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DRAFT

ENVIRONMENTAL IMPACT REPORT

2,800-ACRE GROUND-WATER RECHARGE FACILITY ALONG THE KERN RIVER FOR THE CITY OF BAKERSFIELD

FEBRUARY 10, 1983

STETSON ENGINEERS INC.

SAN FRANCISCO WEST COVINA

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SCH 82090305

STETSON ENGINEERS INC.

San Francisco West Covina

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EXHIBITS

Exhibit	
A	Enviornmental Assessment (Initial Study)
B	Master Spreading Agreement
C	Draft Spreading and Extraction Agreement

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ENVIRONMENTAL IMPACT REPORT

2,800-ACRE GROUND-WATER RECHARGE FACILITY ALONG THE KERN RIVER FOR THE CITY OF BAKERSFIELD

INTRODUCTION

In December of 1976 the City of Bakersfield (City) acquired from Tenneco West, Inc., certain properties and Kern River water rights. Included in this acquisition was a parcel of 2,760 acres (often referred to as 2,800 acres) of land located in and adjacent to the flood plain of the Kern River channel between Renfro Road and Interstate Highway 5 (I-5). Historically, this land was utilized as a percolation area whereby Kern River water was recharged to the underlying ground-water basin. Presently a small portion of this area is being used by the City as a water spreading site. A more intensive spreading and extraction program is being proposed for this land to enhance ground-water recharge in the area.

The plan of the City is to develop 14 separate spreading basins utilizing 1,537 acres of this property. Sources of water for spreading are the Kern River, the Central Valley Project and the State Water Project. Water can be delivered to the spreading area from the Kern River,

the Kern River Canal, the Pioneer Canal and the Cross-Valley Canal.

It is proposed to keep about 1,223 acres of the project area in its present state at this time. Also, the 1,537 acres of spreading basins and levees would be left as much as possible in their natural state or allowed to become re-established with the natural vegetation after alteration of the landscape.

An optimization study by Ricks, Taylor and Associates, Inc., on the development and operation of the proposed recharge facilities entilted "City of Bakersfield, 2,800-Acre Groundwater Recharge Area, Optimization Study" was performed in March of 1981. Several basin design alternatives were proposed in the study. A combination of two alternatives was selected by the Water Board of the City of Bakersfield as the proposed project to be developed.

An ecological survey entitled "An Ecological Assessment Report of the 2,800 Acre Groundwater Recharge Site on the Kern River for the City of Bakersfield" by George E. Lawrence and L. Maynard Moe was performed on the project site. Their findings are incorporated draft herein.

This draft environmental impact report was prepared for the City to evaluate impacts of the project. In this report, water use and disposal, design and operation of proposed recharge facilities, environmental setting and environmental impacts are discussed. This report was

prepared to comply with the California Environmental Quality Act and State Environmental Impact Report Guidelines. The Environmental Assessment (Initial Study) is included as Exhibit A.

DESCRIPTION OF PROJECT

This section describes the project, its location, project works including spreading and extraction areas, monitoring system, project operations and costs, sources of water for spreading and cooperating water districts.

General Description

The lands described in this draft environmental impact report are those project lands of the currently proposed spreading project of the City of Bakersfield, the project described herein. All other lands would be preserved in their present state until such time as the City may need to increase it's area of spreading to enhance it's water conservation program. However, even under ultimate development of the water spreading program of the City, some lands would be permanently preserved in their natural state as wildlife habitat and nature study areas. Generally, those lands would be the higher elevation lands. The lands utilized for water spreading would themselves create additional wetlands and natural areas when not actively being used for water spreading operations. Operation of the spreading ground at times may use all available project

Table 1

GROUND-WATER RECHARGE AT 2,800-ACRE PROJECT SITE
SINCE ACQUISITION BY THE CITY OF BAKERSFIELD
(Acre-Feet)

Calendar Year	Entity				KCWA Unclaimed Spread Water 1/	Total
	City of Bakersfield	Buena Vista Water Storage District	Hacienda Water District	Kern County Water Agency		
1977	-0-	-0-	-0-	-0-	-0-	-0-
1978	104,587	6,056	24,328	-0-	-0-	134,971
1979	4,505	9,913	-0-	-0-	59,076	73,494
1980	68,804	-0-	52,604	-0-	-0-	121,408
1981	2,603	-0-	4,465	44,912	7,141	59,121
1982 (thru Nov.)	31,220	24,465	13,893	-0-	22,232	91,810
	211,719	40,434	95,290	44,912	88,449	480,804

1/ Kern County Water Agency water spread for general enhancement of the basin.

