CONSOLIDATED IRRIGATION DISTRICT

GROUNDWATER MANAGEMENT PLAN

JULY 26, 1995

Summers Engineering, Inc.
Consulting Engineers
Hanford, California

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INTRODUCTION

The Consolidated Irrigation District (District), was organized on September 8, 1921, in accordance with the Irrigation District Law of the State of California as outlined in the Water Code. The District is located in the San Joaquin Valley, principally in Fresno County, with minor portions in Kings and Tulare Counties. The City of Fresno is approximately five miles northwesterly of the District's northern boundary. A District map is attached as Plate 1. This map shows the District boundary along with the principal conveyance facilities. At present, the irrigable acreage in the District is approximately 140,000 acres. Nearly 92,000 acres (gross) are capable of receiving a surface water supply derived from Kings River water rights. The balance of the District, approximately 53,000 acres (gross), obtains its water supply solely from groundwater. In years when a minimal surface supply is available, District landowners have the capability of pumping groundwater to meet their irrigation requirements. The District does not own or operate any production wells. All lands that obtain a supply from groundwater, do so by the use of private wells.

GROUNDWATER MANAGEMENT PLAN GOALS

The Consolidated Irrigation District held a public hearing on August 5, 1993 to discuss the District's intent to prepare a groundwater management plan in

accordance with AB 3030 (California Water Code Section 10750 et seq.). The proposed plan would expand upon the existing and ongoing groundwater management of the District. The objective of the plan is to monitor and analyze groundwater use and trends and to recommend any necessary actions for the wise use of groundwater resources within the exterior boundaries of the service area. In developing and implementing a groundwater management plan, the District will consider the plan's impact on business activities including its impact on agricultural operations.

The AB 3030 legislation authorized local agencies that provide water service in a groundwater basin to adopt and implement a groundwater management plan. Several local communities are located within the District boundaries as indicated on Plate 1. Incorporated cities include Sanger, Fowler, Selma, Kingsburg, and Parlier. Unincorporated communities include Caruthers, Del Rey, and other rural residential clusters. The District encompasses all of these communities and it is the District's goal to develop a groundwater management plan which addresses agricultural water supply concerns and issues as well as the water quality and supply issues which are of concern to the cities and rural communities. The desire is to have a groundwater management plan developed, managed, and monitored by a local agency rather than a mandated groundwater management plan administered by the State of California.

There is recognition by local agencies that the availability and recharge of groundwater supplies is dependent on the availability and delivery of surface water supplies by the District. The District plans to implement a coordinated groundwater management plan for the area. In compliance with AB 3030 requirements, the District will meet at least once each year to coordinate its groundwater management plan with local agencies in the basin that have also prepared such a plan.

The preparation and implementation of this groundwater management plan shall not be interpreted as authorizing the District to make a determination of groundwater rights for any person or entity. The groundwater management plan, as adopted, will not authorize the District to limit or suspend any groundwater extractions unless the District has determined through study and investigation that groundwater replenishment programs or other alternative sources of water supply have proven insufficient or infeasible in lessening the demand for groundwater.

AB 3030 provides procedures for funding and implementation of groundwater management plans. The plan, at this time however, does not authorize the District to levy any fees to fund the implementation of the plan. The District's ongoing groundwater management program has always been funded as part of the District's annual budget and at this time no new fees are proposed for the implementation of the groundwater management plan. It is anticipated the actual costs for sampling and testing the groundwater quality throughout the

District will be shared between the District and the participating cities and other local agencies within the District. If future activities warrant the need for additional funding to implement the groundwater management plan, the District will hold an election to determine whether or not it will be authorized to levy a groundwater management assessment or fix and collect fees for the replenishment or extraction of groundwater pursuant to the requirements outlined in AB 3030.

