium (Na)	ppm	70[3]	108 - 219	178.0
pH		6.0-9.0[1]	6.5 - 8.0	7.0

(1) CRWQCB NPDES Permit No. CA0078859 daily maximum limit.
(2) Drinking water desirable limit.
(3) Desirable limit for irrigation of crops.
(4) Compilation of 41 samples randomly selected from the Schafer Oil Company discharge in Reservoir "C". The Water Quality Analysis Reports from BC Laboratories, Inc. and Oilwell Research Inc., Bakersfield, CA, are available upon request.

- Receiving Water - Canal Check No. 1

A summary of the quality of the Receiving Water, Canal Check No. 1 for the period 1993 through 2006 is set forth in **Table 3-12, Cawelo Water District, Receiving Water - Canal Check No. 1, Water Quality, 1993-2006:**

TABLE 3-12

CAWELO WATER DISTRICT
RECEIVING WATER - CANAL CHECK NO. 1
WATER QUALITY
1993 - 2006

Constituent	Unit	Limit	Range[4]	Median[4]
Salinity (EC)	µmhos/cm	700[1]	115.0-987.0	444.0
Chloride (Cl)	ppm	106[1]	7.0-169.9	53.7
Nitrate (NO3)	ppm	30[2]	0.0-3.4	0.0
Boron (B)	ppm	0.50[1]	0.1-1.1	0.4
Total Dissolved Solids (TDS)	ppm	450[3]	74.0-552.0	251.8
Sodium (Na)	ppm	70[3]	16.5-188.0	72.1
pH		6.5-8.3[1]	6.1-8.5	6.8

(1) CRWQCB NPDES Permit No. CA0082295 daily maximum limit with flow of 50 mgd (77.36 cfs.).
(2) Drinking water desirable limit.
(3) Desirable limit for irrigation of crops.
(4) Compilation of 44 samples randomly selected from the Canal Check No. 1. The Water Quality Analysis Reports from BC Laboratories, Inc. and Oilwell Research Inc., Bakersfield, CA, are available upon request.

3.5 Inelastic Land Surface Subsidence Monitoring

Inelastic land surface subsidence in the San Joaquin Valley probably represents history's greatest single man-made alteration in the earth surface, and has caused serious and costly problems in the maintenance of waterways, highways and deep water wells. The San Joaquin Valley is a broad alluviated structural trough consisting of the southern two-thirds of the Central Valley of California, it is 250 miles long, averages 40 miles in width and encompasses 10,000 square miles, excluding the rolling foothills that skirt the valley. The primary causes of subsidence in the San Joaquin Valley are aquifer-system compaction due to water level decline and near-surface hydro-compaction. Hydro compaction is the process of volume decrease and density increase that occurs when moisture-deficient deposits compacts as they are wetted for the first time. The vertical downward of the land surface that results from this process has been called shallow subsidence or near subsidence.

The principal subsiding area in the San Joaquin Valley is underlaid by a continuous and extensive confining bed. Most of the pumping overdraft and compaction due to head decline occurs in the confined aquifer system beneath the confining bed.

The United States Geological Survey has performed extensive studies and written numerous reports on land subsidence in the San Joaquin Valley, such as Geological Survey Professional Paper 437-B, Land Subsidence Due to Groundwater Withdrawl, Tulare-Wasco Area, California; Geological Survey Professional Paper 437-H, Land Subsidence in the San Joaquin Valley, California as of 1972; and Open File Report 82-370, Land Subsidence in the San Joaquin Valley, California as of 1980.

Figure 5 from Geological Survey Professional Paper 437-H shows the magnitude and extent of subsidence exceeding 1-foot in the San Joaquin Valley from 1926 to 1970. The most prominent subsidence area occurred along a narrow trough West of Fresno that extends 90 miles from Los Banos to Kettleman City with maximum subsidence by 1969 of 28 feet. The subsidence center between Tulare and Wasco identified a 12 foot depression which occurred by 1954. The most westerly portion fo the Cawelo Water District falls within the land subsidence identified in Figure 5.

A continuation of the monitoring of the inelastic land surface subsidence through the use of reports developed by others along with the development of a network of public agencies for further determination of land subsidence that was discontinued by the United States Geological Survey in 1980 will be an objective of the Cawelo Water District Groundwater Management Plan.

3.6 Existing Groundwater Management Programs

3.6.1 District Distribution System

The Cawelo Water District distribution system is composed of a concrete lined canal and a series of pipeline laterals. See **Plate 2-2, Distribution Facilities Map**. Meters are installed in all pumping plant discharges and at all canal and pipeline turnouts for monitoring the quantities of irrigation water delivered throughout the distribution system. The annual **"Surface Water Supply Summary", Table 3-5, page 3-14,** and the annual summary of **"Monthly Surface Water Deliveries", Table 3-13, page 3-22** are prepared as a management tool for the District Board of Directors and the General Manager.

As set forth in **Table 3-5, Cawelo Water District, Surface Water Supply Summary, page 3-14**, the District received from all sources, on average over the last 27 years, 78,386 acre-feet per year of surface water for delivery to the service area landowners. As further provided in **Table 3-13, Cawelo Water District, Monthly Surface Water Deliveries, page 3-22**, the District has delivered, on average during the same period, 72,980 acre-feet to the service area landowners. Thus, the District Distribution system has an average annual delivery efficiency of 93.1 percent. (72,980 a.f. average annual surface water deliveries ÷ 78,386 a.f. average annual surface water supply)

For improved operational efficiency and water conservation, the District installed an extensive supervisory control and data acquisition system (SCADA) to monitor and provide real time data from 15 remote sites using various communication devices. The devices transfer information between a small logic controller (SLC) located at the remote sites and an SLC and computer at the District office. The District office operates as the "Supervisor" collecting data from each of the sites. The SCADA system contains a variety of screens for the operator. The screens are developed in a manner that provides the operator view of similar characteristics and functions at all sites for monitoring and controlling the system.

A copy of the **Cawelo Water District Rules and Regulations for Distribution of Water (Amended February 8, 2000) is annexed as Appendix C.**

3.6.2 Transfers

Water transfers typically move water from areas of surplus to areas of shortage. Water transfers can take many different forms and can serve a number of different purposes in the planning and operation of a district's irrigation delivery system.

TABLE 3-13

CAWELO WATER DISTRICT
MONTHLY SURFACE WATER DELIVERIES
in Acre-Feet

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1980	59	772	3223	6415	7274	8893	9998	9664	4840	3822	2706	621	**58287**
1981	1377	1655	3689	5429	10219	10271	11234	10469	6177	4078	1634	962	**67194**
1982	363	2012	2559	2826	8868	9714	11033	10658	6057	3716	765	414	**58985**
1983	124	167	445	2867	7280	9716	10821	7945	5685	3236	1654	753	**50693**
1984	554	3737	7330	6699	9598	12001	12569	9936	6522	5787	1766	254	**76753**
1985	233	2214	5464	8405	11759	12452	13409	10756	4266	5139	1138	109	**75344**
1986	358	1683	3349	7714	11071	13510	13525	10848	6392	5341	1936	300	**76027**
1987	425	2276	4624	6610	13438	13769	14404	11251	6948	4658	351	704	**79458**
1988	244	3874	6550	4619	8326	10124	13537	12030	7991	5735	1757	1233	**76020**
1989	336	3550	4422	7070	11155	13345	13958	12159	7335	4736	2245	2207	**82518**
1990	1209	2496	5859	5890	5496	7624	9828	8752	5418	5305	3255	2880	**64012**
1991	461	641	2710	1905	6932	7724	10214	9516	5779	4269	2032	1379	**53562**
1992	51	552	1926	4849	7422	10947	10468	8493	5163	4337	2381	1326	**57915**
1993	24	546	2380	4713	10593	12134	13721	12411	7809	5727	2334	1108	**73500**
1994	859	1836	4433	5627	6844	11824	12302	11540	6841	4193	1667	1109	**69075**
1995	53	219	676	3674	8218	11879	14204	13022	8192	6207	3878	1289	**71511**
1996	107	763	1956	6910	11740	15023	14403	13581	8427	5995	1347	653	**80905**
1997	233	356	3978	7543	12880	14419	15246	12546	8009	6171	2292	1343	**85016**
1998	85	57	871	2198	5822	10681	15225	14464	9783	5923	2024	1813	**68946**
1999	523	181	3421	4846	9815	13074	15466	13902	9627	6877	2916	2232	**82880**
2000	1654	1385	2096	5916	11323	15021	15845	13830	8022	6027	2499	1927	**85545**
2001	715	1444	3398	4667	9997	13615	14028	12195	7452	5127	2413	1429	**76480**
2002	1150	1266	4205	6727	9619	13857	15150	12362	7598	4781	2458	820	**79993**
2003	231	1418	3986	4990	8876	13751	14668	12537	9231	7814	2313	855	**80670**
2004	279	758	3874	7290	11973	13743	13465	12491	8030	4030	1360	1437	**78730**
2005	85	318	2232	5653	8041	13541	15589	14431	9724	5885	4028	1520	**81047**
2006	507	2858	2341	2137	9913	14522	14762	13315	9347	4868	3560	1269	**79399**
Average	456	1446	3407	5340	9426	12118	13299	11671	7284	5177	2174	1183	**72980**

The specific objectives of the district, in addition to certain legal or institutional constraints, dictate which type of transfer mechanism is most cost effective and efficient. Types of transfers include:

1. Permanent transfers involving the acquisition and change in ownership of water rights or allotments.

2. Temporary transfers or contingent transfers and dry-year options that may periodically be used under certain conditions.

3. Tradeable shares or exchanges between districts for cost effective and more efficient use of water supplies.

4. Water banking arrangements whereby excess or unneeded annual water supplies are transferred to a "bank" by one user or district in exchange for water supplies returned in a dry year when there are insufficient water supplies.

5. Transfers may involve the right to use water that is made available by reclamation or reduction in water demands, or through successful water conservation efforts.

6. Water wheeling arrangements typically refer to cooperative agreements aimed at improving the storage or conveyance performance of a system. Water belonging to one district may be wheeled or conveyed in a common canal with water of another district. Thereby, eliminating the cost of construction of a conveyance system and further reducing canal seepage and evaporation losses.

In addition to the irrigation water supply contracts and agreements of the Cawelo Water District that provide the annual irrigation surface water supplies for the growers, the District has created an extensive relationship with federal, state and other agencies for the transfer, exchange and purchase of surface waters.

A real time example of a transfer and exchange is demonstrated by the arrangement between Cawelo Water District (CWD) and Buena Vista Water Storage District (BVWSD). BVWSD has water rights on the Kern River and no State Water Project (SWP) entitlement, but the BVWSD is located near the California Aqueduct. CWD has SWP entitlement available from the California Aqueduct and Kern River water entitlement under a contract with the City of Bakersfield, but is much closer to the Kern River supply than is BVWSD. As a result, since 1977, CWD has exchanged a portion of its SWP water entitlement with BVWSD for an equal amount of Kern River water, thereby reducing conveyance losses by both districts and eliminating the Cross Valley Canal (CVC) pumping costs, which conserves electrical energy for the SWP entitlement exchanged. CWD normally pays BVWSD one-half the conserved CVC pumping costs as an exchange fee.

3.6.3 On-Farm Irrigation Facilities

The ability to implement more efficient on-farm management practices and install modern irrigation water application distribution systems may be hampered by the lack of capital by the landowners. However, in the Cawelo Water District nearly all on-farm irrigation distribution systems have been converted to sprinkler, drip or fan jet. Nearly 80 percent of the District is planted in tree crops and vineyards (permanent plantings) and approximately 85 percent of the permanent plantings are irrigated with highly efficient sprinkler, drip or fan jet systems.

The District provides funds annually to the North West Kern Resource Conservation District's irrigation system evaluation program, which offers landowners free evaluation of the efficiency of their on-farm irrigation system. The North West Kern Resource Conservation District also provides public service announcements, publications and other means of communication for informing irrigation water users of management techniques, meetings, seminars and other information of interest regarding water use efficiency.

Many of the growers utilize the California Irrigation Management Information System (CIMIS) data for determination of evapotranspiration of their crops, thereby utilizing water budget irrigation scheduling for more efficient water use.

3.6.4 Oilfield Produced Water

The conservation of oilfield produced water under agreements negotiated by the District provide a source of continuous surface water supply for irrigation and groundwater recharge within the District.

In 2006, the District received 21,411 acre feet, 21.2 percent of the surface water supply of the District, of oilfield produced water under agreements with Chevron/Texaco, Valley Waste Disposal Company and Schaefer Oil Company which would otherwise have been injected into the ground.

Under the agreement for the "Purchase and Sale of Reclaimed Oilfield Produced Water" between Cawelo Water District (CWD) and Texaco Exploration and Production, Inc., Bakersfield Producing Division (TEPI-BPD), now Chevron/Texaco, Cawelo Water District receives a continuous flow of about 30 cfs. in CWD's Reservoir "B" through an 8.5 mile, 30-inch pipeline from the TEPI-BPD Kern River Field operations pumping plant.

The California Regional Water Quality Control Board, Central Valley Region, issued Waste Discharge Requirements for Texaco Exploration and Production, Inc., and Cawelo Water District, Produced Water Reclamation Project, Kern County, Order No. 95-031, NPDES Permit No. CA 0082295 on February 24, 1995. The permit limits the daily discharge to a maximum of 25.2 mgd (38.98 cfs.).

Under the agreement between Cawelo Water District and the Valley Waste Disposal Company entered on May 27, 1980, the District receives a continuous flow of about 2.0 cfs. per day in CWD's Reservoir "B" of oilfield produced water through a 3.4-mile, 20-inch pipeline from the Kern Front No. 2 Oil Production Water Facility in conformance with the California Regional Water Quality Control Board's (CRWQCB) waste discharge requirements (NPDES Permit No. CA 0081311). The permit limits the daily discharge to a maximum of 4.5 mgd (6.96 cfs.).

Under the agreement with the Schaefer Oil Company, the Cawelo Water District receives a continuous flow of about 2.0 cfs. In CWD's Reservoir "C" Waste Discharge Requirements for the Mount Poso Oil Field, Kern County, Order No. 93-125 (NPDES Permit No. CA 0078859) issued August 5, 1993, and reissued as Order No. 98-035 on February 27, 1998, limit the daily discharge to a maximum of 2.16 mgd (3.34 cfs).

The oilfield produced water is treated extensively by the oilfield producers before it is delivered and thereafter blended with other surface waters by the District, principally for the reduction of boron.

3.7 Groundwater Management Programs Under Development

3.7.1 Poso Creek Diversion Project

The purpose of the Poso Creek Diversion Project is to provide facilities for the District's diversion of Poso Creek flow under its State Water Resources Control Board (SWRCB) Permit 21032. Flows of Poso Creek at State Route 65 are allocated under the "Agreement Regarding Operation and Monitoring of Poso Creek Flows" among Cawelo Water District, North Kern Water Storage District and Semitropic Water Storage District, and the "Easement Agreement" between the District and riparian Robert J. Vignolo, et al.