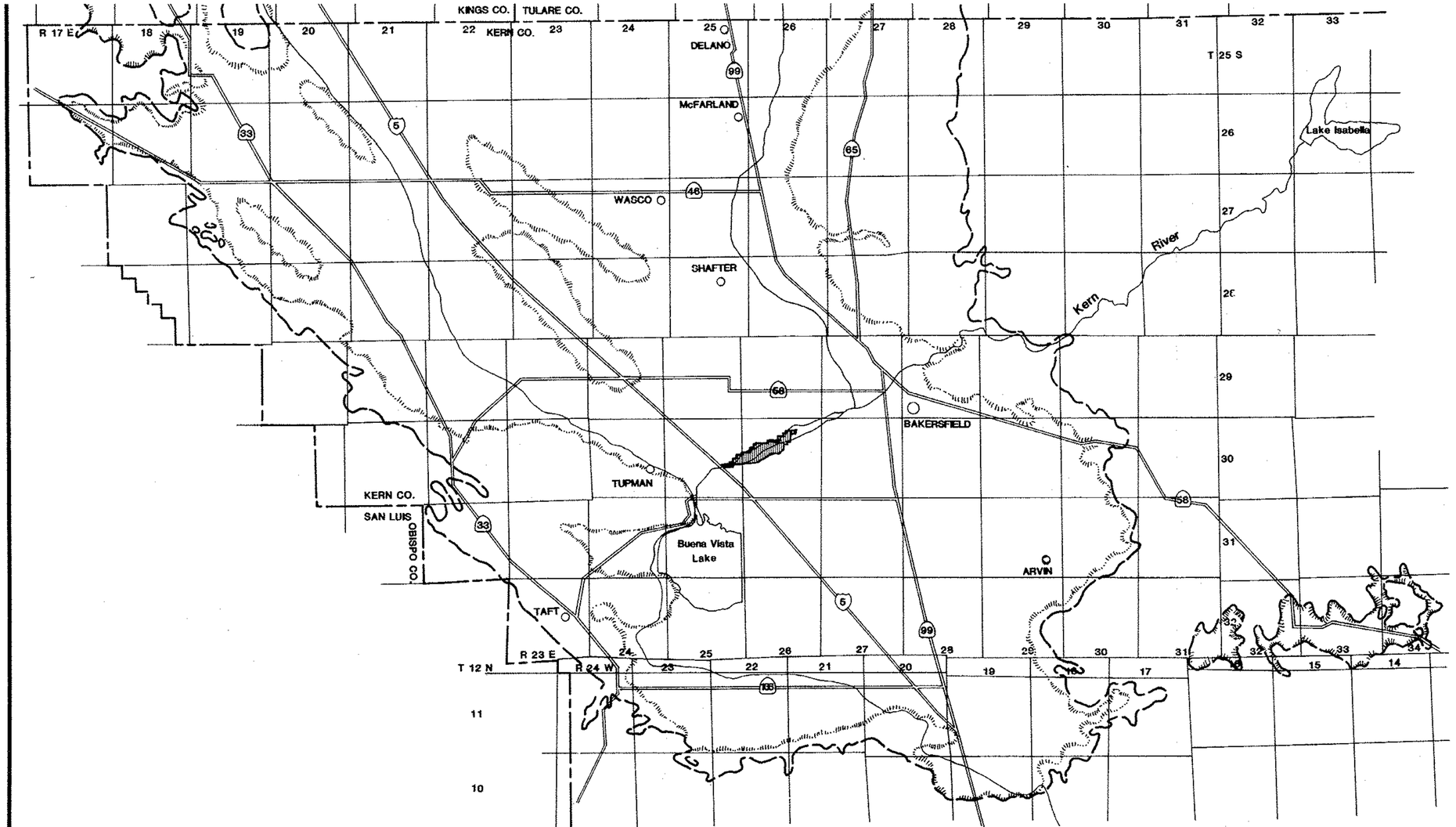
Project Location

The project lands, shown on Plate 1, are located within the City of Bakersfield in Kern County. Theyencompass approximately 2,800 acres and are located in and adjacent to the flood plain of the Kern River channel. As shown on Plate 2, the project lands are surrounded by the James-Pioneer Improvement District of the North Kern Water Storage District. They include a reach of the Kern River channel and lands adjacent to both sides of the river channel extending from Renfro Road to I-5 and lying north of the Kern River Canal.

A portion of the proposed spreading grounds lies within the State Reclamation Board's Designated Floodway. The review responsibility for Designated Floodway Permits lies with the City of Bakersfield through its agreement with the Reclamation Board.