HISTORICAL MANAGEMENT OF GROUNDWATER RESOURCES

The District, in an average year, supplies approximately two-thirds of its irrigable acreage with surface water from rights on the Kings River. The remaining one-third of the irrigable acreage obtains its supplies solely from groundwater. Because of the variability in surface supplies, landowners typically have wells to help meet their irrigation demand. This dependence on groundwater together with declining groundwater levels following District formation in the 1920's caused the District to be acutely aware of the need to manage its groundwater resources. Shortly after formation, the District began operating a groundwater monitoring program which continues to this day. At this time, the program consists of the monitoring of approximately eighty-two observation wells located on a 2-mile grid throughout the District. Water level measurements for these observation wells are

made and recorded monthly. A summary of the historic annual average depth to groundwater in the District is indicated graphically by Plate 2.

There are approximately 4,500 irrigation wells within the District, owned by landowners. In addition, there are at least an equivalent number of domestic wells in operation. Recognizing the need to artificially recharge groundwater in the basin, the District in the early 1930's began purchasing land which could be used as recharge basins to augment the groundwater supply during years of surplus water. This surplus supply, when available, is obtained from the Kings River or excess Friant-Kern Canal supplies. At this time, the District owns or has easements for forty-six recharge basins with a surface area of approximately 1,300 acres. The recharge basins are indicated on Plate 1. In addition to the recharge basins, the District owns and/or operates approximately 350 miles of unlined channels that also provide recharge to the groundwater basin.

Over the past forty years, the District has recharged approximately two million acre feet in its recharge basins and canals. During 1969, it is estimated 308,000 acre feet were recharged to the groundwater basin by direct discharge into the District's recharge basins. In 1978, approximately 180,000 acre feet were recharged and in the 1982-83 period it is estimated that 300,000 acre feet were also recharged into the groundwater basin. When excess flood flows or flood releases occur on the Kings River, the District can initially divert up to 1,100 cubic feet per second into its recharge basins. As the basins fill and the soils become

saturated, the District's recharge capability reduces but usually a long-term recharge rate of approximately 700 cubic feet per second (1,400 acre feet per day) can be maintained.

With its existing surface supply and recharge basins, the Consolidated Irrigation District manages one of the oldest and largest conjunctive use programs in the San Joaquin Valley. The foresight of the District's Board of Directors and staff in purchasing, constructing, and maintaining the recharge basins, as well as implementing a groundwater monitoring program throughout the District has had a major impact on the beneficial use and management of groundwater resources in the area. Despite its recharge efforts, however, the District is still water deficient and continues to look for every opportunity to increase the acreage of its recharge basins and to obtain additional surface water supplies for recharge purposes.

GEOLOGY AND GROUNDWATER RESOURCES

Portions of the easterly and southeasterly boundary of the District follow the existing alinement of the Kings River. The Kings River has deposited an alluvial fan throughout the area. The apex of the fan lies near the northeast corner of the District and the fan deposits have spread out radially to the southwest on lands that now make up the Consolidated Irrigation District. A major portion of the District lands are permeable to moderately permeable younger alluvial deposits from granitic rock eroded and washed down from the Sierra Nevada.

An alluvial fan is formed over geologic time by a river that has often changed its course through the years. Sands and gravels are deposited by high velocity flows during times of flood while lower velocity flows deposit silts. The coarsest materials are typically deposited in the stream and river channels while fine sand and silt are carried further downstream and away from the channels during times of flood where they are deposited on the adjacent flood plains. In the District, the alluvial deposits of sand and silt are somewhat heterogeneous and there are no specific confining clays that create a confined or semi-confined aquifer within the District. As expected, the deposits become progressively finer grained the further the distance from the apex of the fan.

U.S. Geological Survey Water Supply Paper 1469, prepared in 1959, is a report on "Groundwater Conditions and Storage Capacity in the San Joaquin Valley, California." The USGS collected and reviewed available information on the hydrogeology of specific hydrologic units or areas in the Valley, one of which is the Kings River unit. The Consolidated Irrigation District comprises approximately 26% of the northeast portion of this unit. Information on the geology and character of water bearing deposits, groundwater movement, water level fluctuations, and estimated groundwater storage capacity was obtained and evaluated by the USGS. They determined, following a review of drillers' logs, that in the 10 to 200 foot depth, sand and gravel make up approximately 38% of the soil profile. This is the highest average in the valley. Most of the coarse grained

material is sand. Less than 3% is gravel. Gravel is prevalent, as expected, near the apex of the Kings River alluvial fan, but is nearly nonexistent elsewhere. The average specific yield of the deposits in the District for the 10 to 200 foot depth range is also quite high, with an average value of 13.4 percent. The specific yield is a technical term defining the percentage of water that will freely drain by gravity from a volume of soil.