The SWRCB Permit 21032 allows direct diversion by the District, not to exceed 110 cfs. and 30,000 acre-feet annually, during the period November 1 to June 14 of the succeeding year.

The "Agreement Regarding Operation and Monitoring of Poso Creek Flows" allows the diversion of up to 135 cfs of Poso Creek flow, as measured at Trenton Weir (State Route 65), by CWD and the riparian lands within CWD.

The "Easement Agreement" with riparian Robert J. Vignolo, et al., recognizes Vignolo's riparian right but limits the diversion thereof to 25 cfs. and 6500 acre-feet annually.

The Poso Creek Diversion Project included the construction of a concrete check structure in Poso Creek, which was completed in 2004, for the direct diversion of the CWD entitlement to the Famoso Water Banking Project and to the Western Service Area pipeline distribution system.

In addition to the concrete check structure direct diversion of Poso Creek flows for the Famoso Water Banking Project and for the Western Service Area, the SWRCB Permit 21032, along with a State Fish and Game Code Section 1602 "Programmatic Stream Maintenance Agreement for Stream Alteration", Notification No. R4-2003-0086 Poso Creek-Kern County, provides for the construction and maintenance of eight (8) sand dams within Poso Creek for the collection and diversion of 40 cfs. to underground storage, not to exceed 17,899 a.f. per annum.

The location of the 8 sand dams and the Concrete Diversion Structure are shown on **Plate 3-3, Poso Creek Sand Dams & Concrete Diversion Structure, page 3-27**. A general location map of elements of the Poso Creek Diversion Project are shown on **Plate 3-4, Poso Creek Diversion Project and Famoso Water Banking Project, page 3-28.**

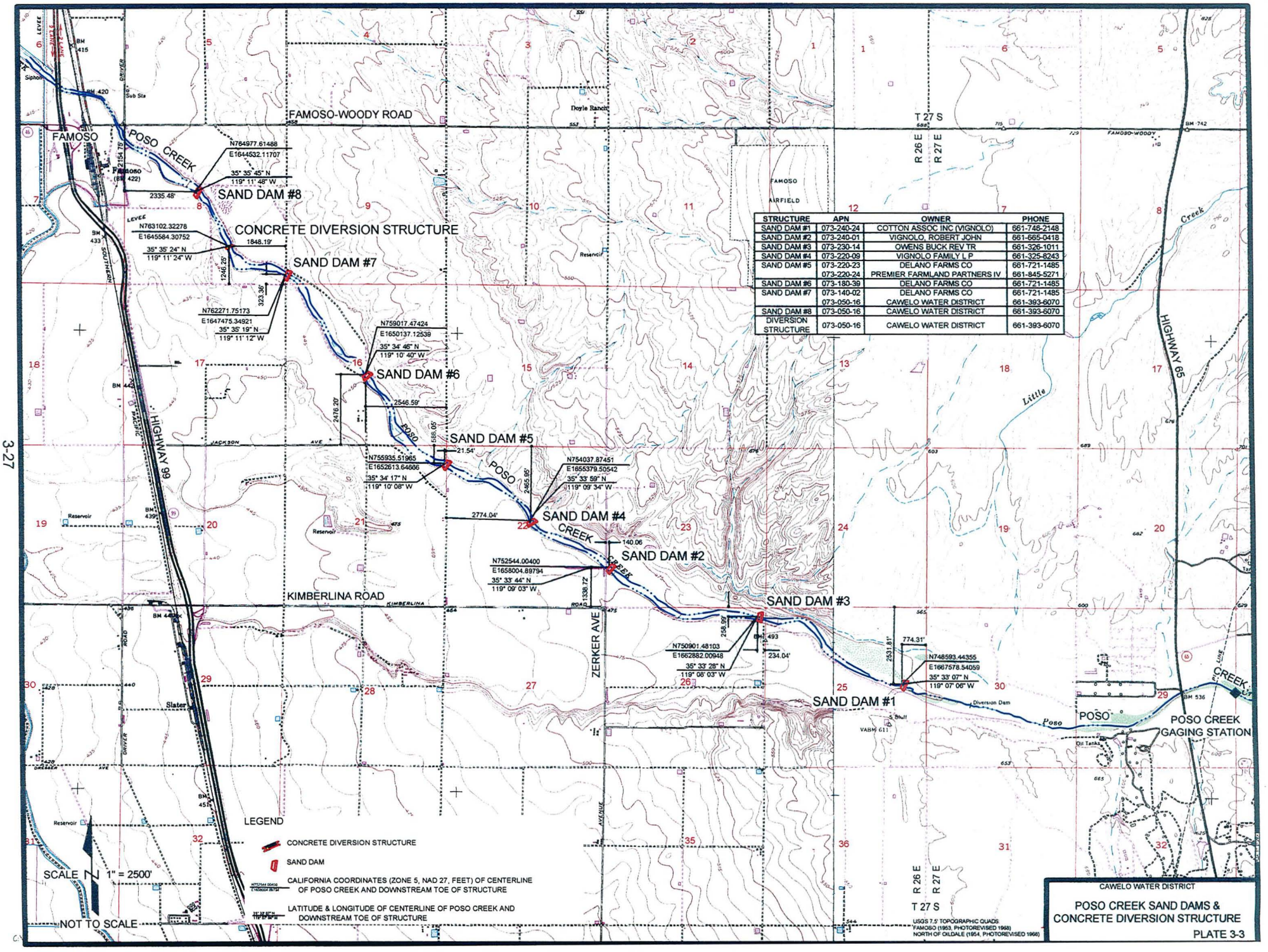
A daily operations study for the 46-year period, 1961 through 2006, see **Table 3-14, Poso Creek Operations Study, Page 3-29**, identified an average annual flow of Poso Creek at State Route 65 of 19,353 acre-feet (Column 1), an average annual Poso Creek diversion entitlement within Cawelo Water District of 12,991 acre-feet (Column 2 and Column 6), an average annual diversion entitlement for the North Kern Water Storage District of 3,817 acre-feet (Column 3 and Column 5), an average annual diversion entitlement for Semitropic Water Storage District of 1,968 acre-feet (Column 4), and a remainder for the Kern National Wildlife Refuge and Tulare Lake Basin of 577 acre-feet (Column 7).

Two recovery wells will be constructed as part of the Poso Creek Diversion Project for recapture of banked water. The discharge from the wells will be distributed for irrigation through the proposed Western Service Area pipeline.

3.7.2 Famoso Water Banking Project

The purpose of the Famoso Water Banking Project is to provide facilities for groundwater storage of waters that become available during times of surplus for recovery during times of shortage, and involves the construction of about 400 acres of infiltration (spreading) basins for groundwater storage of Poso Creek flows, oilfield produced water, surplus and miscellaneous Kern River Water, surplus State Water Project (SWP) water, surplus central Valley Project (CVP) water and other waters available to the District.

The Famoso Water Banking Project involves the modification of the Lerdo Canal and the Poso Creek Lateral 8-23 of North Kern Water Storage District (NKWSD) for transportation of water of Cawelo Water District, along with the construction of spreading ponds, forebays, pumping plants and pipelines for groundwater banking and deep wells for the extraction and delivery of banked water to the lands of Cawelo Water District for irrigation.



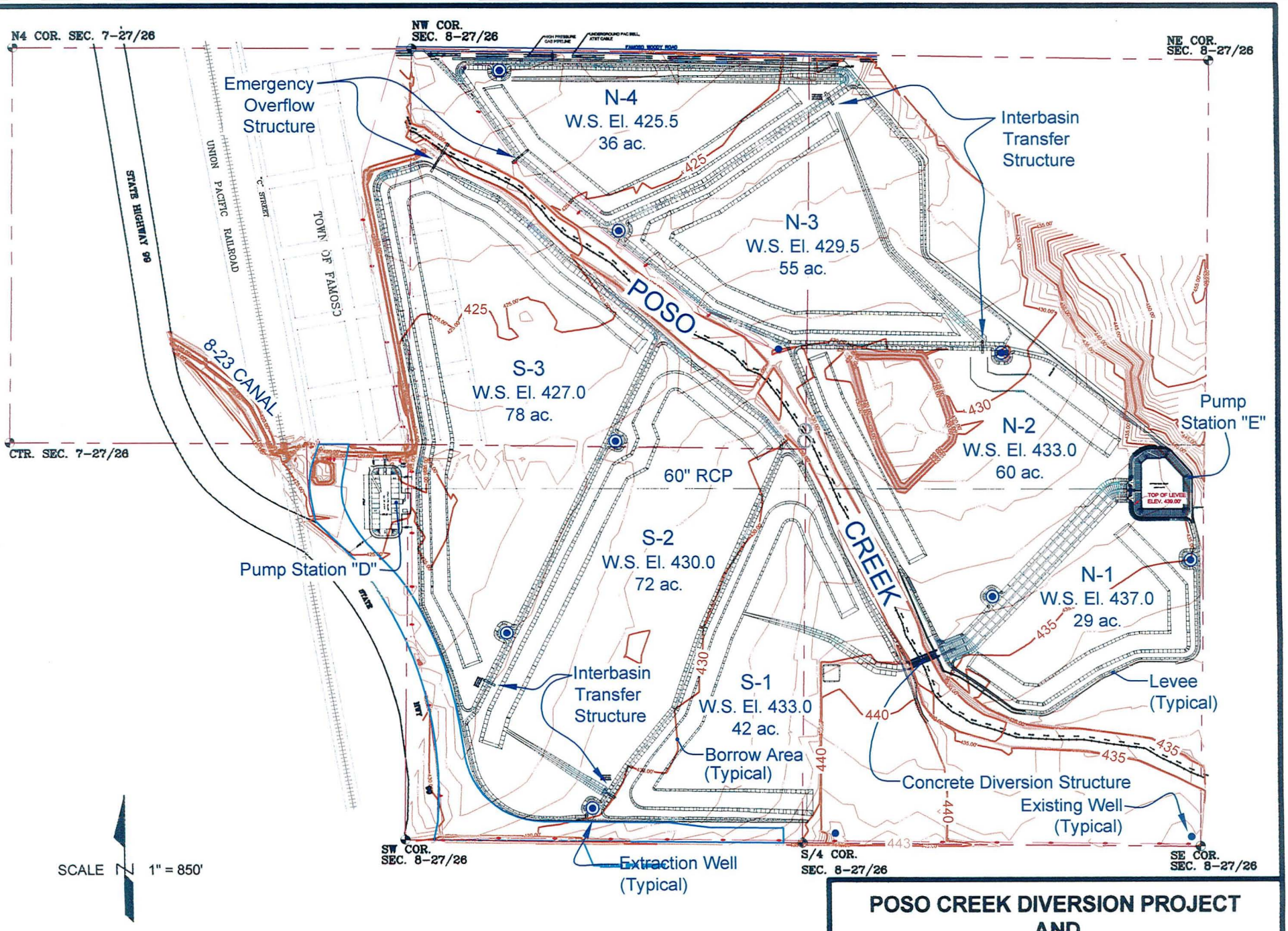
STRUCTURE	APN	OWNER	PHONE
SAND DAM #1	073-240-24	COTTON ASSOC INC (VIGNOLO)	661-748-2148
SAND DAM #2	073-240-01	VIGNOLO, ROBERT JOHN	661-665-0418
SAND DAM #3	073-230-14	OWENS BUCK REV TR	661-326-1011
SAND DAM #4	073-220-09	VIGNOLO FAMILY L P	661-325-8243
SAND DAM #5	073-220-23	DELANO FARMS CO	661-721-1485
	073-220-24	PREMIER FARMLAND PARTNERS IV	661-845-5271
SAND DAM #6	073-180-39	DELANO FARMS CO	661-721-1485
SAND DAM #7	073-140-02	DELANO FARMS CO	661-721-1485
	073-050-16	CAWELO WATER DISTRICT	661-393-6070
SAND DAM #8	073-050-16	CAWELO WATER DISTRICT	661-393-6070
DIVERSION STRUCTURE	073-050-16	CAWELO WATER DISTRICT	661-393-6070

USGS 7.5' TOPOGRAPHIC QUADS:
FAMOSO (1953, PHOTOREVISED 1968)
NORTH OF OILDALE (1954, PHOTOREVISED 1968)

CAWELO WATER DISTRICT

POSO CREEK SAND DAMS & CONCRETE DIVERSION STRUCTURE

PLATE 3-3



POSO CREEK DIVERSION PROJECT
AND
FAMOSO WATER BANKING PROJECT
PLATE 3-4

Table 3-14

POSO CREEK OPERATIONS STUDY NO. 1
in Acre-Feet

	Flow at Trenton Weir @ S.R. 65	Entitlement					Kern NWL Refuge	
		CWD	NKWSD	SWSD	NKWSD	CWD		
		0-135 cfs.	136-300 cfs.	301-685 cfs.	686-760 cfs.	761-790 cfs.	Flow	No. of Days
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
1961	0	0	0	0	0	0	0	0
1962	3,816	3,816	0	0	0	0	0	0
1963	1,668	1,668	0	0	0	0	0	0
1964	2,421	2,421	0	0	0	0	0	0
1965	10,558	9,568	714	276	0	0	0	0
1966	2,191	2,191	0	0	0	0	0	0
1967	28,613	18,843	4,714	2,199	218	60	2,579	1
1968	3,073	3,073	0	0	0	0	0	0
1969	89,659	35,917	23,105	19,655	1,297	476	9,209	8
1970	10,589	7,334	1,107	1,775	149	59	165	1
1971	6,653	6,653	0	0	0	0	0	0
1972	2,212	2,212	0	0	0	0	0	0
1973	41,917	31,802	8,800	1,311	4	0	0	0
1974	26,329	22,794	2,158	1,321	56	0	0	0
1975	15,180	15,180	0	0	0	0	0	0
1976	2,491	2,491	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	42,346	26,944	7,895	4,760	299	119	2,329	2
1979	16,681	15,162	1,394	125	0	0	0	0
1980	34,398	23,266	6,718	3,439	278	60	637	1
1981	7,209	7,169	40	0	0	0	0	0
1982	34,074	26,600	6,792	682	0	0	0	0
1983	134,695	56,104	36,970	32,318	3,643	1,071	4,589	18
1984	41,991	35,438	5,045	1,508	0	0	0	0
1985	12,279	12,202	77	0	0	0	0	0
1986	28,291	22,533	5,357	401	0	0	0	0
1987	6,270	6,270	0	0	0	0	0	0
1988	567	567	0	0	0	0	0	0
1989	4,191	4,180	11	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	1,844	1,844	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	11,919	11,537	382	0	0	0	0	0
1994	1,154	1,154	0	0	0	0	0	0
1995	36,873	30,527	5,124	1,025	149	48	0	0
1996	26,550	20,708	4,472	1,346	24	0	0	0
1997	40,259	28,361	9,391	2,126	149	59	173	1
1998	109,891	48,985	37,156	16,274	446	178	6,852	2
1999	19,434	19,427	7	0	0	0	0	0
2000	7,970	7,955	15	0	0	0	0	0
2001	224	224	0	0	0	0	0	0
2002	406	406	0	0	0	0	0	0
2003	3,405	3,405	0	0	0	0	0	0
2004	256	256	0	0	0	0	0	0
2005	9,671	9,562	109	0	0	0	0	0
2006	10,023	8,709	1,314	0	0	0	0	0
46-Year Total	890,241	595,458	168,867	90,541	6,712	2,130	26,533	34
46-Year Average	19,353	12,945	3,671	1,968	146	46	577	0.7

A general location map of the elements of the Famoso Water Banking Project has also been provided on **Plate 3-4, Poso Creek Diversion Project & Famoso Water Banking Project, page 3-28**.