Project Objectives

The proposed project is designed primarily to increase the rate of ground-water recharge, augment ground-water storage and utilize available ground-water storage capacity to store spread water for future extraction and use. It is anticipated that by increasing the rate of recharge to the ground-water basin, the continuing overdraft of the ground-water basin can be diminished. Also, the additional water placed in storage within the ground-water basin could be used during periods of drought when surface



EXPLANATION

BOUNDARY OF UNCONSOLIDATED SEDIMENTS THAT FORM THE KERN COUNTY PORTION OF THE SAN JOAQUIN VALLEY GROUND-WATER BASIN

FOOTHILLS

PROJECT AREA

PROJECT AREA AND GROUND-WATER BASIN

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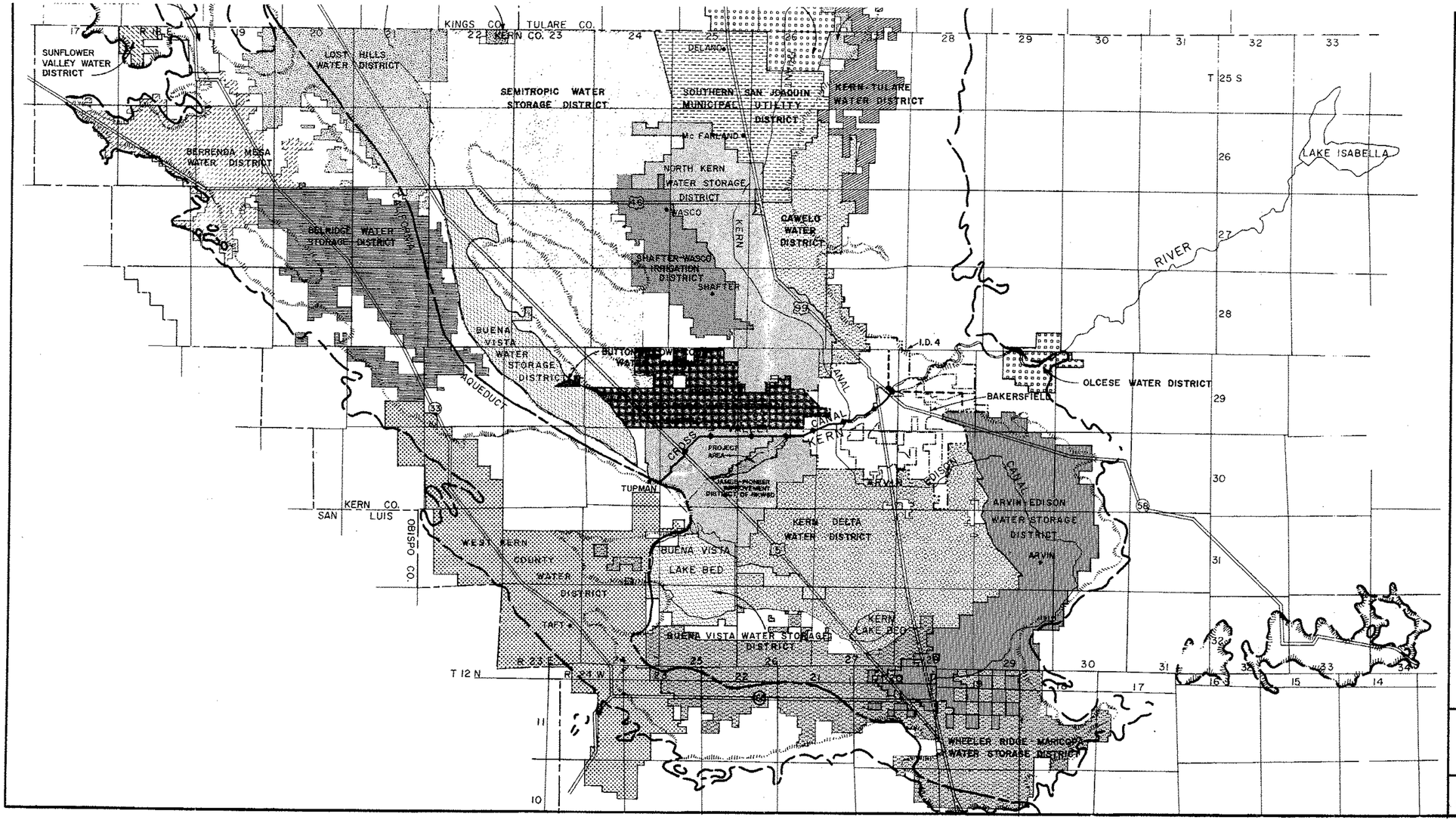