The shallowest alluvial deposits are found near the apex of the fan north easterly of Sanger and extend at this location to a depth of approximately 100 feet, while to the west and southwest they become much deeper. Wells drilled in the District vary from approximately 80 to 400 feet in depth with the average irrigation well approximately 200 feet deep. The specific capacity for wells in the District varies from approximately 40 to 70 gallons per minute per foot of drawdown with well yields typically varying in the range of 500 to 800 gallons per minute.

As indicated by Plate 2, there has been some fluctuation in water levels, but there has also been a gradual lowering of groundwater levels through the years. The Department of Water Resources in Bulletin 118-80, "Groundwater Basins in California," defines the District's groundwater supplies as being located in a basin "subject to critical conditions of overdraft." Summers Engineering, Inc. (1973) in a report prepared for the District estimated there was an annual average overdraft in the District of approximately 53,000 acre feet. Without the District's recharge

program this amount would be much higher. Plate 2 indicates that during years of above normal Kings River supply, a significant replenishment and recharge to the groundwater basin occurs. This is evident following the 1968-69 and 1978 thru 1986 water years. During years of minimal surface runoff, landowners increase groundwater pumping to supplement their irrigation requirements. The increased groundwater pumping and the resultant lowering of groundwater levels during the 1987 through 1992 six-year California drought is clearly depicted in the graph on Plate 2.

GROUNDWATER MANAGEMENT PLAN COMPONENTS

Monitoring of Groundwater Levels and Storage

One of the primary objectives of the proposed groundwater management plan is to monitor and analyze groundwater use and trends in order to be able to recommend any necessary actions for the wise use of the groundwater resources in the service area. As mentioned, the District has eighty-two monitoring wells located on a 2-mile grid throughout the District. Depth to groundwater measurements have been made monthly through the years. Under the proposed groundwater management plan, the District will continue monitoring the existing groundwater levels throughout the District. This data will be entered into a computer data base that can be utilized to create hydrographs for individual wells and groundwater contour maps of the District. Included as Plate 3 is a map

showing the April 1994 Groundwater Elevation Contours. Plate 4 shows Depth to Groundwater Contours for April 1994. This information will be used to calculate changes in groundwater storage from year to year. The District will maintain a data base evaluating annually the changes in groundwater storage and recommend, if necessary and feasible, any actions to protect and maintain the groundwater resources in the service area. The Kings River Conservation District also monitors wells in the District and in adjacent areas.

Water Quality Monitoring

The District also proposes monitoring groundwater quality on a rotating basis using existing wells in the District service area. Groundwater quality is generally excellent throughout the District for irrigation purposes. For potable water supplies, a major groundwater quality problem and concern is contamination by dibromochloropropane (DBCP), a soil fumigant used for many years to control nematodes in orchards and vineyards. This contamination has not impacted groundwater use for irrigation, but some groundwater used for domestic purposes where there is DBCP contamination may require costly filtration equipment to remove the contaminants. Monitoring the groundwater quality at select wells throughout the service area will provide regional information on existing groundwater quality and help identify the potential for any future degradation or unanticipated movement of poor quality groundwater.

Water Well Construction and Abandonment Policy

The Consolidated Irrigation District is located in Fresno, Kings and Tulare Counties. Each county has an existing water well ordinance regulating the construction, reconstruction, destruction, and inactivation of water, cathodic protection and monitoring wells within the respective counties. Individuals constructing a well are required to obtain a permit from their respective county for the construction of such a well. Each county has adopted by reference the minimum standard for the construction or destruction of wells as specified in Department of Water Resources Bulletins 74-81 and 74-90. Properly constructed or destroyed wells normally do not cause groundwater contamination. However, when wells have been improperly sealed or have been left abandoned or in disrepair, they can serve as conduits by which contaminates can directly enter groundwaters. The District shall urge county authorities to enforce and strengthen their ordinances. The District will develop additional construction guidelines, if needed, to further minimize water quality contamination concerns related to the construction of new wells or the abandonment of existing wells.