During extremely wet years, three of ten, the Famoso Water Banking Project would be used throughout the year for groundwater recharge. Using a long term infiltration rate of 0.3 feet per day the Famoso Water Banking Project would have the capability of recharging about 14,000 acre-feet annually.

3.7.3 Dudley Ridge Water District Conjunctive Use Program

The Cawelo Water District and Dudley Ridge Water District entered a Conjunctive Use Program (Program) in May 2001. The purpose of the Program is to develop facilities needed for a conjunctive use program that provides Dudley Ridge Water District with a dry-year water supply and Cawelo Water District with the supplemental use of conveyance, recharge and recovery facilities and reduced water costs. Funds for construction of the Program facilities are being provided from a Proposition 13 grant of Dudley Ridge Water District.

Cawelo Water district has commenced the Program with the construction of groundwater recharge basins, and the construction of related pipelines, appurtenances and structures. The Program also provides for the installation of six extraction wells,

Through the integration of the Dudley Ridge Water District Conjunctive Use Program with the Cawelo Water District Poso Creek Diversion Project and the Famoso Water Banking Project, both Districts will enjoy the use of additional facilities available for groundwater recharge and extraction, that will provide additional reliability of irrigation water supply for both Districts.

3.7.4 Water Banking and Exchange Program

Cawelo Water District entered a long-term Water Banking and Exchange Program with Alameda County Flood Control and Water Conservation District, Zone 7, in 2006. The Program will allow the banking partner to store its surplus water when available in CWD and recover that water from CWD when needed.

New facilities are being constructed and existing facilities expanded as part of the Water Banking and Exchange Program. These facilities include canals, pipelines, pumping plants, extraction wells and reservoirs. Together, the facilities will provide the mechanism for the delivery and recovery of the banking partner's water, both directly and by exchange. Capacity not used by the banking partner will be used by CWD to import supplemental supplies when available.

The Water Banking and Exchange Program is expected to provide up to 120,000 acre-feet (a.f.) of groundwater storage capacity. At least 10,000 a.f. of the recharge capacity would be available to the banking partner in any year and could be as much as 40,000 a.f. in a year under the right conditions. Recovery for the banking partner's would not exceed 10,000 a.f. per year.

The Program will be managed and operated by CWD. The term of the Program would be through 2035 with the ability for the banking partner to renew the Program.

Under the proposed Water Banking and Exchange Program, the banking partner's water will be delivered into CWD when irrigation wells (District and landowner) would otherwise be operating, thereby recharging groundwater supplies by delivering surface water in-lieu of pumping groundwater. Recovery of banked water would be by release of the District's SWP water in the California Aqueduct or by pumping groundwater from the District. The Program will be structured so that there are no adverse unmitigated impacts to landowners in Cawelo or in neighboring districts.

The development of two new service areas will be achieved with the Program. The service areas are:

- A "Famoso Service Area" of about 3,000 acres adjacent to Poso Creek and near Famoso in Sections 9, 15, 16, 17, 20, 21 & 22, of Township 27 South, Range 26 East, Mount Diablo Base and Meridian will be provided with a new distribution system. The lands of the Famoso Service Area will be served when available surface water supply exceeds the demands of the presently served lands.

  Within Section 8, Township 27 South, Range 26 East, MDB&M, the District constructed the Famoso Water Banking Project of 400 acres of groundwater recharge basins and related facilities.

- A "Western Service Area" of about 5,000 acres is located in the western portion of the existing North Service Area in Sections 22, 23, 26, 27, 34 & 35, of Township 26 South, Range 26 East, Mount Diablo Base and Meridian and in Sections 2, 3, 10, 11, 14 and 15 of Township 27 South, Range 26 East, Mount Diablo Base and Meridian. The plan involves removing the Western Service Area acreage from the North Service Area, and creating a new service area. Removing this acreage from the existing North Service Area will reduce capacity constraints in certain key facilities, allowing increased deliveries to all landowners in the District North of Poso Creek.

In addition, facilities in other parts of the district that have limited capacity may also be modified or replaced to increase the delivery of water, when available, for in-lieu recharge.

It is anticipated with the new delivery systems, at least 10,000 a.f. per year could be delivered in the new service areas that could not have been delivered historically. Of the 10,000 acre-feet annual delivery by the banking partner, 5,000 acre-feet would be placed in the storage account of the banking partner. Additional water above the 10,000 a.f. may also be delivered for in-lieu recharge when irrigation wells in the other service areas of the District would otherwise be in operation. Total in-lieu recharge may be in the order of 40,000 a.f. in some years. Recharge shall occur before recovery.

Construction of new wells and use of existing wells are also a part of the Water Banking and Exchange Program. The new wells, to be equipped with electric motors to minimize noise and maintain air quality, will be located near District recharge areas or within the in-lieu service areas. The new wells are expected to be located in Section 8, Township 27 South, Range 26 East, Mount Diablo Base and Meridian and in Section 30, Township 27 South, Range 27 East, Mount Diablo Base and Meridian. The use of existing wells could include both landowner and district wells. Use of landowner wells would be on a strictly voluntary basis. The Program recovery would provide the banking partner with a firm yield of up to 10,000 a.f.

The groundwater quality in the Program area of the District is excellent. Return of banking partner(s) water could occur by direct delivery through the Friant-Kern Canal, the Cross Valley Canal and the California Aqueduct. With the approval of the North Kern Water Storage District (NKWSD), the construction of new pipelines and the modification of existing canals may be required in NKWSD to facilitate the delivery of recovered water to the Friant-Kern Canal and to NKWSD. Since other users along these conveyance systems would also have demands in a dry year, it is unlikely that physical return of the banked groundwater would be required. Rather, return of water to the banking partner(s) would occur through a series of exchanges typically involving North Kern Water Storage District and others or by delivery of CWD's State Water Project water directly from the State Aqueduct. The Program does not include the delivery of Kern River water to the California Aqueduct.

CWD offered a relatively large storage capacity to the banking partner, as a larger rather than a smaller storage capacity is believed to be consistent with CWD's desire to see the Program used frequently. Since wet and dry years sequences are often cyclical, limitations on storage may prevent water from being recharged at the end of wet cycles. Likewise, limited storage capacity can also reduce the ability to make repeated withdrawals during prolonged drought cycles. Consequently, a storage capacity limit on the order of 120,000 a.f. is contemplated, which is twelve times the annual recovery requirement.

A monitoring program will be developed with the North Kern Water Storage District and other districts in the immediate vicinity of CWD that are interested in participating in the Program. The District will evaluate the impacts of the Program, over time, and determine appropriate mitigation measures as necessary.

3.5.5 Auxiliary Reservoir "C" Project

The purpose of the Auxiliary Reservoir "C" Project is to provide facilities for the storage of surface water during the Winter and Spring months. The stored surface water would be delivered for irrigation and in-lieu groundwater storage during the summer months in the District's service area North of Poso Creek.

The Auxiliary Reservoir "C" Project involves the construction of an earth fill dam in an existing drainage adjacent to the District's existing distribution system and Reservoir "C", the construction of a Spillway & Outlet Structure for the dam, the construction of Inlet and Pump-Back Facilities and the installation of two extraction wells for recapture of seepage or infiltrated water.

Flows from oilfield produced water, surplus and miscellaneous Kern River water, surplus State Water Project water, surplus Central Valley Project water and other waters available to the District would be delivered to Auxiliary Reservoir "C" through the District's existing distribution system. In addition to groundwater storage from reservoir infiltration, the surface water stored in Auxiliary Reservoir "C" would be pumped back into the existing distribution system on demand for crop irrigation.

Studies of the filling, infiltration, and evacuation operations of Auxiliary Reservoir "C" indicate that during a normal November 15 through the following May 15 period, six months (180 days), 9,000 acre-feet of water would infiltrate as groundwater storage and 3,000 acre-feet of water would be pumped-back and delivered for irrigation of crops and in-lieu recharge, thereby providing the capability of 12,000 acre-feet of groundwater storage annually. However, during extremely wet years, three of ten, the Auxiliary Reservoir "C" Project would be used throughout the year for groundwater recharge and surface storage. With a long term infiltration rate of 0.25 feet per day and a full reservoir, the Auxiliary Reservoir "C" Project could infiltrate about 16,000 acre-feet in a year.

SECTION 4

CAWELO WATER DISTRICT

Groundwater Resource Protection

4.1 Wellhead Protection

As defined in the Federal Safe Drinking Water Act Amendments of 1986, wellhead protection is "the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field." Wells are randomly located throughout the District, thus, the entire Plan area will be treated as a wellhead protection area.

Contaminants from the surface can enter an improperly designed or constructed well along the outside edge of the well casing or directly through openings in the wellhead. Wells are the initial supply source to the user, and contaminants entering the well could then be discharged directly into the distribution system. Therefore, essential to the wellhead protection program is the proper well design, construction, and site grading to prevent intrusion of contaminants into the well from surface sources.

Wells can also be a direct conduit to the aquifers and must be properly destroyed when abandoned or they will provide an unimpaired route for contaminants to enter groundwater, particularly if pumping equipment is removed from the well and the casing is left uncapped. Well destruction is covered in Section 4.3.

Wells constructed by the Plan participants will be designed and constructed in accordance with DWR Bulletin 74-81 and Kern County ordinance, Section 14.08.210 Well Construction Standards.

DWR Bulletin 74-81 provides specifications pertaining to wellhead protection, including:

- Methods for sealing the well from intrusion of surface contaminants.
- Covering or protecting the boring at the end of each day from potential contaminated sources or vandalism.
- Site grading to assure drainage away from the wellhead.
- Setback requirements from known contaminated sources.

4.2 Well Construction Policies

A "well" is defined by Kern County ordinance, Title 14 Utilities, Section 14.08.116 as "any artificial excavation constructed by any method for the purpose of extracting water from or injecting water into the underground, or used for the purposes of observation or monitoring of the groundwater basin, or for cathodic protection, or as a grounding terminal."

Well Construction in conformance with approved design standards ensures the reliability, longevity, and protection of groundwater resources from contamination. Kern County has adopted Well Construction Standards by ordinance, Section 14.08.210 consistent with the Department of Water Resources Bulletin 74-81, "Water Well Standards, State of California".

Construction of a monitoring well is also covered by Kern County ordinance, Section 14.08.074. Important considerations for proper construction of a monitoring well include (1) method of drilling, (2) casing type and diameter, (3) perforations or well screen, (4) gravel pack, (5) annular seal, and (6) well development. As a general rule, monitoring wells should be placed immediately upgradient and downgradient of a waste discharge site. After the monitoring well is developed an aquifer test is recommended. Care should be taken to drill monitoring wells deep enough for use during summer months or drought periods; however, consideration for means of sampling the first groundwater is required in the design of the monitoring well. Historical water level fluctuations should be examined for determination of the depth and location of perforations of the monitoring well.

4.3 Well Abandonment/Destruction

The Kern County ordinance, Section 14.08.022 states an "Abandoned Well" means a well not equipped with operable pumping equipment, which has not been used for a period of one (1) year and which has been declared to be an "out of service well", such well must be destroyed in accordance with Section 14.08.360.

Destruction of an abandoned groundwater well is necessary to protect groundwater resources and public safety. Improperly destroyed wells can provide a conduit for surface or near-surface contaminants to reach groundwater. Further, undesired mixing of groundwater of different chemical characteristics from different aquifers can occur in wells improperly destroyed.

The administration of well construction, abandonment and destruction has been delegated to the Counties by the State legislature. Accordingly, Kern County adopted a permitting program consistent with DWR Bulletin 74-81 for well abandonment and destruction ordinance, Chapter 14.08 Water Supply Systems, Section 14.08.022 and Section 14.08.360.

The Plan participants will be encouraged to properly destroy wells in conformance with the Kern County ordinance or convert the wells to monitoring wells, so they can become a part of the permanent groundwater monitoring program.

4.4 Saline Water Intrusion

Salinity is determined by the concentration of mineral salts dissolved in the water, and may be expressed in terms of total dissolved solids (TDS) or electrical conductivity (EC).

Saline water intrusion is not currently an identified problem in the Plan area. The Plan area is not located within or near a large saline water body such as the ocean, saline inland lake, or deep aquifer containing saline water. The District has been monitoring groundwater quality for the past 12-years and witnessed the diminishment of a degraded plume along the western boundary of the District. See Section 3.3.4 Groundwater Quality. The District imports high quality surface water for users upgradient and encourages groundwater pumping of the degraded plume for removal thereof.

4.5 Migration of Contaminated Groundwater

Groundwater contamination can be caused by man or occur naturally. Sources of groundwater contamination may occur from irrigation, dairies, pesticide applications, septic tanks, industrial sources, stormwater runoff, and disposal sites. Groundwater within the Plan area is generally of excellent quality for agricultural use. A degraded plume of groundwater exists along the western edge of the Plan area, near State Route 99 with electrical conductivity levels approaching 2000 umhos/cm. The source of the degraded groundwater plume is under investigation as a part of the Plan, along with the development of a solution for the improvement or removal thereof.

SECTION 5

CAWELO WATER DISTRICT

Groundwater Sustainability

5.1 Groundwater Replenishment

The groundwater basin is dependant upon sustainability of a long-term groundwater supply for beneficial uses and the social, environmental and economic benefit of the area. The actions described herein are intended to maintain or increase the groundwater supply of the Plan area. Water conservation plans, importation of oilfield produced water, groundwater recharge programs, surface water importation, and water banking projects are used within the Plan area to mitigate groundwater overdraft and replenish the groundwater supply.

Historic groundwater pumping within the Plan area as of 1980 created an average groundwater depth of 452.3 feet. At the present time, with the groundwater replenishment efforts of the District the combined effect of groundwater extractions, subsurface inflow and subsurface outflow, the average depth to groundwater within the Plan area, as of 2006, was 428.3 feet. Therefore, the average depth to groundwater within the Plan area increased 24-feet between 1980 and 2006.

5.2 Groundwater Recharge

Groundwater recharge may be defined as the planned addition of surface water to a groundwater basin by discharge to a spreading basin or natural channel. Groundwater may be a renewable resource through proper management. Groundwater recharge is a viable method of renewing groundwater extracted.