EXPLANATION

- FOOTHILL LINE
- BEDROCK LINE
- IMPROVEMENT DISTRICT NO. 4 BOUNDARY
- BAKERSFIELD CITY LIMITS
- CANAL
- PIPELINE
- PUMPING PLANT
- TREATMENT PLANT

N

MILES

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BASE MAP ADAPTED FROM CALIFORNIA DEPARTMENT OF WATER RESOURCES

PUBLIC WATER DISTRICTS

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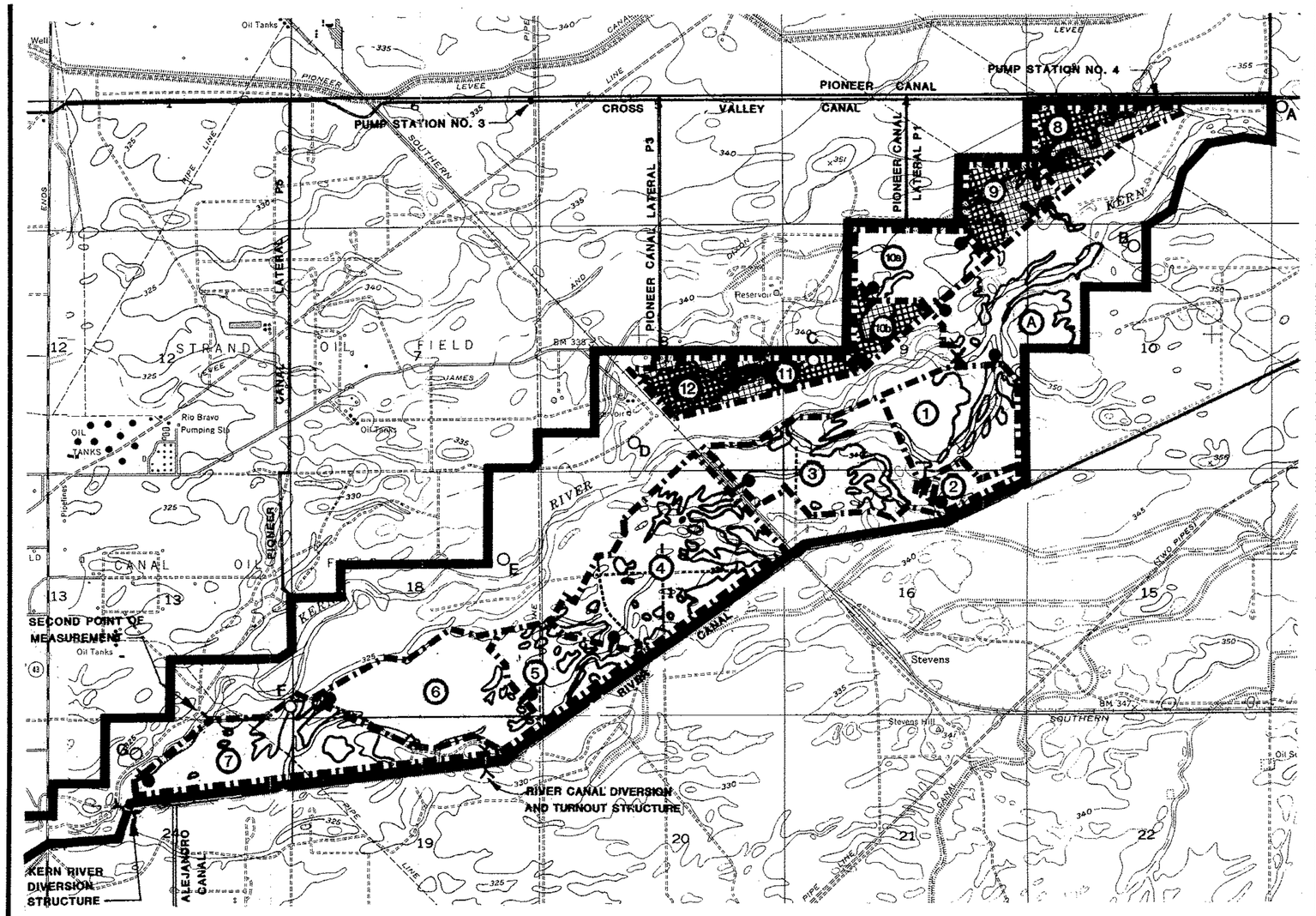