Facilitate Conjunctive Use Operations

Conjunctive use is the planned management and coordination of two or more water resources to accomplish the greatest long term benefit. As discussed under the section, Historical Management of Groundwater Resources, the

Consolidated Irrigation District has practiced throughout its history a conjunctive use operation. While the district's primary responsibility is the delivery of surface water for irrigation, the District's forty-six recharge basins covering over 1,300 acres also provide the District with the ability to percolate additional surface water supplies, when available, into the groundwater basin. Although the goal of conjunctive use management is to balance the recharge and extraction of groundwater over a given time period, there continues to be a gradual lowering of groundwater levels throughout the District. Without the District's conjunctive use program, however, groundwater levels would have lowered significantly below what they presently are throughout the District.

The District will continue to maintain and operate their existing recharge basins to facilitate groundwater recharge when additional surface supplies are available. It will also continue to review the feasibility of purchasing additional lands to increase the size and number of recharge basins when appropriate lands become available for purchase.

Mitigation of Groundwater Overdraft

The groundwater basin in the District has been defined by the Department of Water Resources as a basin subject to critical conditions of overdraft. The economy of the area, however, is dependent on groundwater pumping. Any restrictions placed on groundwater pumping to mitigate groundwater overdraft

may create a significant impact on the local economy. The District will make every effort to increase its conjunctive use operations when feasible and possible, by pursuing the purchase or transfer of additional surface water supplies to reduce its dependence on groundwater pumping. The District will prohibit the transfer of water out of the District's exterior boundaries except for potential water banking arrangements determined to be beneficial to the District. Landowners within the District will also be encouraged to use surface water whenever possible "in lieu" of groundwater to further minimize the depletion of existing groundwater supplies.

Replenishment of Groundwater Extractions

As summarized under the section "Historical Management of Groundwater Resources" the Consolidated Irrigation District since its early formation has pursued the purchase and construction of recharge basins on lands adjacent to its existing distribution system. The basins will continue to be operated and maintained to recharge the groundwater basin by using additional surface water supplies from the Kings River, purchasing or transferring supplies which may become available from the Friant-Kern Canal, or by purchasing or transferring any additional surface water supplies which could be delivered to the District. As mentioned, the District will continue to consider the construction of additional recharge basins to further increase its recharge capabilities when appropriate

lands become available for purchase. The District will also explore the possibility of water banking if it is determined to be feasible.

The Development of Relations with State and Federal Regulatory Agencies

The District will strive to maintain its working relationship with the California Department of Water Resources and the State and Regional Water Quality Control Boards that oversee and provide direction for California's groundwater protection efforts. National policy and direction relating to groundwater protection efforts are provided by the Environmental Protection Agency. The District will evaluate information provided by both the State and Regional Water Quality Control Boards and also the Environmental Protection Agency regarding planning efforts to further improve and protect groundwater resources.

Coordination with Local Agencies

The Consolidated Irrigation District strives to maintain a strong working relationship with all public entities within its service area. As stated, it is the goal of the District to develop a groundwater management plan which addresses not only District concerns regarding agricultural water supply and availability but also the concerns of the cities and rural communities within the District that obtain their potable water supplies from groundwater. The District will continue to interact with all applicable agencies in the County to develop a coordinated groundwater

management plan which is acceptable by all. As outlined in Water Code Section 10755.2, and if feasible, the District will work with all public or private water purveyors in the service area to enter into a Memorandum of Understanding regarding the adoption and implementation of a coordinated groundwater management plan pursuant to AB 3030.

The goal of this plan is to protect and wisely use the valuable groundwater resources within the service area of the Consolidated Irrigation District. Therefore, the District will encourage public agencies within the service area to establish guidelines for the development of a planning methodology for the review of proposed developments or industries which have the potential to seriously impact the existing groundwater supplies.

IMPLEMENTATION OF GROUNDWATER MANAGEMENT PLAN

Following approval and adoption of the groundwater management plan, the District will adopt "rules and regulations" to implement and enforce the plan pursuant to Water Code Section 10753.8.

