KERN DELTA WATER DISTRICT
GROUNDWATER MANAGEMENT PLAN

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INTRODUCTION

The Kern Delta Water District (District) is located in Kern County, approximately 8 miles south of the City of Bakersfield. Approximately 80 percent of the District's 124,000 assessed acres are devoted to irrigated agriculture. The irrigation of District lands commenced in the 1870's utilizing surface waters diverted from the Kern River. Two-thirds of the District's lands are located within five distinct Kern River service areas which were operated as public utilities by the Kern Island Water Company until 1976 (The Kern River water rights and unlined canal systems were acquired by the District at that time).

Because of the lack of firmness of the Kern River water rights supplying most of the service areas, surface water deliveries were supplemented by pumped groundwater commencing in the 1920's. Other District lands located outside the Kern River service areas developed to irrigated agriculture relying solely on pumped groundwater as a source of water supply. By the 1960's, landowners were becoming concerned over declining groundwater levels.

The District was formed in December, 1965, pursuant to the provisions of the California Water District Law, Division 13 of the Water Code of the State of California. Landowners formed the District to provide a public entity that could contract with the Kern County Water Agency (KCWA) for an imported water supply from the State Water Project (SWP) and to protect the existing water rights of the lands within the District.

Since its formation, the District has taken the following actions:

1. Entered into a water supply contract with the KCWA in 1972 for a maximum firm water entitlement from the SWP of 25,500 AF/year.

2. Entered into two agreements (1972 and 1975) with Buena Vista Water Storage District (BVWSD) providing for the exchange of the District's SWP water supply for an equivalent supply of Kern River water owned by BVWSD.

3. Adopted a plan for utilization of supplemental water in 1974.

4. Acquired the Kern River water rights and canal distribution facilities of the Kern Island Water Company in 1976.

In order to preserve local management and enhance existing groundwater management programs operated over many years, the Board of Directors of the District on April 16, 1996 adopted Resolution 96-02 authorizing the development of a draft Groundwater Management Plan under AB 3030. This plan will identify and quantify the surface and groundwater supplies available to the District and define the interaction between these supplies. Groundwater storage is affected by groundwater pumping and groundwater recharge as water users attempt to meet their water use demands. The net result of the

interactions between the available water supplies and the demands for water is a change in groundwater storage. The Plan is intended to provide the District with the information and tools required to maintain and improve its total water resources through enhanced management of groundwater.

PLAN OBJECTIVE

The District desires to formalize its existing groundwater management practices to provide for the continuance of local management and to enhance existing monitoring activities. Through this Plan, the District will identify and implement modifications to ongoing practices in order to preserve and enhance groundwater resources. The District will organize existing and expanded groundwater management activities under provisions of Part 2.75 (commencing with Section 10750) of Division 6 of the California Water Code, otherwise known as the Groundwater Management Act of 1992 (AB 3030).

Preservation and enhancement of the groundwater resource is vital to sustaining the local economies which have been built up in reliance, in whole or in part, on this resource. The District's objective is to preserve the utility of the groundwater resource, both in terms of quantity and quality, to sustain agricultural production and meet other land use requirements within the boundaries of the District at the least possible cost. Enhancement or augmentation of the resource is necessary to mitigate the present level of overdraft and the attendant long term decline in groundwater levels in the District.

MANAGEMENT AREA

The District's management area will initially have the same boundaries as the District. However, the groundwater basin underlying the District is a part of the Kern County portion of the San Joaquin Valley Groundwater Basin. Thus the groundwater underlying the District is influenced by the uses of surface water and groundwater in the areas surrounding the District. For this reason, the District plans to meet on a periodic basis with other entities overlying the Kern River Fan to discuss groundwater management activities and objectives. It is anticipated that the District might ultimately be a part of a larger multi-district management plan.

SURFACE WATER SUPPLY

Groundwater management in the District is based on the conjunctive use of surface and groundwater resources and has been practiced since the early 1900's. Water supplies from these two sources are integrated to accomplish the optimum utilization of each. The District receives local surface water supplies from the Kern River and imports surface water from the SWP. Certain lands within the District also have independent Kern River water rights (South Fork) or receive treated effluent from the City of Bakersfield's Wastewater Treatment Plants No. 2 and No. 3. The District also makes arrangements to secure high flow water from the SWP, the Central Valley Project (CVP), and the Kern River on an as available basis.