LEGEND

- PROJECT AREA BOUNDARY
- SPREADING BASINS LEVEES
- POTENTIAL SPREADING AREA
- RIVER WEIR STRUCTURE
- GATED CONTROL STRUCTURE
- (1) BASIN NUMBER
- (A) DESILTING BASIN
- PHASE I BASINS (1) TO (7) & (10a)
- PHASE II BASINS (8) TO (12)
- O^{A} MONITORING WELL

N

0 3,000 FEET

SOURCE: RICKS, TAYLOR & MEYER, INC. AUGUST 1981

SPREADING FACILITIES

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water supplies may be reduced. The project would reduce the energy requirements necessary for extraction of ground water from the basin. Infiltration of additional water should also preserve water quality within the basin.

The project site with its habitats could be used for biological studies or research by colleges, schools and interested community groups in the Bakersfield area.

Spreading Area

The spreading area, as shown on Plate 3, consists of seven off-river spreading basins south of the Kern River, six off-river spreading basins north of the river, and one on-river settling and spreading basin. Construction of the project would be in two phases, as shown on Plate 3. When Phase I is completed, approximately 960 acres of potential wetted area would be available for direct spreading. Upon completion of Phase II, the potential wetted area would be 1,241 acres.

Spreading basins can be operated in parallel or in series. Parallel operations involve use of a feeder canal passing through or adjacent to the spreading basins. This canal enables the filling or dewatering of individual basins without interfering with the operations of adjacent basins. Operation in series has the advantage of desilting the water in the upper basins before spilling into the lower ones, but

makes it difficult to dewater one basin without affecting the whole operation. This project would have the advantages of both types of operation.

Project Works

The river diversion structure and levee would cause a ponding of water in the first basin (Basin A) to act as a desilting basin. This would inundate up to 117 acres. The diversion structure would allow up to 3,000 cubic feet per second (cfs) to pass through Basin A and continue down the Kern River Channel during periods of high flow.

Gated control structures connect adjacent spreading basins. The basins would then be operated in series from the highest to the lowest basin allowing for maximum recharge. If a basin must be dewatered for reconditioning or other purposes, the water can be drained by allowing it to flow through the natural channels within the basin to the lower spreading basins. These natural channels would act as the feeder canal and must be kept flowing unless water is not needed in the lower basins.