Stabilization and recovery of the groundwater aquifers are goals of groundwater management and will result in (1) decreasing the pumping lifts and thereby decreasing the energy needed for pumping; (2) preventing expenditures for deepening wells; and (3) preventing the premature abandonment of wells which would occur by the lowering of groundwater levels.

5.3 Conjunctive Use of Water Resources

Conjunctive use of water may also be defined as the coordinated optimal beneficial use of both groundwater and surface water. Conjunctive use of the water resources available to the Cawelo Water District was a goal of the District's 1994 Groundwater Management Plan and continues as a major program.

Groundwater banking is the process of recharging excess surface water when available in the subsurface aquifers for a period of time, then extracting the recharged water for beneficial use. This process allows surface water supplies available during periods of above normal hydrologic conditions, to be extended and then delivered during dry cycles or periods of higher demand. The banking participants extraction is limited to a percentage of the banked water such that benefits are derived for all parties involved, including adjacent landowners. In addition, banking of surface water is required before extraction of the banked water to prevent adverse impact on the local groundwater basin.

Conjunctive use of water resources by Cawelo Water District are covered in **Section 3.6 Existing Groundwater Management Programs** and **Section 3.7 Groundwater Manage Programs Under Development** of this Plan.

5.4 Water Conservation

Utilizing guidelines provided by the Department of Water Resources, the major practices that may improve water use efficiency along with applicability to Cawelo Water District were systematically itemized and set forth in **Table 5-1, Practices of Increase Water Management Efficiency, Page 5-3 through Page 5-6**.

From **Table 5-1, Practices to Increase Water Management Efficiency**, The District developed **Table 5-2, Water Conservation Plan, Page 5-7**. The data provided in Table 5-2 restates the practice as tabulated in Table 5-1 and sets forth the goal of the District for each practice during the next five years.

Table 5-1
Practices to Increase Water Management Efficiency

	Practice	Method of Measurement/ Assessment	Frequency of Measurement/ Assessment	Current Status	Assessment of Remaining Potential Savings	Estimated Cost of Further Work	Estimated Benefit/ Cost	Further Work
	IRRIGATION MANAGEMENT							
1.	Improve Water Measurement and Accounting	Meters	Daily	Meters for all deliveries into the district and to landowners were installed in 1976	None			Maintain meter reading procedure
2.	Conduct irrigation efficiency studies	RCD Studies	Multiple Annually	District funds irrigation efficiency studies to provide free service to landowners. 8-14 evaluations per year covering 1,000-1,400 acres/yr.	None			Maintain support for RCD
3.	Evaluate Distribution System Efficiency	Computation	Annual	Average annual efficiency of distribution system estimated at 93%.	None			Calculate annually
4.	Provide farmers with evapotranspiration information	Available on-line to subscribers	Daily	District supports & subsidizes CIMIS station within district boundaries	Survey farmers to see if additional information is necessary	$5,000	>1	Perform survey
5.	Monitor Surface Water Quantity	Continuous daily metering of surface water. (240 meters)	Daily	Read daily since 1976	None			Maintain meter reading procedure
6.	Monitor Surface Water Quality	Intermittent, 65 samplings and lab analyses annually.	Quarterly	Sampled since 1980	Water quality does not change significantly by source. Value of more frequent monitoring is expected to be minimal.		<1	Maintain water quality testing
7.	Monitor soil moisture	Varies by farmer	Varies by farmer	Most farmers have some on-farm method for assessing soil moisture	Survey farmers to see if additional information is necessary	$5,000	>1	Perform survey
8.	Promote efficient pre-irrigation techniques	N/A	N/A	In 2006 of the irrigated lands, 98.5% were in permanent plantings with only 525 acres in row crops. Of all the irrigable land in CWD, 84.4% are planted in permanent crops.	None			No further work proposed
9.	Monitor soil salinity		Varies by farmer	Farmers already monitor soil salinity. CWD monitors groundwater salinity.	Minimal	Duplicative	<1	No further work proposed
10.	Provide on-farm irrigation system evaluation	RCD Studies	Multiple Annually	District funds irrigation efficiency studies to provide free service to landowners	None			Maintain support for RCD. Include irrigation system type in annual crop survey.
11.	Monitor quality and quantity of drainage water	N/A	N/A	85% of irrigation systems are drip or micro-sprinkler. Field runoff that occurs from other systems goes to tail water return pits and is re-used.	The district has no drainage water returning to it nor is there any return flow to streams. Therefore, there is no potential to reduce drainage water or improve the quality.			No further work proposed

	Practice	Method of Measurement/ Assessment	Frequency of Measurement/ Assessment	Current Status	Assessment of Remaining Potential Savings	Estimated Cost of Further Work	Estimated Benefit/ Cost	Further Work
12.	Evaluate and improve water user pump efficiencies	Pump efficiency percentage	As requested by farmers	Pump efficiency tests are performed by utilities and pump companies as requested by farmers.	Farmers have financial incentive to maintain pump efficiency. Role of district to increase pump efficiency is limited and outside the authority of the district.			No further work proposed by district
13.	Monitor Groundwater Elevations	Sounding	Semi-Annual	Groundwater level measurement of about 250 wells semi-annually performed since 1979.	None			Continue monitoring program
14.	Monitor Groundwater Quality	Sample/Lab	Annual	40 groundwater samples and lab analyses annually since 1980.	None			Continue monitoring program
15.	Designate a Water Conservation Coordinator	N/A	N/A	David Ansolabehere, General Mgr.	N/A			Preserve position and duties
	PHYSICAL IMPROVEMENT							
16.	Evaluate Condition of Flow Measuring Devices	Meter inspection and comparison to historical use	Part of routine responsibility	District has ongoing inspection and maintenance program	None			Continue inspection program and replace meters as necessary
17.	Automate Canal Structures	Canal	N/A	All pumps and canals are automatically controlled and the control system was upgraded in 1997.	None			No further work proposed
18.	Line Canals	N/A	N/A	All conveyance systems within the district have been lined since 1975	None			No further work proposed
19.	Modify distribution facilities to increase flexibility	Max gpm/ac	N/A	District has two projects underway to increase conveyance capacity to farmers, increasing delivery capacity by 65% from 3.38 gpm/ac to 5.6 gpm/ac in the North Service Area	Future deliveries will not be limited by capacity constraints.			No further work proposed
20.	Reduce evaporative losses			Evaporative losses are calculated to be 670 af/year based on reservoir surface area and average pan evaporation.	District is not aware of cost effective technology to reduce these losses further.			No further work proposed
21.	Reduce phreatophytic growth	Visual inspection	Weekly inspections	District controls phreatophytic growth on district land as needed	None			Maintain control program
22.	Line Regulatory & Terminal Reservoirs	N/A	N/A	Reservoir seepage & system losses estimated to average 2,650 af/year for the prior 6 years.	Reservoir seepage replenishes groundwater. Reservoir lining would create energy savings but not water savings.	Cost to line reservoirs estimated to be >$4 mill.	30 year life, 5 % interest, B/C <1.	No further work proposed
24.	Construct district tailwater re-use systems			Tailwater does not leave farms	None			No further work proposed
25.	Develop recharge basins for systems	N/A	N/A	District has developed 450 ac of recharge basins over the last 5 years	The district has developed the most strategic sites for groundwater recharge. Site near Reservoir C should be evaluated.	$10,000 to perform study	To be determined	Perform study of additional recharge land.

	Practice	Method of Measurement/ Assessment	Frequency of Measurement/ Assessment	Current Status	Assessment of Remaining Potential Savings	Estimated Cost of Further Work	Estimated Benefit/ Cost	Further Work
26.	Improve on-farm irrigation and drainage systems			District is currently 85% converted to micro-irrigation. There are no drainage systems in the district nor are they required.	Conversion is currently occurring at 600 ac per year on average. Potential to speed this up is limited, driven by crop choice.			No further work proposed
27.	Evaluate Efficiency of District Pumps	Continuous assessment of energy consumption versus water conveyed	Continuous	Performed pump tests in 2003. District monitors pump efficiency on a continuous basis. Pumps needing work are serviced on an annual basis	None			Maintain monitoring and maintenance program
28.	Use Reclaimed Water	Meter	Daily	District has used 20,000 af/year of reclaimed water from oilfield operations since 1995	District is working with oil companies to take increased flows that meet quality standards			Extend agreement with oil companies and pursue additional opportunities
	INSTITUTIONAL ADJUSTMENTS							
29	Communicate and Cooperate with Other Agencies	N/A	N/A	CWD currently works with PGE, RCD and neighboring districts to minimize water costs, increase water use efficiency and reduce power costs	None			Maintain and promote communication and cooperation with others
30.	Change Water Fee Structure to Provide Incentives for More Efficient Use of Water	N/A	N/A	CWD already has one of the highest ag water rates in the valley which already encourages conservation. The rate structure was modified in 1998 to increase the incentive for conjunctive use.	None			Maintain fee structure that promotes efficient water management
31.	Provide Flexibility in Water Ordering and Delivery	Flexibility in duration of water order	N/A	District currently permits landowners to order water for any duration thereby eliminating the need to take water that is not required	None			No further work proposed
32.	Provide educational seminars & conduct Public Information Programs			1 day workshops currently provided to farmers by Resource Conservation District covering a variety of irrigation efficiency and management topics.	None			No further work proposed
33.	Facilitate Financing Capital Improvements of District systems	Contributed capital	Annual	District applies for grants and is working with potential banking partners to provide additional capital to improve district distribution systems	Significant		>1	Pursue additional financing mechanisms when the current round of projects near completion
34.	Facilitate Financing Capital Improvements of on-farm systems			District has been a water purveyor not a provider of capital.	Minimal. Improvements of on-farm systems have been driven by replanting and crop choice decisions.			Provide information to landowners regarding grant programs, low interest loans, energy efficiency programs etc.

	Practice	Method of Measurement/ Assessment	Frequency of Measurement/ Assessment	Current Status	Assessment of Remaining Potential Savings	Estimated Cost of Further Work	Estimated Benefit/ Cost	Further Work
35.	Increase Conjunctive Use of Groundwater and Surface Water	Volume of groundwater pumping	Annual	District is currently involved in projects totaling $22 million to expand conjunctive use operations.	Greater conjunctive use beyond existing projects likely to be limited by availability of water not conveyance capacity. Remaining potential is likely to be limited but should be assessed.			Evaluate additional conjunctive use programs when the current round of projects near completion
36.	Reduce Irrigation of marginal lands. Facilitate, when appropriate, alternative land uses.			There are no Class 5 lands in the District (lands considered marginal). There are 806 acres of Class 6 lands in the District some of which may be marginal. CWD has converted land in flood plains to recharge basins. CWD historically has cooperated with other local agencies to modify district boundaries so that utility service is provided by those best suited to serving the projected land use.				Consider quality of agricultural land when requests are made to bring new land into the service area. Maintain cooperate efforts with others to reduce water use and provide efficient water service.
37.	Install meters on landowner wells	Number of meters installed	Not compiled	Some landowners have meters on their wells.	Groundwater in CWD ranges from 300 to 550 feet. The cost to pump groundwater can range from $80 to $145/af. At these costs, landowners are not wasting groundwater. Installing meters on wells is not expected to improve efficiency of groundwater use.			No further work proposed.
	NEW TECHNOLOGY							
38.	Anti-transpirant Application	Acreage Applied	Not compiled	Anti-transpirants are applied in the district to a small acreage of crops for reasons other than irrigation efficiency.	Anti-transpirants reduce consumptive use for short periods and have impacts on quality of the agricultural crop. Currently this does not appear to be a cost effective method of reducing consumptive use.			No further work proposed
39.	New Methods/Management			RCD has information on new technologies for monitoring soil moisture.	Efforts by district would be duplicative and not cost effective.		<1	Cooperate with RCD to disseminate information on new technologies.

RCD = North West Kern Resource Conservation District
CWD = Cawelo Water District
CIMIS = California Irrigation Management Information System
N/A = Not Applicable

Table 5-2
Cawelo Water District
Water Conservation Plan

	Practice	Measurable Goal
	PRACTICES TO MAINTAIN AND IMPROVE IRRIGATION MANAGEMENT	
1.	Ensure complete water measurement and accounting by maintaining daily meter reading procedures	Meter reading in CWD computer system
2, 10.	Continue to support RCD irrigation efficiency studies	RCD studies > 1000 ac/year
3.	Continue to evaluate distribution system efficiency annually	Distribution system efficiency >90%
4.	Survey farmers to see if additional evapotranspiration information is required.	Survey results by Feb 2008
5.	Continue to monitor Surface Water Quantity	Daily flow reports in CWD computer system
6.	Monitor Surface Water Quality	During irrigation season (May-Sep) at Check 1: Boron <0.7, EC < 600, Chlorides < 100, Sodium < 70
7.	Survey farmers to see if additional soil moisture information is required.	Survey results by Feb 2008
10.	Include irrigation system data in annual crop survey	Report irrigation system type by crop
13.	Monitor Groundwater Elevations	Produce depth to water map annually and make available to landowners
14.	Monitor Groundwater Quality	Produce groundwater quality maps annually and make available to landowners
15.	Water Conservation Coordinator	Reports to Board on progress of water conservation plan
	PHYSICAL IMPROVEMENT	
16.	Continue to evaluate condition of flow measuring devices	Report annually on number of meters replaced.
21.	Maintain control for phreatophytic growth	Keep phreatophtyic growth to minimal levels
25.	Expand conjunctive use programs by completing Famoso banking project, phase 1 of western service, phase 1 of the Famoso service, and a feasibility study of new recharge basins near Reservoir C.	Famoso banking project, Western Service Area phase 1, and Famoso Service Area Phase 1 complete by July, 2007.
27.	Maintain monitoring and maintenance program for district pumps	Semi-annual report from Joint Electrical Services
28.	Increase use of reclaimed water	Work with oil companies to increase flows of acceptable quality of water by Dec 2008
	INSTITUTIONAL ADJUSTMENTS	
29	Maintain and promote communication and cooperation with others Agencies	No goal specified.
30.	Maintain fee structure that promotes good water management	Evaluate rate structure by November of each year
33, 35	Pursue additional financing mechanisms to facilitate construction of projects that promote good water management when the current round of projects near completion	Evaluate new project feasibility as needed but not later than Dec 2008
34.	Assist landowners in obtaining information on grant programs, low interest loans, energy efficiency programs etc.	Water conservation manager to compile a list of sources and disseminate to water users
36.	Reduce Irrigation of marginal lands by considering quality of agricultural land when requests are made to bring new land into the service area.	Work with landowners to discourage development of possibly marginal lands (Class 6 soils).
	NEW TECHNOLOGY	
39.	Cooperate with RCD to disseminate information on new technologies.	Water Conservation Coordinator to contact RCD to obtain information on new technologies and develop a plan for dissemination.