Under this Plan, the District will seek to preserve the existing water rights and contracts and will pursue opportunities to supplement these supplies through importation of additional water supplies and greater utilization of local supplies such as reclaimed wastewater and urban storm water.

GROUNDWATER BASIN CHARACTERISTICS

The physical characteristics of the groundwater basin influence the content of the Plan. In particular, the manner in which groundwater is replenished is directly affected by surface and subsurface characteristics, such as the permeability of the overlying and subsurface soils. The District overlies areas of both unconfined, and semi-confined aquifers. There are also areas of perched water and shallow groundwater tables within the District.

PLAN ELEMENTS

GROUNDWATER RECHARGE

The replenishment of the underlying groundwater occurs naturally and through deliberate, controlled means. The District's groundwater replenishment is achieved by controlled means through direct recharge to the underground and through the delivery of surface water, when available, to lands otherwise relying on the groundwater resource.

Direct recharge is achieved through the placement of surface water in channels or basins located on permeable soils for the express purpose of percolation to the underground. The District's surface water conveyance system substantially consists of unlined canals. As a result, approximately 30 percent of the surface water supplies diverted into the District's facilities percolates to the groundwater basin in the form of canal seepage losses. The District also has limited off-canal recharge areas it has been able to use through the cooperation of the landowners during extremely wet years. It is the intention of the District to develop additional off-canal groundwater recharge capability. The District is a participant in the KCWA sponsored Pioneer Project which will provide the District the opportunity to recharge high flow water supplies on the Kern River Fan within a few miles and up-gradient of the District's northwest boundary.

Delivery of surface water for irrigation purposes reduces the need for water users to draw on groundwater thereby conserving the water available in the aquifer for later use. The use of surface water in this manner is known as in-lieu recharge and is practiced extensively within the District. An additional benefit is derived when irrigation water applied beyond crop water needs percolates to the underground.

Importation of affordable water supplies, in quantities sufficient to achieve a long term water balance within the District is a prerequisite for successful implementation of the recharge programs described here. All opportunities to supplement the regular supplies of the District through water exchange and banking agreements with outside entities will be evaluated for compatibility with the goals of this Plan.

Effective groundwater replenishment involves the management of water supplies available to the basin and extractions from the basin. Extractions within the management area are primarily by private wells. Management of groundwater extractions can best be achieved through economic incentives rather than through the regulation of extractions. This current practice will continue to be implemented though the pricing of surface water at rates which encourage water users to use surface water in-lieu of pumping groundwater.

CONJUNCTIVE USE OF SURFACE AND GROUNDWATER

As previously stated, groundwater management is the conjunctive use of surface water and groundwater supplies where conjunctive use refers to integrating the two sources of supply to achieve the optimal use of each. In years of abundant supply, surface water is stored in available aquifers. In years of shortage, that previously stored water is pumped to supplement available surface water. The District will attempt to maximize the utilization of available facilities and resources for conjunctive use through cooperative management.

Conjunctive use opportunities motivated the District to enter into the water supply contract with the KCWA for imported water from the SWP. Water transfers and exchanges are an integral part of the District's existing conjunctive use programs. Under the Plan, the District will seek to preserve and enhance conjunctive use activities through coordinated use of available supplies made possible by water transfers and exchanges and through expansion of recharge facilities. Enhancement of conjunctive use activities could include the development of water banking arrangements with other agencies by utilizing available groundwater storage capacity for the temporary storage of water.

MONITORING

Optimal use of the groundwater resource is dependent on the acquisition of good basic data respecting both geology and hydrology. The purpose of this element of the Plan is to monitor conditions within the groundwater basin to identify changing conditions which may require attention. Monitoring includes gathering and analyzing basic data to characterize the basin which provides the information necessary for future management decisions. Present activities in this regard may be enhanced to provide a more complete picture of the condition of the groundwater resource.