The project works would involve the construction of levees and spreading basins. Three categories of levees have been proposed, depending on their location: (1) river levees; (2) interbasin levees; and (3) outer levees. There are 14 basins proposed to be constructed in two phases. Phase I calls for the construction of nine basins and Phase II for construction of the remaining five basins.

The three levee systems to be constructed in the project area would be similar in construction, design and materials. Optimum levee height varies from four to six feet. Upstream sideslopes of 4:1 and downstream sideslopes of 2:1 with a 16-foot top width are proposed depending upon the type of soil and upon operating conditions.

Construction of levees as proposed by this project would channelize the Kern River in some places. In February 1976 the Kern County Water Agency entered into an agreement with U.S. Army Corps of Engineers in connection with the construction of the Kern River-California Aqueduct Intertie giving assurances to prevent encroachment of any type that would impair the effectiveness of the Kern River channel from Bakersfield to Tulare Lake, and to maintain the existing channel capacities. The proposed levees however would not interfere with the flow of the river in the present channel. The shortest distance separating any two river levees is at least 500 feet.

Roads would be built on top of only those levees or portions of levees necessary for maintenance and observation activity. Other levees would be left in natural vegetation.

The purpose of the levees and the height of freeboard are the variables distinguishing the three levee categories. River levees run parallel to the river and separate it from the spreading area. These have the least amount of freeboard (1.5 feet) and would be the most susceptible to failure in the event of extremely high river

flows. Should the river levees fail, the potential for damage to the surrounding area is minimized because water would be contained within the flood plain by the outer levees and interbasin levees.

The outer levees would surround the recharge basin area and have the largest freeboard height, three feet. Interbasin levees separate the individual spreading basins and would have a freeboard height of two feet. This variation in freeboard height sets up a sequence of failure should flooding occur. At first, individual basins would be damaged with an increasing number of basins being damaged at extreme flood conditions. During normal operation and river conditions, routine maintenance of the levees is all that would be required. Replacement or reconstruction of the outer levees and interbasin levees would only occur when flood flows cause failure of the river levee and damage to the spreading basins.

Extraction Area

Water applied to the recharge basins that percolates to the ground-water basin is theoretically available for use by the entity causing the recharge. Because of the fungible nature of water it will also have the favorable effect of improving pumping levels in most years for overlying users in the basin in the vicinity of the

recharge facilities. However, those pumpers with wells in the immediate vicinity of the spreading area would realize the most benefit from the spreading operation.

Monitoring Systems

The amount of infiltration and the effect on the ground-water basins would be monitored by flow meters, evaporations pans, and monitoring wells.

Flow meters would be used to determine the amount of water that enters the spreading area and percolates into the ground-water basin. Losses due to evaporation, which are considered insignificant when compared to the quantity of water spread, would be estimated by the use of evaporation pans. Monitoring wells would be utilized to determine changes in water-level elevation and to measure ground-water mound development or dissipation under the spreading areas. As shown on Plate 3, seven monitoring wells have been constructed. Water levels in these monitoring wells are currently being measured.

The Master Spreading Agreement requires all participating agencies to file an annual report with the City by April 1st of each year, quantifying the amount of stored water which has been extracted in the previous calendar year from all wells owned or controlled by each agency, and all wells owned by landowners within their districts.

Operation of Recharge Facility

The facility would be operated to ensure a maximum rate or recharge. A recharge rate of up to one foot of water per acre per day is expected. As silting of the basins occurs this rate is expected to decrease until such time as the basins are reconditioned.

Each basin is connected in series by a gated control structure, enabling it to be individually regulated. Recharge operations would be conducted with daily observations and would be coordinated with inflow and outlfow conditions and with underlying ground-water mound development.

Initial infiltration rates in each spreading operation would probably be quite high. With continued spreading, the rates of infiltration would decrease until they reach a stable equilibrium rate and remain fairly constant thereafter. The decline in infiltration rate may be caused by a diminishing hydraulic gradient due to the development of a ground-water mound, rising ground-water elevations, swelling of the clays in the soil, algae growth, movement of fine soil particles into the soil pores or any combination of these factors.