CONSOLIDATED IRRIGATION DISTRICT

SELMA · CALIFORNIA

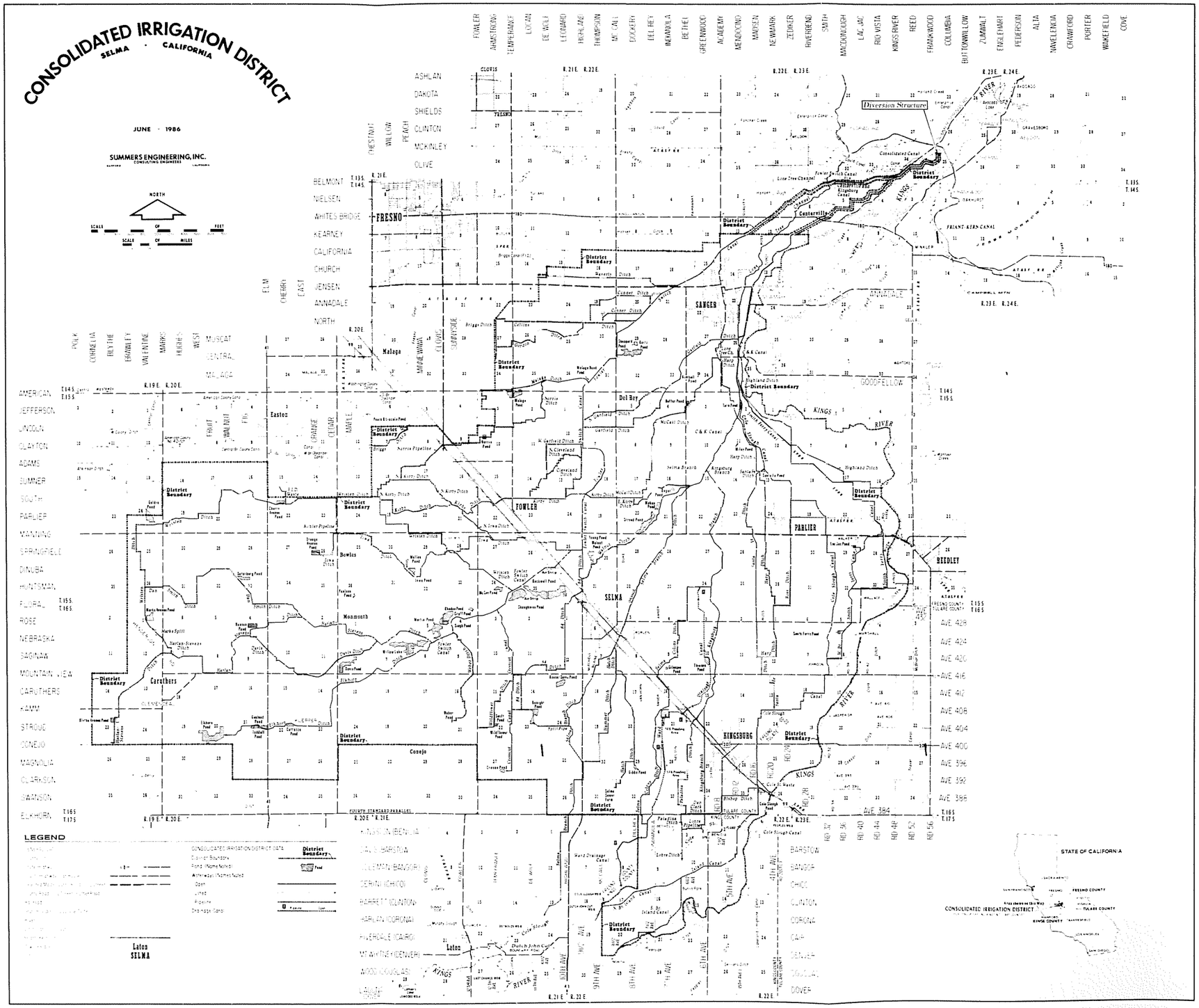
JUNE - 1986

SUMMERS ENGINEERING, INC.
CONSULTING ENGINEERS

NORTH

SCALE OF FEET

SCALE OF MILES



LEGEND

CONSOLIDATED IRRIGATION DISTRICT BOUNDARY

District Boundary

Roads (Name Noted)