Groundwater Levels

Data on groundwater levels are used to evaluate groundwater movement and storage conditions. Groundwater contour maps showing lines of equal elevation of the water surface indicate the direction of groundwater movement and also can be used to develop estimates of groundwater flow entering or leaving the management area. Maps of depth to groundwater can provide insight into the distribution of pumping lifts and resultant energy cost for extraction. Maps showing changes in groundwater levels, when used in conjunction with data on specific yield, can also be used to estimate changes in groundwater storage.

There are 583 active water wells and 50 abandoned water wells within the District. The District routinely measures groundwater levels in 148 agricultural water wells and 2 small domestic water wells. Measurements are made in both spring (February) and fall (October). The present monitoring networks will be maintained or enhanced to assure the availability of sufficient data for the preparation of groundwater contour maps. Measurement of groundwater levels will continue to be performed in both spring and fall in order to show the seasonal variation.

The KCWA routinely measures 38 piezometers within the District on an annual basis in order to map the depth and areal extent of perched water.

Groundwater Quality

Monitoring of groundwater quality provides the information required for determination of the suitability of groundwater for various uses. The sampling of wells will be expanded, if necessary, to provide sufficient data to allow identification of water quality problem areas. Supplemental sampling may also be performed to better define localized areas of impaired water quality. Testing will typically include standard agricultural type analysis, but may also include additional testing (e.g. Title 22) as required.

Well Construction and Abandonment

The increase in groundwater extraction resulting from the construction of additional wells affects the long-term water balance of the region. Well construction or abandonment may allow contamination of the groundwater if not done properly. Both construction and abandonment must be conducted in conformance with standards adopted by the County of Kern. The District will monitor these activities by reviewing records compiled by the County. Appropriate information on proper construction and abandonment will be made available through the District.

Water Supply and Water Use

Data related to the hydrologic inventory will be collected annually for quantification and analysis. Components of the inventory include precipitation, evaporation, cropping pattern, utilization of Kern River, SWP, and reclaimed effluent surface supplies, amounts of groundwater replenished and quantities of groundwater extracted.

Annual Report

Documentation in the form of an annual report will be prepared as required to document the results of the monitoring elements of the Plan. The contents of the report may include:

1. Maps and/or tables showing:
    a) Spring and fall groundwater elevations.
    b) Spring and fall depths to groundwater.
    c) Change in groundwater levels between subsequent spring readings.
    d) Groundwater quality.
    e) Perched water conditions.
2. Estimation of the change in groundwater storage computed using specific yield data and maps of change in groundwater levels.
3. Summary of water resource data.
4. Estimation of long term water balance.
5. Assessment of the effectiveness of management activities.

INSTITUTIONAL CONSIDERATIONS

California Water Code, Sections 10750, et seq., provide the District with the powers necessary to adopt and implement a Plan. Powers granted to an entity which adopts a Plan include the powers of a Water Replenishment District pursuant to Part 4 (commencing with Section 60220) of Division 18 of the California Water Code to the extent not already possessed by the District including but not limited to the following:

1. Acquire and operate facilities, waters and rights needed to replenish the groundwater supplies.
2. Store water in groundwater basins, acquire water rights, import water into the District and conserve water.
3. Participate in legal proceedings as required to protect and defend water rights and water supplies and to prevent unlawful exportation of water from the District.
4. Under certain conditions, to exercise the right of eminent domain.
5. Act jointly with other entities in order to economically perform required activities.
6. Carry out investigations required to implement the Plan.
7. Fix rates for water for replenishment purposes.
8. Fix the terms and conditions of contracts for use of surface water in-lieu of groundwater.
9. Fix and collect fees and assessments for groundwater management in accordance with Part 6 (commencing with Section 60300) of Division 18 of the California Water Code.

ASSESSMENTS

Upon adoption of this Plan, the District is authorized to levy and collect general groundwater replenishment assessments, as well as water extraction fees based on the amount of groundwater extracted from the aquifer. Assessments or fees proposed to be collected by the District under this Plan may, under certain circumstances, require an area-wide election before implementation.