When infiltration rates reach an unacceptable level the basins would have to be dewatered and possibly reconditioned. Basin reconditioning involves removal of the fine soil particles deposited on the bottom and sides of the basins. Reconditioning intervals depend primarily on the

quality of water used for spreading. More heavily silt laden waters would cause clogging of the soil pores more quickly than a cleaner water. Chemical quality of water is also important because of the interactions of some of the ions with the clay particles causing the clays to swell, reducing the pore space in the soil.

Recharge operations could occur at any time that water is available. The river diversion structure could be used during normal Kern River flow, while the Kern River canal diversion could occur when river water might be excessively silty, of poor quality or of insufficient quantity.

Ponding of water in Basin A would cause most of the particles in the water to settle out. During periods of flow greater than 3,000 cfs, the levee across the river creating Basin A is expected to be overtopped and would begin to wash away along with the sediment that has been deposited behind it. Should a period of years occur when flows do not exceed 3,000 cfs or if there is not a failure of the levee across the river, the sand and sediment deposited in Basin A could be removed mechanically in order to prevent a build-up of material in the Kern River channel.

Extractions

Water percolated to the ground-water aquifer from the spreading basins would be available for extraction by the cooperating water district. Until extracted it would improve

water levels to other users of the ground-water basin. The "Master Spreading Agreement" requires the participating water districts to maintain a positive balance of water spread at the recharge area. Also, they are not entitled to the water that would have naturally percolated to the ground-water basin in the spreading area had the recharge operation not existed.

The Kern County Water Agency (Agency) has a temporary contract with the City of Bakersfield to spread water and to construct and install wells, pumps and pipelines within the recharge area for the extraction of spread water. Under certain conditions, these facilities may be used by any other entities contracting with the City for withdrawl of the ground-water percolated by that entity through the City's recharge area project.

Annual operation and maintenance costs of the facilities would be shared proportionately by the City, the Agency and any other entity utilizing the facilities.

Cooperating Water Districts

Presently, Olcese Water District and Buena Vista Water Storage District have agreements to spread and recover water. These projects were environmentally assessed and negative delcarations were filed. The Kern County Water Agency has a temporary agreement with the City to spread water.

This environmental assessment involves all increased future spreading and extraction activities by the City or by others pursuant to future contracts with the City similar to, but not limited to, the Master Spreading Agreement, a copy of which is attached and incorporated herein as Exhibit B. An example of such an agreement is the draft agreement with the Kern County Water Agency for spreading operations and the construction of extaction facilites, incorporated herein as Exhibit C, which by definition is covered by this environmental impact report.

Water Deliveries

Water could be delivered to the spreading basins from the Kern River, Kern River Canal, Pioneer Canal and Cross-Valley Canal. Due to the City's existing agreements with Olcese Water District, Buena Vista Water Storage District and the Kern County Water Agency, the actual water spread for recharge could come from three different sources. Buena Vista Water Storage District can spread both Kern River water and Friant-Kern Canal water. The Kern County Water Agency can spread State Project water.

The inflow rate into the basin area with all basins operating would be about 620 cfs, assuming a recharge rate of one-foot per acre per day, the expected maximum sustained rate. The better quality water from the Kern River or the

Friant-Kern Canal would usually be spread first should water be available from either of these. Under conditions of the Master Spreading Agreement, Kern River water has first priority for spreading over imported water.

Project Cost

The initial capital cost of the project, as shown on Table 2, is estimated to be about $919,000. This covers the 1,241 acres of spreading basins at an average cost of $740 per acre. Table 2 shows the proposed cost breakdown for construction of basins and levees, including basin outlet structures

It is not anticipated that major construction work would be required yearly. With the hierarchy of levees, it is planned that only minimal maintenance and repair would be required after high flows. However, considerable repair and construction may be reqired after periods of extreme high flows. Generally, it is expected that operation and maintenance costs as well as reconstruction costs would be higher following wet years than dry or normal years.