Railroads (Names Noted)

Open

Lines

Private

Drainage Canal

Pond

Laton
SELMA

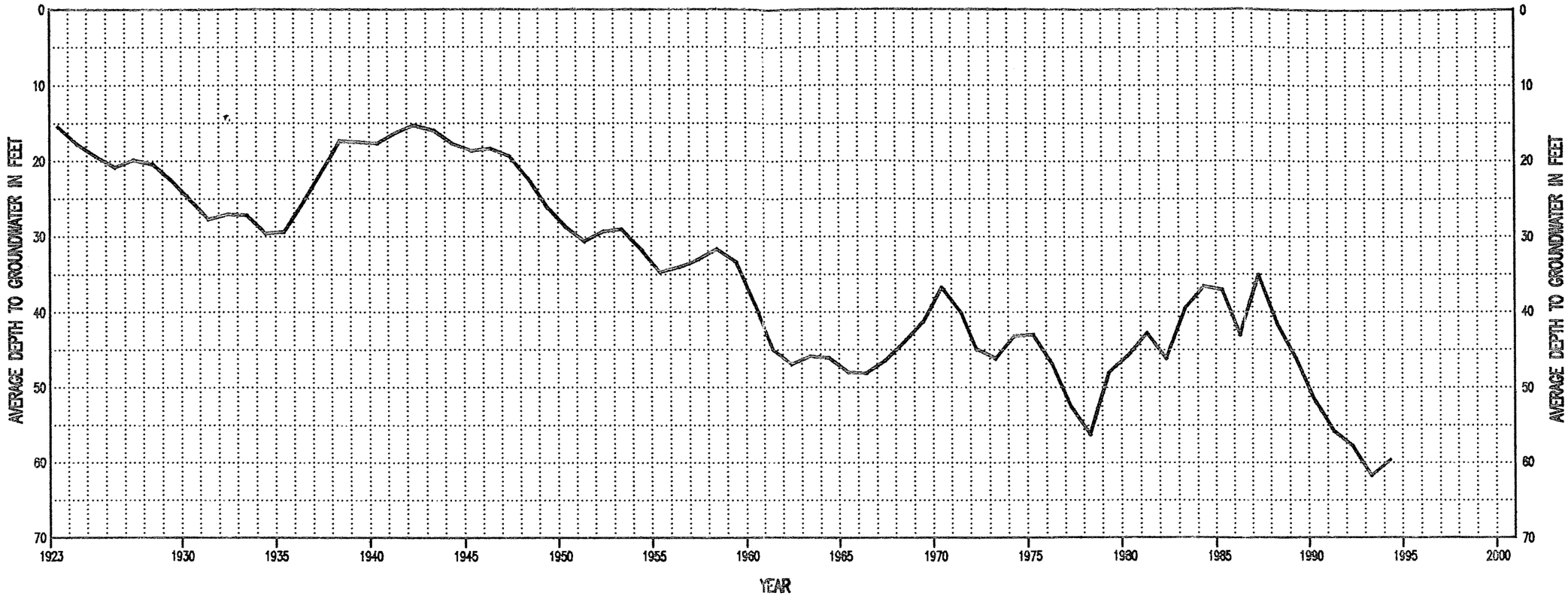
STATE OF CALIFORNIA

FRESNO COUNTY

TULARE COUNTY

KINGS COUNTY

CONSOLIDATED IRRIGATION DISTRICT



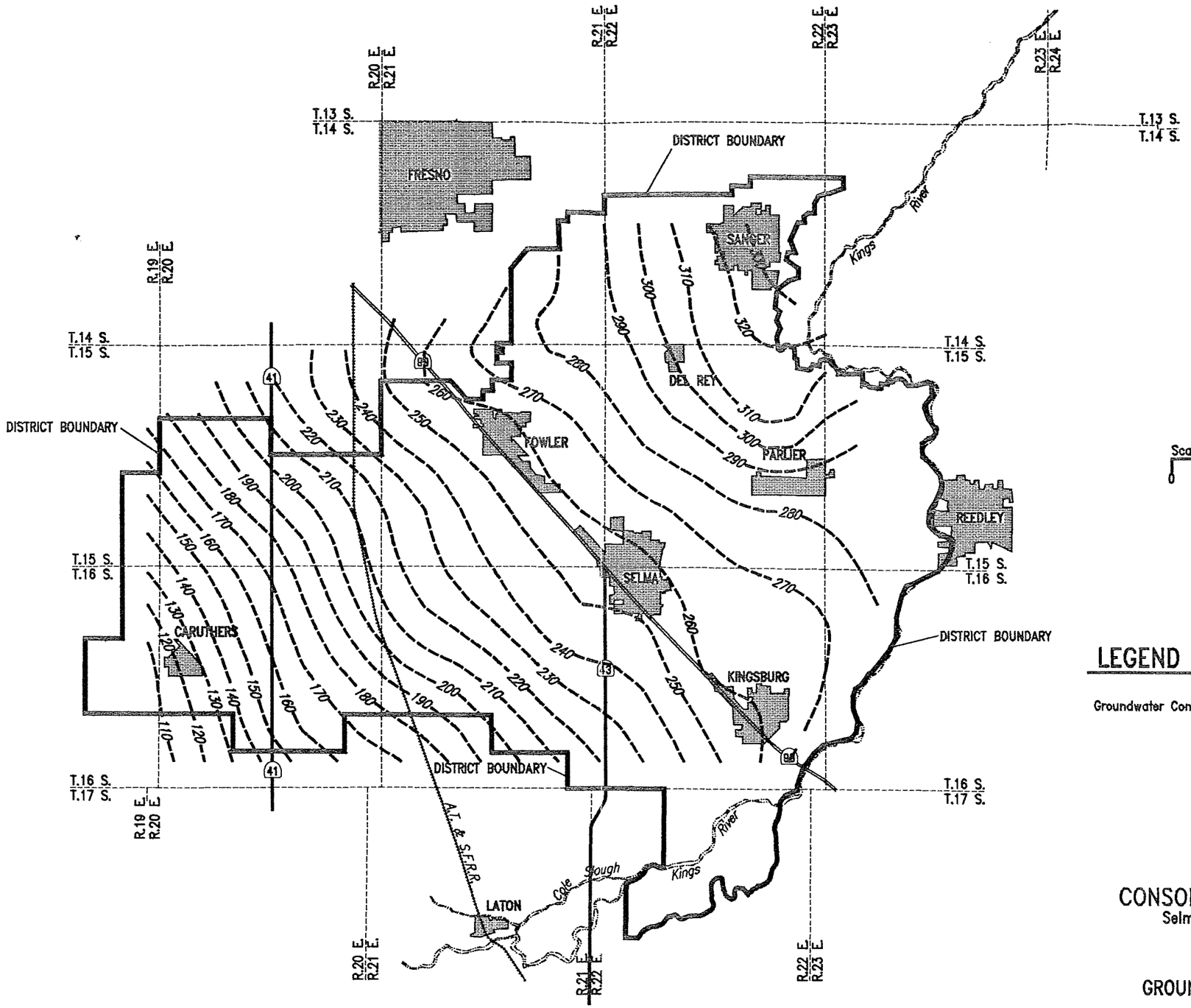
CONSOLIDATED IRRIGATION DISTRICT