SECTION 6

CAWELO WATER DISTRICT

Groundwater Planning and Management

6.1 Plan Implementation

The Groundwater Management Plan serves as a mechanism for the cooperative efforts of the Plan participants and other public agencies of the Plan area within the Kern County Basin. The Plan has been prepared to provide historical data on all components that affect groundwater of the Plan area. Through the continuation of the annual groundwater level monitoring, the annual groundwater quality monitoring, the annual surface water monitoring and the inelastic land surface subsidence monitoring, using the monitoring protocols, changes or trends in the Plan area are readily identified, allowing adjustments in the monitoring protocols and Plan to fulfill the objectives of the Plan.

6.2 Poso Creek Integrated Regional Water Management Plan

Cawelo Water Disrict is a member of the Poso Creek Integrated Regional Water Management Plan group (Poso Creek IRWMP) along with seven (7) other public districts that overlie the portion of the Kern County Basin in the northerly portion of Kern County.

The public districts and their respective manager, acting as an Advisory Committee of the Poso Creek IRWMP, are listed as follows:

- Semitropic Water Storage District, Wilmar L. Boschman, General Manager
- Cawelo Water District, David Ansolabehere, General Manager
- Delano-Earlimart Irrigation District, Dale R. Brogan, General Manager
- Kern-Tulare Water District, Steven C. Dalke, General Manager
- North KernWater Storage District, Dana S. Munn, Engineer-Manager
- North West Kern Resource Conservation District, Brian Hockett, District Manager
- Rag Gulch Water District, Steven C. Dalke, General Manager
- Shafter-Wasco Irrigation District, Jerry Ezell, General Manager

The Regional Management Group conduct public meetings the first Tuesday of each month at the Semitropic Water Storage District (lead Agency) office.

The Poso Creek IRWMP supports the collective resolution of the Region's short-term and long-term water supply requirements through an integrated water resources plan for the improvement of the Region. The Districts' individually have conjunctively managed their respective surface water supplies made up of State Water Project water, Central Valley Project water, Kern River water and Poso Creek water in the Kern County Basin.

Since the supplemental surface water supplies available to the Region have different hydrologic basins, the integration of the water supplies, combined with conjunctive use in the common groundwater basin, offers the opportunity of increased surface water deliveries to the Region.

The Poso Creek IRWMP, Regional Management Group has detailed 28 proposed structural and non-structural actions for improvement of water resources for the Region. The actions for the Plan area include a pipeline connection between the Friant-Kern Canal and Cawelo Water District's distribution system along Hanawalt Avenue, and an additional pipeline between the Friant-Kern Canal and the proposed Poso Creek flood control reservoir above State Route 65.

6.3 Stakeholder Involvement

The management of water resources of a basin is based upon serving the stakeholders in a responsible manner. Implementation of the Cawelo Water District Groundwater Management Plan provides the opportunity for landowners and public districts of the groundwater basin to participate in the formulation and actions of the Plan through public noticed hearings and meetings of the Poso Creek IRWMP.

6.4 Land Use Planning

The intent of this Groundwater Water Management Plan is not to dictate land-use planning Policies, but rather to establish land-use planning goals that can aid in protecting and preserving the groundwater resource. Although the land-use planning authority is controlled by the County of Kern, the District has the opportunity of commenting on zoning and environmental documents that affect land-use of the Plan area. Land-use planning goals may include the following: (1.) preserving areas with high groundwater recharge potential for recharge activities; (2.) protecting areas sensitive to groundwater contamination; (3.) requiring hydrogeologic investigations, water master plans, and proven sustainable water supplies for all new developments; and (4.) requiring appropriate mitigation of any adverse impacts that a land use change would have on the groundwater resource.

California Water Code Section 10753.8 authorizes the inclusion in a Groundwater Management Plan the right to review and comment on land use plans of a controlling agency to assess activities that may create a reasonable risk of groundwater contamination in the Plan area.

6.5 Groundwater Reports & Plan Re-Evaluation

The monitoring data maintained by the Cawelo Water District provides the information for the preparation and updating of annual reports on groundwater levels, groundwater quality, surface water imported from all sources and surface water quality. The annual reports are submitted and reviewed with the Board of Directors of the Cawelo Water District. The landowners (stakeholders) of the District are invited to attend the meeting wherein the results of the monitoring programs are presented and discussed. Historical trends, changes, management actions and results along with proposed future management actions are reviewed, discussed and formulated in the annual meeting.

The annual meeting serves as a periodic re-evaluation of the Groundwater Management Plan. The effectiveness of the Plan may be measured by the conditions of the basin both in terms of groundwater levels and groundwater quality. Re-evaluation will be focused on the identification of changes in the Plan that could improve the groundwater resource and warrant modification of the Plan goals and Plan objectives.

6.6 Dispute Resolution

The District acknowledges that controversial issues could arise concerning the groundwater resource and the Groundwater Management Plan. Usually, disagreements can be resolved by compromise, particularly in the Plan area, due to the recognition by the Plan participants that the groundwater resource is the only dependable water supply of the Region.

No fixed rule exists concerning dispute resolution under a groundwater management plan. All disputes that arise under this Groundwater Management Plan, if not resolved by management, shall be settled by the Board of Directors of the Cawelo Water District.

6.7 Program Funding and Fees

Funding requirements for the implementation of this Groundwater Management Plan will be provided through the Cawelo Water District budget. The District has a variety of options for funding groundwater management projects as discussed below.

- Water Replenishment Fees. Included in the authority granted to local agencies under the California Water Code is the power to limit groundwater extractions and implement water replenishment fees based upon the amount of water extracted (extraction based on fees must first be approved by majority vote of impacted landowners). Inherent in these powers is the authority to implement metering of private wells. These are considered measures of last resort.

- Capital Improvement Fees. The District has the authority to finance capital improvement projects and collect repayment charges from the beneficiaries.

This process requires a favorable vote approving the repayment fees prior to implementation, and is considered a realistic alternative for funding large capital projects that would improve the groundwater conditions of the Plan area.

- Grants. Funding may be available from the DWR and other state agencies for projects that are consistent with the goals of the Groundwater Management Plan. The District will pursue available grants and low-interest loans from DWR as well as other state and federal agencies as considered feasible.

- Other Revenue Sources. Groundwater projects may also be financed through a variety of water user fees, assessments and development impact fees.

REFERENCES

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GLOSSARY

A

abandoned well - a well that has not been used for one year, unless the owner demonstrates intention to use the well again in accordance with the provisions of section 115700 of the California Health and Safety Code.

acre-foot (af) - equivalent to the volume of water which will cover 1 acre of land to a depth of 1 foot; an acre-foot of water equals 43,560 cubic feet or 325,851 gallons.

alluvium - a general geologic term describing stratified unconsolidated beds of sand, gravel, silt and clay deposited by flowing water.

aquifer - a body of rock that is sufficiently permeable to conduct groundwater and to yield economically significant quantities of water to wells and springs.

artificial recharge - addition of surface water to a groundwater reservoir by human activity, such as putting surface water into spreading basins or injecting water through wells.

B

beneficial use - the use of water for some domestic, agricultural, industrial, social, recreational or instream use. The SWRCB lists 23 types of beneficial uses with water quality criteria for those uses established by the RWQCBs. Water rights holders must demonstrate that the use is both reasonable and beneficial.

C

California Department of Water Resources (DWR) - oversees the State Water Project (SWP) and has the ability to implement, promote and encourage statewide water conservation. The DWR also has the responsibility for investigating groundwater conditions and recommending protective actions and the safety of non-federal dams. Updates the State Water Plan every 5 years.

chloride - A compound of chlorine and a positive radical of one or more elements. Useful in recognition of seawater in groundwater, chloride is the dominant anion of ocean water and normally occurs in only small amounts in groundwater.

confined aquifer - A water-bearing subsurface stratum that is bounded above and below by formations of impermeable, or relatively impermeable, soil or rock.

confined groundwater - groundwater that is under pressure greater than that of the atmosphere so that, if provided an upward escape route, it will rise above the interface between the top of the aquifer and the impermeable bed which confines it.

confining bed - a body of impermeable or distinctly less permeable material stratigraphically above one or more aquifers.

conjunctive use, conjunctive operation - the operation of a groundwater basin in combination with a surface water storage and conveyance system to maximize water supply. Water is stored in the groundwater basin for later use by intentionally recharging a basin when a water supply is available.

consumptive use - use of water in a manner that makes it unavailable for use by others, generally because of absorption, evaporation, transpiration or incorporation in a manufactured product.

contamination - the impairment of water quality as a result of the introduction of pathogens, chemical or industrial wastes, sewage or other pollutants in such concentrations that the water may eventually become unfit for its intended use or constitutes a public health hazard.

contour line - an imaginary line that connects points of equal value (e.g., land surface elevations) above or below a reference value or datum (e.g., sea level). Contour lines may also demonstrate variations in other quantifiable properties such as sediment characteristics, porosity or the texture of deposits.

D

deep percolation - precipitation that moves downward below the root zone towards storage in subsurface strata.

destroyed well - a well that is no longer useful and that has been completely filled in accordance with the procedures described in Section 23 of the California Well Standards, DWR Bulletin 74-81 and Bulletin 74-90 (supplement to Bulletin 74-81).

drought - a prolonged period of dry weather characterized by an absence or a deficiency in rainfall. There is no measure for determining a drought, but qualitatively it usually causes a partial crop failure, a hydrologic imbalance or an interference with the ability to meet established water demands.

E

evaporation - the vaporization of a liquid from a free surface at a temperature below the boiling point; a process that occurs whenever water in a liquid state comes into contact with the unsaturated atmosphere.

evapotranspiration - that portion of the precipitation return to the air through direct evaporation or by transpiration of vegetation, no attempt being made to distinguish between the two or consumptive use by vegetation.

G

groundwater - subsurface water occurring in the zone of saturation.,

groundwater basin - a groundwater reservoir, defined on the basis of geological and hydrological conditions and possibly consideration of political boundary lines. Often described as a basin or trough shaped structure that is filled with porous or permeable material that stores and transmits water.

groundwater management - the planned and coordinated management of a geographically defined groundwater system with the overall goal of long-term sustainability of the resource.

groundwater management plan - a comprehensive written document developed for the purpose of groundwater management and adopted by an agency having appropriate legal or statutory authority.

groundwater table - the surface between the zone of saturation and the zone of aeration or the level at which the hydraulic pressure of a body of unconfined groundwater is equal to atmospheric pressure. No water table exists if the upper surface of the zone of saturation is in contact with an overlying confining layer.

H

hydraulic conductivity (permeability coefficient) - the degree of permeability of a porous or waterbearing stratum, expressed as the rate of flow of water in gallons/day through a cross section of 1 square foot of a unit hydraulic gradient at either the prevailing temperature in the field or at a temperature adjusted to 60 degrees Fahrenheit or 15.6 degrees Centigrade. The conductivity can also be expressed in ft/day, cm/s or m/day.

hydraulic gradient - the slope or gradient of the water table or piezometric or potentiometric surface in the direction of greatest change. A gradient may be expressed as a ratio (vertical or horizontal), a fraction (feet per mile, meters/kilometer), percentage (vertical distance as a percentage of horizontal distance) or as an angle (degrees).

hydrogeology - the science that deals with subsurface waters, subsurface water quality and related geologic aspects of surface waters.

hydrograph - a time record of groundwater level or stream discharge at a given cross section of stream surface elevation, and at a given point. Stream hydrographs generally indicate rate of flow and represent stage, flow, velocity or other characteristics, while groundwater hydrographs represent water level or head.

hydrologic cycle - the process involving the continuous circulation of water from the oceans and the land surface of the Earth to the atmosphere through transpiration and evaporation, and its eventual return to the Earth's surface through various forms of precipitation.

hydrology - the study of the origin, distribution and circulation of water of the Earth including precipitation, streamflow, infiltration, groundwater storage and evaporation.

I

impermeable - a textural condition of rock, sediment or soil that makes it incapable of transmitting fluid under pressure. The cause is generally low porosity or the presence of small individual pores that lack connectivity.

imported water - water transported into a watershed from a different watershed. Native water is water that occurs naturally within a watershed.

irrigation - distribution of water to land through artificial means to enhance crop production, either where natural water sources are so deficient as to make crop production impossible or where it is advantageous to supplement the natural water supply at certain critical stages in the development of crops.

L

land subsidence - the lowering of a natural land surface in response to; Earth movements; lowering of fluid pressure (or lowering of groundwater level); removal of underlying supporting materials by mining or solution of solids, either artificially or from natural causes; compaction caused by wetting (hydrocompaction); oxidation of organic matter in soils; added load on the land surface; by tectonic activity; or by lithification.

M

MOU - memorandum of understanding

O

overdraft - the intentional or inadvertent withdrawal of water from an aquifer in excess of the amount of water that recharges the basin over a period of years, during which if continued over time could eventually cause the underground supply to be exhausted, cause seawater intrusion, cause subsidence, cause the water table to drop below economically feasible pumping lifts, or cause a detrimental change in water quality. Synonym: groundwater mining.

overdraft, critical conditions of - a groundwater basin in which the continuation of present practices would probably result in significant adverse overdraft-related environmental, social or economic impacts.

P

perched groundwater - unconfined groundwater separated from an underlying main body of groundwater by an unsaturated zone.

perennial yield - the maximum quantity of water that can be withdrawn annually from a groundwater resource under a given set of conditions without causing an undesirable result. The phrase "undesirable result" is understood to refer to a gradual lowering of the groundwater levels resulting eventually in depletion of the supply, subsidence, increased energy costs, desiccated wetland or degraded water supply.

permeability - the capability of soil or other geologic formation to transmit water.

phreatic zone - the zone beneath the water table in which the pore space is filled with water. Also referred to as the saturated zone.

pollution - contamination or other change in the physical, chemical or biological properties of a substance, especially water (including change in temperature, taste, color or odor) that may eventually impair its quality for use by ecosystem organisms or create a nuisance or make the substance detrimental to public health, safety or welfare. See contamination.

precipitation - the discharge of water, in either liquid or solid form, from the atmosphere to the surface of the Earth, including rain, drizzle, sleet, snow, snow pellets, snow grains, ice crystals, ice pellets, hail, dew and frost, usually measured in inches, hundredths of inches or millimeters of equivalent depth in water.

R

reasonable use - required by the California Constitution, Article X, Section 2, but a term which is not subject to a standard definition; one of the requirements that must be satisfied by any party asserting a water right in California. Primarily thought to refer to the method, manner, or means of use.

recharge - flow to groundwater storage from precipitation, infiltration from streams, irrigation, spreading basins, injection well and other sources of water.

recharge basin - a surface facility, often a large pond or other similar artificial basin used to increase the percolation of surface water into a groundwater basin thereby replenishing a groundwater supply.

Regional Water Quality Control Board (RWQCBs) - the primary state agencies that regulate water quality and which are operated pursuant to policies adopted or approved by the State Water Resources Control Board. The RWQCBs have authority to compel cleanup and abatement of groundwater pollution under the Porter-Cologne Water Quality Control Act.

return flow - the portion of withdrawn water not consumed by evapotranspiration or system losses which returns to its source or to another body of water.

S

salinity - generally, the concentration of mineral salts dissolved in water. Salinity may be measured by weight (total dissolved solids), electrical conductivity or osmotic pressure. Where sea water is known to be the major sources of salt, salinity is often used to refer to the concentration of chlorides in the water. See total dissolved solids.

salinity intrusion - the movement of salt water into a body of fresh water. It can occur in either surface water or groundwater bodies. There are six types of salinity intrusion, one of which is sea water intrusion.

salt water intrusion - the phenomenon occurring when a body of salt water, because of its greater density, invades a body of fresh water. It can occur either in surface or groundwater bodies. When groundwater is pumped from aquifers that are in hydraulic connection with the sea, the gradients that are set up may induce a flow of salt water from the sea toward the well.

saturated zone - the area below the water table in which the soil is completely saturated with groundwater.

specific yield - the ratio of the volume of water that a given mass of saturated rock or soil will yield by gravity to the volume of that mass.

spreading water - discharging native or imported water to a permeable area for the purpose of allowing it to percolate to the zone of saturation.

static groundwater level - the water level in a well that is not flowing or being pumped, generally the level immediately before pumping is started after being stopped for a period of time.

surface supply - water in reservoirs, lakes or streams; expressed either in terms of rate of flow or volume.

State Water Resources Control Board (SWRCB) - administrative agency with the primary responsibility for regulating and determining rights to surface water and subterranean stream flow. In addition, the SWRCB has primary responsibility for enforcing the constitutional reasonable use requirement.

T

total dissolved solids (TDS) - the quantity of minerals (salts) in solution in water, usually expressed in milligrams per liter or parts per million.

U

unconfined groundwater - groundwater that has a free water table at atmospheric pressure. It is not confined under pressure beneath relatively impermeable rocks or soil.

unsaturated zone - a subsurface soil zone, also called the vadose zone or the zone of aeration that lies above the zone of saturation (the water table). The interstitial water tends to move under gravity despite being held by molecular capillary forces. This zone of aeration is divided into the belt of soil water, the intermediate belt and the capillary fringe which is just above the zone of saturation.

usable storage capacity - the quantity of groundwater of acceptable quality that can be economically withdrawn from storage.

V

vadose water - water below the surface of the earth and above the water table, either held by the soil or percolating downward toward the water table through the vadose zone (unsaturated zone).

W

water banking - a water conservation and use optimization system whereby water is allocated for current use or stored in surface water reservoirs or in aquifers for later use. Water banking is a means of handling surplus water resources during wet years.

water conservation - reduction in applied water due to more efficient water use such as implementation of Urban Best Management Practices or Agricultural Efficient Water Management Practices. The extent to which these actions actually create savings in a water supply depends on how they affect total water use and depletion.

Appendix A
The Right to Use Groundwater in California

California does not have a statewide management program or statutory permitting system for groundwater. Some local agencies have adopted groundwater ordinances under their police powers, or have adopted groundwater management programs under a variety of statutory authorities.

Prior to a discussion of groundwater management, it is helpful to understand some of the laws governing the right to use groundwater in California. When the Water Commission Act of 1913 (Stats. 1913, Ch. 586)became effective in 1914, appropriative surface water rights became subject to a statutory permitting process. This appropriation procedure can be found in Water Code Section 1200 *et seq*. Groundwater classified as underflow of a surface stream, a "subterranean stream flowing through a known and definite channel," was made subject to the State permit system. However, most groundwater in California is presumed to be "percolating water," that is, water in underground basins and groundwater which has escaped from streams. This percolating water is not subject to a permitting process. As a result, most of the body of law governing groundwater use in California today has evolved through a series of court decisions beginning in the early 20th century. Key cases are listed in Table B-1, and some of the most significant are discussed below.

Table A-1 Significant court cases related to the right to use groundwater in California

Case	Issues addressed
Katz v. Walkinshaw, 141 Cal. 116 (1903)	Established Correlative Rights Doctrine. Correlative rights of overlying users, and surplus supply available for appropriation among non-overlying users.
Peabody v. City of Vallejo, 2 Cal. 2d 351 (1935)	Limited riparian rights under the reasonable and beneficial use requirement of the 1928 constitutional amendment; requirement of reasonable and beneficial use.
Pasadena v. Alhambra, 33 Cal. 2d 908 (1949)	First basin adjudication in California; established Doctrine of Mutual Prescription.
Niles Sand and Gravel Co. v. Alameda County Water District, 37 Cal. App. 3d 924 (1974)	Established right to store water underground as a servitude.
Techachapi-Cummings County Water District v. Armstrong, 49 Cal. App. 3d 992 (1975)	Modified the Mutual Prescription Doctrine articulated in Pasadena v. Alhambra. Overlying owners' water rights must be quantified on the basis of current, reasonable and beneficial need, not past use. By analogy to riparian rights, factors to be considered include: the amount of water available, the extent of ownership in the basin, and the nature of projected use.
Los Angeles v. San Fernando, 14 Cal. 3d 199 (1975)	Significantly modified Mutual Prescription Doctrine by disallowing it against public entities (Civil Code section 1007); established pueblo right above overlying owner right; established right to store imported water underground and recapture when needed above the right of overlying landowner.
Wright v. Goleta Water District, 174 Cal. App. 3d 74 (1985)	The unexercised water rights of overlying owners are protected from appropriators; notice and opportunity must be given to overlying owners to resist any interference with their rights.
Hi-Desert County Water District v. Blue Skies Country Club,	Retention of overlying right; no acquisition of prescriptive
23 Cal. App. 4th 1723 (1994)	right by overlying owner.
Baldwin v. Tehama County, 31 Cal. App. 4th 166 (1994)	City and County regulation of groundwater through police power. County limitations on export upheld.
City of Barstow v. Mojave Water Agency,	Held that in considering a stipulated physical solution
23 Cal. 4th 1224 (2000)	involving equitable apportionment, court must consider correlativerights of parties that did not join the stipulation.

This table modified from Bachman and others 1997

Katz v. Walkinshaw (141 Cal. 116)

In the 1903 decision, *Katz v. Walkinshaw*, the California Supreme Court rejected the English Common Law doctrine of groundwater rights and established the Doctrine of Correlative Rights. Prior to the *Katz* decision, California had followed the doctrine articulated in the 1843 English decision of *Acton v. Blundell* (12 M. & W. 324, 152 Eng. Rep. 1223), which established that landowners enjoyed absolute ownership of groundwater underneath their property. The 1903 decision rejected the English Common Law approach as unsuitable for the "natural conditions" in California, and instead established the Correlative Rights Doctrine analogous to a riparian right. Each overlying landowner was entitled to make reasonable beneficial use of groundwater with a priority equal to all other overlying users. Water in excess of the needs of the overlying owners could be pumped and used on nonoverlying lands on a first-in-time, first-in-right basis under what is known as an appropriative right. An appropriative groundwater right, unlike its surface water counterpart, is not subject to a permitting process. Where overlying owners made full use of available supplies, appropriative rights were extinguished. Where there was insufficient water to meet even the needs of the overlying owners, the court applied the Correlative Rights Doctrine to apportion the available groundwater among the overlying landowners. Figure B-1 depicts the rights to use groundwater established in *Katz v. Walkinshaw*.

City of Pasadena v. City of Alhambra (33 Cal. 2d 908)

The 1949 decision, *Pasadena v. Alhambra*, added significant complexity to the right to use groundwater in California. This decision, involving the adjudication of the Raymond Basin, established the doctrine of mutual prescription. Groundwater levels in the basin had been declining for many years by the time court action was initiated. Most substantial pumpers, both overlying and appropriators, were joined in the action. Previously, appropriators only had a right to water surplus to the needs of overlying users. However, based upon a stipulation by most of the parties, the court in *Pasadena* adopted a program of proportionate reductions. These appropriators had each effectively gained a prescriptive right, similar to that of surface water rights, in which they had taken the water in an open, notorious, and hostile manner for at least five years. Mutual prescription provided groundwater rights to both overlying users and appropriators in depleted groundwater basins by prorating their rights based on the highest continuous amount of pumping during the five years following commencement of the overdraft. All of the users in the Raymond Basin were thus entitled to extract their portion of the court-approved safe yield of the basin.

City of Los Angeles v. City of San Fernando (14 Cal. 3d 199)

In 1975, in *Los Angeles v. San Fernando*, the California Supreme Court significantly limited the Mutual Prescription Doctrine introduced in Pasadena v. Alhambra. This opinion had far-reaching impacts on both the right to use groundwater and the practice of conjunctive use of groundwater and surface water to manage a basin. The case began in 1955, when the City of Los Angeles sued the cities of San Fernando, Glendale, Burbank and other pumpers, asserting a prior right to the San Fernando Valley groundwater basins in the northern part of the City of Los Angeles. The court, relying on Civil Code Section 1007, held that public agencies and public utilities cannot lose their groundwater rights by prescription. This holding effectively ruled out any future "mutual prescription" settlements or judgments involving rights held by public entities.

With respect to the native water supply of the San Fernando Basin, the court found that the City of Los Angeles had prior rights to all of this supply pursuant to its "pueblo right." Pueblo rights are traceable to rights recognized by the Spanish crown and the Mexican government. Under the Spanish/Mexican system, water rights were held in trust by pueblos for the benefit of all of its inhabitants. Under the Treaty of Guadalupe Hidalgo executed by Mexico and the United States in 1848, the municipal successors to Spanish/ Mexican pueblos retained their pueblo rights upon the cession of California. In the San Fernando decision, the court confirmed Los Angeles' pueblo right, finding it superior to the rights of all overlying landowners. While a pueblo right is rare, it is an example of the complexity of the rights to use groundwater in California.

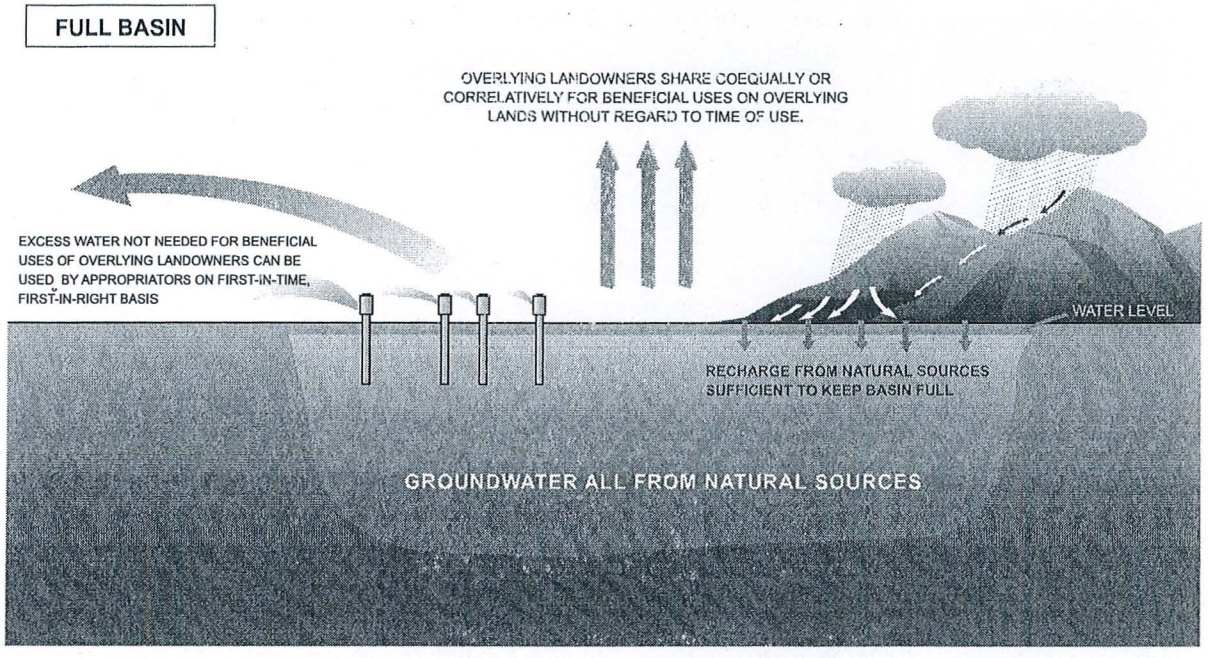

Figure A-1 Rights to groundwater use in full basin established in Katz v. Walkinshaw

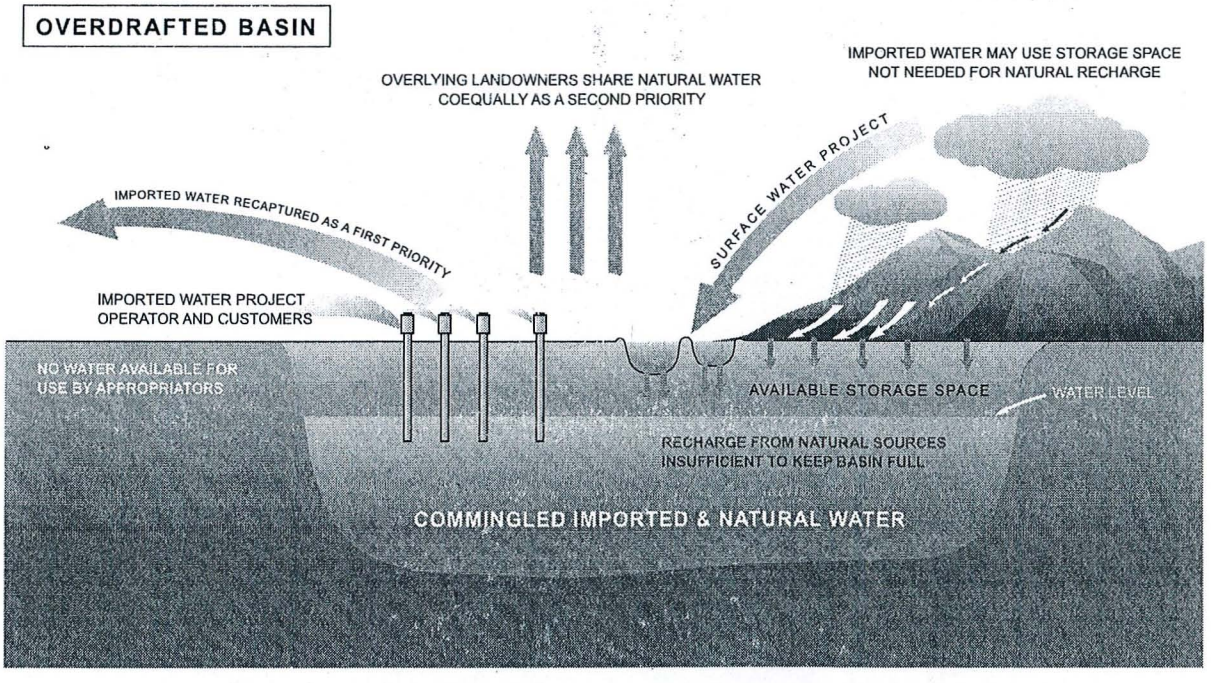

Figure A-2 Rights to groundwater use in overdrafted basin established in Los Angeles v. San Fernando

For the future of conjunctive use of groundwater basins, the court's holding with respect to the rights to available storage space in the Basin is significant. The court upheld the right of public agencies – namely the cities of San Fernando, Los Angeles, Burbank, and Glendale–to recapture the imported water they added to the Basin. The court held that the rights of the respective public agencies to recover such imported water are of equal priority to the City of Los Angeles' pueblo right, and that all such public agency rights are "prior to the rights dependent on ownership of overlying land or based solely upon appropriation of groundwater from the basin." The court remanded the case, directing the trial court to apportion the safe yield of the Basin accordingly.