Selma California

Average Annual April Depth to Groundwater

SUMMERS ENGINEERING, INC.
Consulting Engineers
HANFORD CALIFORNIA

April 1995



LEGEND

Groundwater Contours — 300 — Elevation In Feet Above Mean Sea Level

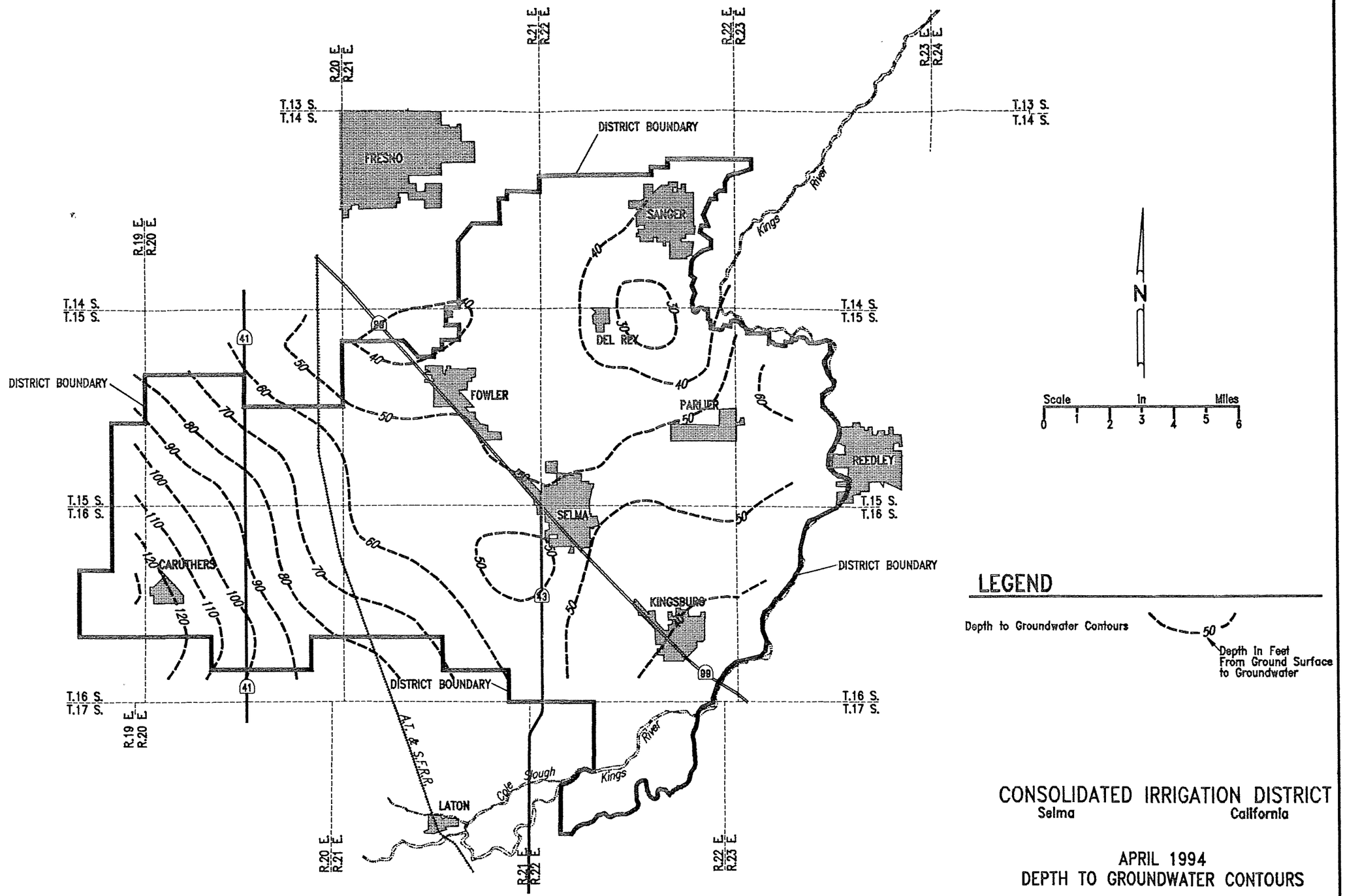
CONSOLIDATED IRRIGATION DISTRICT

Selma California

APRIL 1994
GROUNDWATER ELEVATION CONTOURS

SUMMERS ENGINEERING, INC.
Consulting Engineers
HANFORD CALIFORNIA

May 1995



CONSOLIDATED IRRIGATION DISTRICT

Selma California

APRIL 1994
DEPTH TO GROUNDWATER CONTOURS

SUMMERS ENGINEERING, INC.
Consulting Engineers
HANFORD CALIFORNIA

May 1995