The court noted that there did not appear to be any shortage of underground storage space in relation to the demand and, hence, the court did not find it necessary to determine priorities as to the future use of such space. The Judgment issued by the trial court on remand, however, provided: "To the extent of any future spreading or in lieu storage of import water or reclaimed water by Los Angeles, Glendale, Burbank or San Fernando, the party causing said water to be so stored shall have a right to extract an equivalent amount of ground water from the San Fernando Basin." Pursuant to the Judgment, a court-appointed Watermaster now manages the groundwater extraction and storage rights within the ULARA. Figure B-2 depicts the rights to use groundwater established in Los Angeles v. San Fernando in an overdrafted basin where water has been stored.

City of Barstow v. Mojave Water Agency (23 Cal. 4th 1224)

In 2000, the California Supreme Court partially overturned the 1995 adjudication of the Mojave River Basin. The trial court had approved a negotiated settlement (or stipulated agreement) that failed to include a well-by-well determination of water rights. The trial court held the negotiated settlement to be binding on all users in the basin, including some pumpers who had not agreed to the settlement. The lower court decision was based on the doctrine of "equitable apportionment," in which the available water is shared based on concepts of equity and fairness. The Court of Appeal had partially reversed the lower court, and held that the trial court did not have the authority to ignore California's traditional water rights doctrine giving overlying users a priority right to beneficial and reasonable use of the groundwater. The Court of Appeal affirmed the trial court's negotiated settlement except as it applied to two of the parties. First, the Court of Appeal reversed the holding against a non-negotiating party since the trial court had ignored that party's existing overlying water rights. Secondly, the Court of Appeal reversed the trial court's judgment as it applied to a company, where the negotiated agreement did not give the company a water-allowance equal to its actual water use. The Supreme Court affirmed the Court of Appeal decision, but reversed the judgment applying to the company's water-allowance. The Supreme Court also affirmed that the trial court could not apply the doctrine of equitable apportionment when overlying water users had already established a prior water right. The Court stated that, while the trial court could impose a physical solution (such as the negotiated settlement), the court could not simply ignore affected owners' legal water rights. Equitable apportionment, thus, remains a tool for adjudicating basin groundwater rights, but only if all parties stipulate to its use.

Appendix B
Required and Recommended Components of Local Groundwater Management Plans

Section 10750 et seq. of the Water Code, commonly referred to as Assembly Bill 3030, stipulates certain procedures that must be followed in adopting a groundwater management plan under this section.

Amendments to Section 10750 et seq. added the requirement that new groundwater management plans prepared under Section 10750 et seq. must include component 1 below (SB1938 (Stats 2002, Ch 603)).

In addition, the amendments mandate that if the agency preparing the groundwater management plan intends to apply for funding administered by the California Department of Water Resources (DWR) for groundwater or groundwater quality projects, the agency must prepare and implement a groundwater management plan that includes components 2, 3, 6, 7 and 9 below. DWR recommends that all the components below be included in any groundwater management plan to be adopted and implemented by a local managing entity.

Consideration and development of these components for the specific conditions of the basin to be managed under the plan will help to ensure effective groundwater management. In developing these criteria, DWR recognizes that the goal of a groundwater management plan and the goal of an ordinance to manage groundwater should be the same—assurance of a long-term, sustainable, reliable, good quality groundwater supply. Such efforts can benefit greatly from cooperative management within the basin or region.

None of the suggested data reporting in the components below should be construed as recommending disclosure of information that is confidential under State law.

1. Include documentation that a written statement was provided to the public "describing the manner in which interested parties may participate in developing the groundwater management plan," which may include appointing a technical advisory committee (Water Code § 10753.4 (b)).

2. Include a plan by the managing entity to "involve other agencies that enables the local agency to work cooperatively with other public entities whose service area or boundary overlies the groundwater basin." (Water Code § 10753.7 (a)(2)). A local agency includes "any local public agency that provides water service to all or a portion of its service area" (Water Code § 10752 (g)).

3. Provide a map showing the area of the groundwater basin, as defined by DWR Bulletin 118, with the area of the local agency subject to the plan as well as the boundaries of other local agencies that overlie the basin in which the agency is developing a groundwater management plan (Water Code § 10753.7 (a)(3)).

4. Establish an advisory committee of stakeholders (interested parties) within the plan area that will help guide the development and implementation of the plan and provide a forum for resolution of controversial issues.

5. Describe the area to be managed under the plan, including:
   a. The physical structure and characteristics of the aquifer system underlying the plan area in the context of the overall basin.
   b. A summary of the availability of historical data including, but not limited to, the components in Section 7 below.
   c. Issues of concern including, but not limited to, issues related to the components in Section 7 below.
   d. A general discussion of historical and projected water demands and supplies.

6. Establish management objectives (MOs) for the groundwater basin that is subject to the plan. (Water Code § 10753.7 (a)(1)).

7. Include components relating to the monitoring and management of groundwater levels, groundwater quality, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping. (Water Code § 10753.7 (a)(1)). Consider additional components listed in Water Code § 10753.8 (a) through (l).

8. For each MO, describe how meeting the MO will contribute to a more reliable supply for long-term beneficial uses of groundwater in the plan area, and describe existing or planned management actions to achieve MOs.

9. Adopt monitoring protocols for the components in Section 7 (Water Code § 10753.7 (a)(4)). Monitoring protocols are not defined in the Water Code, but the section is interpreted to mean developing a monitoring program capable of tracking changes in conditions for the purpose of meeting MOs.

10. Describe the monitoring program, including:
    a. A map indicating the general locations of any applicable monitoring sites for groundwater levels, groundwater quality, subsidence stations, or stream gages.
    b. A summary of monitoring sites indicating the type (groundwater level, groundwater quality, subsidence, stream gage) and frequency of monitoring. For groundwater level and groundwater quality wells, indicate the depth interval(s) or aquifer zone monitored and the type of well (public, irrigation, domestic, industrial, monitoring).

11. Describe any current or planned actions by the local managing entity to coordinate with other land use, zoning, or water management planning agencies or activities (Water Code § 10753.8 (k), (l)).

12. Provide for periodic report(s) summarizing groundwater basin conditions and groundwater management activities. The report(s), prepared annually or at other frequencies as determined by the local management agency, should include:
    a. Summary of monitoring results, including a discussion of historical trends.
    b. Summary of management actions during the period covered by the report.
    c. A discussion, supported by monitoring results, of whether management actions are achieving progress in meeting MOs.

d. Summary of proposed management actions for the future.
e. Summary of any plan component changes, including addition or modification of MOs, during the period covered by the report.
f. Summary of actions taken to coordinate with other water management and land use agencies, and other government agencies.

13. Provide for the periodic re-evaluation of the entire plan by the managing entity.

14. For local agencies not overlying groundwater basins, plans should be prepared including the above listed components and using geologic and hydrologic principles appropriate to those areas (Water Code § 10753.7 (a)(5)).

Appendix C

CAWELO WATER DISTRICT

RULES AND REGULATIONS FOR DISTRIBUTION OF WATER (Amended February 8, 2000)

As authorized by the provisions of Section 35423 of the California Water Code, the Board of Directors of Cawelo Water District hereby adopts and establishes rules and regulations for the distribution of water by Cawelo Water District.

I.

DEFINITIONS

1. "Agent Authorization Form" means the form supplied by the District for a Landowner to designate authorized agents, including a Designated Representative.

2. "Agricultural Use" means use of water in the growing and producing of agricultural crops and products.

3. "Assessment" means the per acre charge upon land in the District (both the Service Area and the Non-Service area) fixed and levied by the Board pursuant the California Water Code.[1]

4. "Board" means the Board of Directors of Cawelo Water District.

5. "Canal Service Area" means lands served through turnouts directly from the Lerdo Canal.

6. "Designated Representative" means a person or entity designated as such by a Landowner on an Agent Authorization Form to act on behalf of the Landowner in all matters relating to obtaining District water for Agricultural Use on the Landowner's Farm, including applying for water, ordering water, accepting delivery of water, paying District Water Charges, and communicating with the District. Provided, however, the Designated Representative may not bring land into or exclude land from the District Service Area.

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[1]See sections 35359, *et seq.*

7. "District" means the Cawelo Water District, a California Water District organized and existing pursuant to law, its agents, representatives, Directors and employees.[2]

8. "District Delivery Capacity" means the extent of capability of a District distribution facility to pump, carry, store, deliver or otherwise make available District water to Water Users for Agricultural Use at any given time.

9. "District Manager" means the person who is appointed by the Board of Directors to carry out the policies and directives of the Board, or someone who is acting in that capacity in the District Manager's absence.

10. "Farm" means a single parcel of land, or contiguous parcels of land (no part of which is merely cornering another part), or non-contiguous parcels being served through a single District Turnout , the title or the equitable ownership to which is held of record in a single ownership.

11. "Landowner" means a holder of title to land as defined in the California Water Code.[3]

12. "Meter" means a measuring and recording device for determination by the District of the quantity of water delivered by the District through a Turnout.

13. "Non-Service Area" means those lands within the boundaries of the District which have been designated by the Board as developed for water use, but are not in the Service Area.

14. "Non-Service Area Water" means the water allocated to water users in the Non-Service Area, after the District meets the demands for Service Area Water, deliverable at the Non-Service Area Water Toll rate.

15. "Non-Service Area Water Toll" means the charge per acre foot for Non-Service Area Water.

16. "North Service Area" means lands served by the District's Pump Station "C."

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[2]Division 13 of the California Water Code.

[3]Section 34026 of the California Water Code.

17. "Service Area" means those lands within the boundaries of the District to which surface delivery of water service will be made available pursuant to these rules and regulations, under the plan for water allocation adopted by the Board.[4]

18. "Service Area Water" means the quantity of water allocated to Water Users within the Service Area to satisfy Water User applications and deliverable at the Service Area Water Toll rate.

19. "Service Area Water Toll" means the charge per acre foot for Service Area Water.[5]

20. "South Service Area" means lands served between the District's Pump Station "B" and the District's Pump Station "C."

21. "Standby Charge" means the per acre charge upon land in the Service Area fixed and levied by the Board for making water delivery service available, whether the water is actually used or not.[6]

22. "Supplemental Water" means any water available for delivery to lands within the District boundaries other than the water available annually under the District's water supply contracts.

23. "Supplemental Water Toll" means the charge per acre foot for Supplemental Water.

24. "Turnout" means a device owned and operated by the District and used to deliver water from a District facility to a Farm.

25. "Water Charges" means Standby Charges, Water Tolls, and Assessments fixed, levied, and collected by the District, which Water Charges can be enforced as liens upon the subject land.[7]

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[4] Section 35526 of the California Water Code

[5]Section 35470 of the California Water Code.

[6]Section 35470 of the California Water Code

[7]Sections 36726, 36729, 35470, and 35470.5 of the California Water Code

26. "Water Shortage" means a condition where total Water User applications for water use in the Service Area received by March 1st exceed the sum of the water supplies expected as a result of the District's contractual water supplies.

27. "Water User" means a Landowner or Designated Representative who uses water delivered by the District on lands within the District's boundaries.

28. "Year" means calendar year.

II.

SERVICE AREA

From the District's inception, it has not been intended that the District would supply all of the lands within its boundaries with water or to provide a full water supply to the serviced lands. Therefore, in order to provide cost effective service, the Board has designated the District's Service Area.[8] Only some of the lands in the District are in the Service Area. The Board shall maintain a Service Area designation, which shall be available for inspection at the District office by anyone during regular business hours. Maps of the Service Area are available from the District's office. From time to time, the Board may consider the modification of the boundaries of the Service Area, by either adding lands thereto or removing lands therefrom.

The Service Area has the first priority for delivery of District water and the first priority for the use of District Delivery Capacity as described in Sections IV and V of these Rules and Regulations. The water tolls vary between the Service Area and the Non-service Area as described in Section VI of these Rules and Regulations.

Requests to add lands to or remove lands from the Service Area shall be submitted in writing, signed by the Landowner, to the Board of Directors. The Board may modify the Service Area boundaries independently of Landowner requests. The Board shall have a public hearing before taking such actions. Owners of land affected by the proposed change shall receive written notice of the hearing.

III.

APPLICATIONS FOR WATER

Water Users in the Service Area shall file with the District by February 1st each Year, applications for delivery of Service Area Water, subject to availability, for that Year on forms provided by the District. Water Users should consider possible capacity constraints

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[8]California Water Code Sections 35525 through 35531.

when submitting applications for water delivery. The Board may determine an allocation for Water Users in the Service Area who do not submit a timely application. Any such determination by the Board shall be final.

Water Users in the Non-Service Area may file with the District, on forms provided by the District, their applications for delivery of Non-Service Area Water. Applications for Non-Service Area Water shall be submitted by February 1st to receive the highest priority for such water. Such applications shall be accompanied by deposits in an amount fixed by the Board. If the District is unable to acquire all of the water for which a deposit is made, the District will credit or reimburse the Water User for the excess deposit, i.e., that portion of the deposit relating to water that was applied for but is unavailable. The District shall not deliver any Non-Service Area Water to a Landowner unless all of the charges for the such water have been paid in advance.

The Board shall review the applications and the projections of available water supplies after February 1st and determine the allocation on a per-acre basis. Water Users shall be notified of their final allocation no later than April 30th each Year.

If not all Water User applications can be filled from available supplies due to a water shortage, the District will attempt to obtain Supplemental Water. If the District is successful in obtaining Supplemental Water, it will notify Water Users of each block of Supplemental Water as it becomes available. The notification will usually include information on price and limitations on supply, if any. Water Users may opt to purchase Supplemental water by responding by the date indicated on the District's notification of availability. A form will be supplied by the District for making such response.

IV.

PRIORITIES FOR RECEIVING DISTRICT WATER

Priorities for receiving District water each Year are as follows:

1. The first priority is for use within the Service Area, which has been ordered or deemed ordered by February 1st of each year, allocated, if necessary, in proportion to standby acreage.

2. The second priority shall be for use outside the Service Area ordered by February 1st of each year, allocated, if necessary, in proportion to assessed acreage.

If, after the District has notified the Water Users of their final allocation, water supplies to the District are reduced, supplies to the Non-Service area shall be reduced before reducing supplies to the Service Area. Payments made for supplemental Water shall be refunded to Landowners in proportion to the reduction.

If multiple Water Users require additional water, each block of Supplemental Water shall be allocated first to the Service Area and then to the Non-Service Area. Within each priority, Water User applications shall be treated equally if submitted within the response time designated by the District. Absent a known demand by multiple Water users, the priority for Supplemental Water applied for after February 1st shall be on a "first come, first served" basis.

The District Manager's decisions respecting the proper distribution of any water, shall be final and conclusive, and there shall be no liability on the part of the District for any failure or alleged failure to distribute any water in accordance with any of said priorities.

V.

PRIORITIES FOR USE OF DISTRICT DELIVERY CAPACITY

District Landowners shall have the same priorities for the use of related District Delivery Capacity as they have for receiving District water. Except as expressly authorized by the Board, the District shall not wheel another district's water through District distribution facilities during times the District distribution facilities are at capacity transporting District water.

VI.

WATER CHARGES

The Board shall set an assessment levied on a per acre basis on all the lands in the District; a Standby Charge levied on all lands in the Service Area; Service Area Water Tolls levied per acre foot for Service Area Water; and Non-Service Water Tolls levied per acre foot for Non-Service Area Water. Supplemental Water Tolls may be set by the Board from time to time and may vary within a year as additional sources of water become available to meet District demands.

Where a Farm is comprised of both Service Area and Non-Service Area land, deliveries to that Farm exceeding 3.0 acre feet per acre of Service Area Land shall be charged the Non-Service Area Water Toll.

Before the adoption of the District's budget for the subsequent year and before the fixing the Water Charges, the Board shall duly call and notice public hearings at which all interested persons may appear and be heard. Following said hearings, the Board shall adopt its budget and fix the Water Charges.

As a courtesy to Water Users, the District shall collect current Water Charges in accordance with the following procedure:

3. Written notice of Water Charges shall be given sufficiently in advance that the payor has not less than 45 days between the date of notice and the

due/delinquency date of the first installment. Bills for Standby Charges should be sent, as near as practical, during the second week of November of each Year.

4. The due/delinquency date for payment of the first installment of Standby Charges should fall, as near as practical, on the first Thursday of January in each Year.

5. If Standby Charges remain unpaid within two days of the delinquency date, the District will attempt to provide a phone call to each Water User; provided, however, (i) the District will make one attempt to reach the Water User; (ii) the District will not be responsible for failure to reach such Water User by telephone; (iii) the District will use the phone number on the Authorized Agent form on file with the District for the purpose of such call; and (iv) telephone notice is a courtesy only and the failure of the District to give or the Water User to receive such notice will not be sufficient grounds, in and of itself, to warrant waiver of delinquency penalties.

In the event of a Water Shortage, the Board may revise the Water Tolls. If the Water Tolls are revised, Landowners shall have the opportunity to revise their applications for Water Delivery.

VII.

CHANGE OF PLACE OF USE OF WATER WITHIN THE DISTRICT

The proposed place of use of any type of water may be changed in whole or in part to another Farm within the District located either within or outside the Service Area with the consent of the District Manager. Requests for change of place of use shall be submitted to the District Manager on a form supplied by the District. Standby Charges shall not be changed or otherwise affected by such change of place of use. The District Manager will not refuse to consent to such change of place of use unless he or she is of the opinion that such change would adversely affect another Water User. (For example, the change in the place of use which results in an increase in acreage served in the North Service Area when it is "on allocation," would normally have adverse impacts to other Water Users.)

Water Toll differentials between the North Service Area, the South Service Area, and the Canal Service Area shall be taken into account where appropriate. Differentials between the Water Toll and the Supplemental Water Toll shall be taken into account when water originally allocated to the Service Area is delivered to the Non-Service Area, unless the Service Area Land is fallowed.

VIII.

USES OF SURPLUS LANDOWNER WATER

If a Water User has surplus water (water that has been ordered and paid for but not needed in the current Year), the Water User may, after notifying the District in writing:

1. Transfer or sell the surplus water to another Water User within the boundaries of the District.

2. Return the surplus water to the District by August 31st. The District shall pool all such water, attempt to sell all such water inside or outside the District, return any revenues to Water Users in proportion to the quantity of water each Water User returned to the District before August 31st. In no case shall the refund to the Water User exceed the Water Toll, nor shall it be less than the refund calculated below.

3. Return the surplus water to the District after August 31st. The District shall pool all such water, attempt to sell such water inside or outside the District after selling all surplus water described in VIII.2. above, and return any revenues to the Water Users in proportion to the quantity of water each Water user returned to the District after August 31st. In no case shall the refund to the Water User exceed the Water Toll, nor shall it be less than the refund calculated below.

4. Subject to approval by the Board, and other necessary approvals, the Water User may transfer water from the District to land in substantially the same ownership outside the District. Among other concerns, the Board will require that all demands for water inside the District have been met before approving such a transfer and that groundwater conditions will not be adversely impacted.

If a Water User does not sell, exchange, transfer or return surplus water to the District, the Water User shall receive a refund, calculated by the District, equivalent to the variable delivery costs that were avoided by non-delivery. The refunds shall be calculated by service area so that each Landowner in each service area receives the same refund per acre foot.

IX.

AUTHORIZATION TO ACT FOR LANDOWNER

A Designated Representative is a person or entity (e.g., a management company), designated by the Landowner on the Agent Authorization Form supplied by the District, to act for the Landowner in all matters relating to obtaining District water for Agricultural Use

on the Landowner's Farm, including applying for water, ordering water, accepting delivery of water, paying District Water Charges, and communicating with the District. The Designated Representative is not authorized to submit requests to bring land into or remove land from the Service Area. The Landowner does not forego its powers or authority by naming a Designated Representative and the designation may be modified or withdrawn at any time by the Landowner upon notice in writing to the District.

Agent Authorization Forms shall be completed an delivered to the District by January 1st of each year. If a new form is not submitted by January 1st of a given year, the District shall rely on the most recently submitted form.

X.

SUBDIVISION OF FARMS IN SERVICE AREA

Problems may arise when a Landowner constructs a facility to distribute water on the Landowner's Farm and the Farm is subsequently subdivided and sold. For example, the facility may have insufficient capacity or the meter may be inaccurate. To help avoid such problems, the District will not recognize a subdivision of a Farm that requires shared use of an existing District turnout until the plans for the delivery facility and the meter have been approved by the District.

For the foregoing reason, if a Farm located within the Service Area is subdivided into different ownerships held by holders of title and equitable owners,[9] the District will continue to fix, levy and collect Standby Charges with respect to said Farm the same as if such subdivision had not occurred. Also the District will continue to allocate water to the Farm the same as if no subdivision had occurred.

In no event shall the District be held liable for any failure to receive notice of any such subdivision or for any delay in failing to recognize any part of such subdivided land. It shall be the sole responsibility and liability of the subdividing Landowner to make timely notification to the subdivided parcel purchaser of these rules and regulations and the special assessment policies of the District. The District shall seek indemnity from any cost or expense to the District resulting from the failure of a subdividing Landowner to notify the District immediately of any subdivision of land within the Service Area of the District.

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[9]Section 34026 of the California Water Code.

XI.

CONSTRUCTION OF ADDITIONAL DISTRIBUTION FACILITIES

Except for a major distribution facility, which in the opinion of the Board will directly benefit a substantial number of Landowners within the District, any addition to the existing District distribution facilities which a Landowner requests in order to obtain delivery of water to his or her land shall be paid for by the requesting Landowner pursuant to terms and conditions set by the Board, whether such request derives from a subdivision of land within the Service Area or otherwise.

XII.

NO WATER IF DELINQUENT WATER CHARGE OR ASSESSMENT

The District will not deliver any water for use upon any Farm as to which there exists any delinquent Water Charge or District special assessment as to any part of said Farm. Any refunds due on a delinquent Farm shall be credited first to the delinquent charges.

XIII.

NO LIABILITY FOR SHORTAGES IN WATER, FAILURE TO DELIVER WATER, OR LACK OF AVAILABLE DELIVERY CAPACITY

In the event of water shortage or a shortage of related capacity in District distribution facilities, the available District water or related capacity shall be prorated proportionately on a per acre basis respectively within each of the two priority categories affected and in the order of priority. In no event shall the District be liable for any damage directly or indirectly caused by any failure of the District to deliver water to anyone for any reason whatsoever, whether or not by alleged failure to observe the water or capacity priorities as herein provided.

The obligation of the District to deliver District water pursuant to the District's rules and regulations shall be limited to the extent that the necessary water and distribution facilities are available, and neither the District nor any of its directors, officers, agents and employees shall be liable for any damage caused by any failure to deliver District water so long as the District and its officers, agents and employees have not acted in an arbitrary, capricious or unreasonable manner with respect to the cause or reason for any such failure to deliver District water.

XIV.

WATER QUALITY, DISCLAIMER AND INDEMNITY

Water shall be delivered by the District for Agricultural Use only. Water supplied by the District is not potable or fit for domestic use, and it may not be fit for stockwatering or mixing with pesticides.

The District makes no warranty or representation whatsoever as to quality or fitness for use or purpose of the water it delivers.

Should a Water User use or permit use of District water for any purpose other than Agricultural Use as defined in Section I.2, such Water User or Landowner shall be solely responsible for any damage, injury, loss or expense of whatever nature resulting directly or indirectly from the District water being used for such other purpose or use. The District shall seek indemnity from any cost or expense to the District resulting from the failure of a Water User to adhere to this rule.

XV.

WATER DELIVERY OPERATING RULES

1. No facility of the District, whether a Turnout, a Meter or other facility, may be modified in any manner whatsoever without the prior written consent of the District Manager.

2. To the extent possible, the District will attempt to start and stop delivery of water as requested by Water Users but will not incur unusual costs to do so. To ensure delivery, and to avoid unnecessary expense to the Water User, at least 48 hours advance notice should be given for delivery and shut-off.

3. In the event a Water User requests the District to shut off his or her water because of an emergency, if reasonably possible the District will hold the subject water for a reasonable time, but otherwise the water will be released by District in a spill condition and the Water User must initiate a new order for water if and when desired; however, any water so spilled will be charged against the Water User's Allocated Water or ordered Supplemental Water.

4. If District water is ordered and the ordering Water User for any reason decides not to take the water, the District will attempt to deliver the water elsewhere, but if such is not reasonably possible in the opinion of the District Manager, the original ordering Water User will have to pay for the water even though he or she did not receive it.

5. In an emergency situation the District may shut off Turnouts without notice to Water Users, but in such case the District will make a reasonable effort to notify such affected Water Users in advance.

6. Water Users who connect to a District Turnout are advised to have protective devices on their distribution system so that if the Turnout is shut off without notice it will not cause damage to the Landowner's delivery system. The District shall not be responsible for damage resulting from failure to install such a device.

7. If a Water User hooks up solid to a District Turnout without an air gap, the Water User must install a back flow preventative device sufficient to protect the District's facility.

8. If a Water User is injecting fertilizer into his system which is connected to a District facility, the Water User must have installed an adequate back flow preventative device.

9. If a Water User has a water recovery system, he or she must maintain a back flow preventative device to prevent possible contamination of District water within its system.

10. If a Water User or Landowner operates any equipment or performs any act over, upon, at or near a District facility, in a manner which could cause damage to such District facility, then the Water User or Landowner must notify the District of such intention at least 48 hours in advance of any such act or operation. Irrespective of any such notice, each Water User and Landowner shall indemnify and hold the District harmless from any damage to a District facility resulting from any act, or operation of any equipment, caused by the Water User or Landowner.

11. It is understood that District personnel must from time to time enter upon Water Users' property with respect to the operation of the District's facilities and it is understood that all Landowners shall provide such access to water Meters, Turnouts, and related facilities.

12. Each Water User shall be responsible for controlling and disposing of tail water and filtration flush water on his or her property. Tail water and flush water shall not be allowed to collect upon District right-of-ways nor shall such water be returned to District facilities without written permission from the District being first obtained. Deliveries of District water to Water Users who fail to comply with this provision may be terminated until the problem is corrected.

XVI.

CHANGES IN RULES AND REGULATIONS

These rules and regulations are effective as of the amendment date first above written and may be changed by resolution of the Board of Directors of District duly adopted according to law.

XVII.

ENFORCEMENT OF RULES AND REGULATIONS

In addition to all remedies available pursuant to applicable law, the District reserves the right and privilege to discontinue or refuse to deliver District water for use upon a Farm or part thereof with respect to which place of use the Water User is in violation of any of these rules and regulations, in the good faith opinion of the District Manager, which opinion shall be conclusive and binding with respect to both the existence of any such violation and the duration thereof.

No Water User or Landowner or any other person or entity shall have any claim or cause of action of any nature whatsoever against either the District or the District Manager as a result of any claimed injury or damage caused by, arising out of or related to any such discontinuance of or refusal to deliver District water. Acceptance of water service under these Rules and Regulations shall be conclusive proof of Water User's and/or Landowner's agreement to said Rules and Regulations.

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CAWELO WATER DISTRICT
KERN COUNTY, CALIFORNIA

DISTRIBUTION FACILITIES MAP

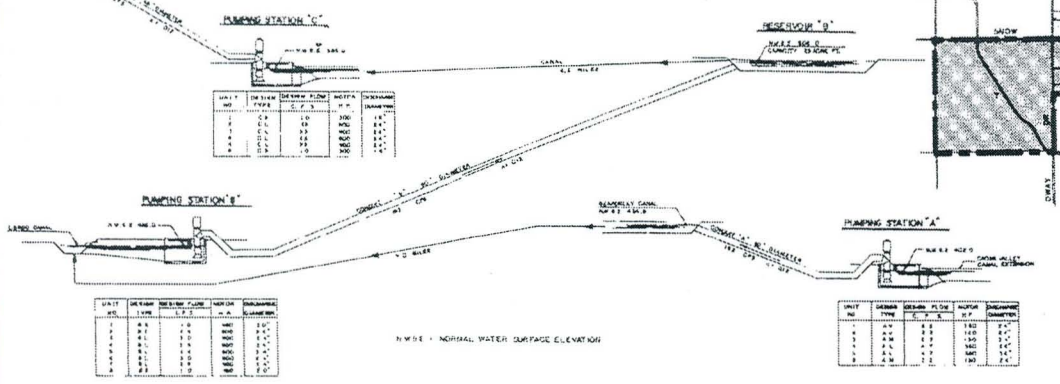
PLATE NO. 2-2

R. L. SCHAFER & ASSOCIATES INC.
CIVIL ENGINEERS PLANNERS
P.O. BOX 1358, PORTERVILLE, CALIFORNIA, 93257
P.O. BOX 3229, VISALIA, CALIFORNIA, 93277

DRAWN BY: G. K. LASURE
DATE: FEB. 1980
SCALE: 1" = 2000'
CHECKED: D. T. G.

MARK	DATE	REVISION	MARK	DATE	REVISION

HYDRAULIC SCHEMATIC



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