Operation and maintenance costs for ground-water spreading facilities range from about 50 cents to more than one dollar per acre foot of applied water. A cost estimate for general maintenance and operation of the spreading basins and levees ranges between 75 cents and one dollar per acre-foot of applied water. It is anticipated that there may

Table 2

COST OF PROPOSED
GROUND-WATER RECHARGE DEVELOPMENT PLAN

Basin	Wetted Area (Acres)	Approximate Flow Rate (cfs)	Earthwork Cost *	Average Structure Cost **	Total Cost ***	Cost/Acre
SOUTH OF RIVER						
1	127	63.5	$61,265	$44,000	$105,300	$829
2	23	11.5	11,105	7,940	19,080	829
3	107	53.5	57,900	37,100	95,000	888
4	153	76.5	64,420	53,010	117,430	768
5	85	42.5	33,140	29,450	62,590	736
6	165	82.5	38,860	57,210	96,030	582
7	183	91.5	0	63,450	63,405	346
Subtotal	843	421.5	$226,690	$292,140	$558,835	$663
NORTH OF RIVER						
8	53	26.5	$55,320	$18,375	$73,695	$1390
9	41	20.5	20,145	14,215	34,360	838
10A	81	40.5	22,555	28,065	50,620	625
10B	27	13.5	16,300	9,360	25,660	950
11	22	11.0	32,025	7,360	39,655	1802
12	57	28.5	59,320	19,765	79,085	1387
Subtotal	281	140.5	$205,670	$97,410	$303,080	$1078
RIVER CHANNEL						
A	117	58.5	$16,035	$40,565	$56,600	$484
Total	1241	620.5	$488,395	$430,115	$918,510	$740

* Based on $1.50/cubic yard.
** Total project structure cost divided proportionately among basins.
*** Cost includes 30 percent engineering and contingencies.

NOTES: 1. Anticipated Phase I construction includes ponds 1 through 7 plus pond 10A.
2. Phase II construction includes ponds 8, 9, 10B, 11, and 12.
3. Source: Ricks, Taylor and Meyer, Inc., August, 1981.

be problems with rodents and burrowing animals from the surrounding agricultural lands weakening the levees. Because of the presence of endangered species of burrowing animals, no animal control measures could legally be employed. Therefore, routine operation and maintenance of the levees would have to be followed.

DESCRIPTION OF ENVIRONMENTAL SETTING

The existing environment of the area of the project can be described by considering the physical, biological, cultural, archeological and historical characteristics. It is situated in the southern portion of the San Joaquin Valley, southwest of the City of Bakersfield.

Physical Charateristics

This section describes the physical environment in the vicinity of the project including climatic conditions, surface water sources and quality, ground-water conditions and quality, air quality, geologic conditions and hazards, and oil and mineral resources.

Climatic Conditions. The climate of the area is arid with hot summers and mild winters. The average monthly temperatures in Bakersfield range from 47.6°F in January to 83.9°F in July. The summers are relatively cloudless. The average length of the growing season is about 300 days. In winter months fog occurs primarily at night but at times it

prevails for two to three weeks continuously. Annual precipitation at Bakersfield averages less than six inches, with ninety percent of the rainfall occuring from November April. Table 3 shows the average monthly temperature and precipitation at Bakersfield.

The normal monthly evaporation for the southern San Joaquin Valley area was reported by the California Department of Water Resources (1980) as tabulated below. The information was based on evaporation records from the National Weather Service pans, located in large, well managed, irrigated pastures. The evaporation data were developed from the average of several locations over several years.

The potential evaporation loss from the spreading area also tabulated below, was estimated by applying a pan coefficient of 0.80 to the evaporation data. The estimated evaporation loss, in acre-feet per acre of wetted area, would occur during actual spreading operations. The estimated evaporation loss from the spreading areas should be reduced by the amount of any precipitation occurring during the spreading operation.

Table 3

AVERAGE MONTHLY TEMPERATURE
AND PRECIPITATION AT
BAKERSFIELD

Month	Average Temperature (^{o}F)	Average Precipitation (inches)
January	47.6	0.96
February	52.4	1.03
March	56.6	0.83
April	62.7	0.85
May	69.8	0.19
June	76.9	0.06
July	83.9	0.02
August	81.6	0.01
September	76.6	0.08
October	66.9	0.26
November	56.0	0.69
December	47.9	0.74
Annual Average	64.9	5.72

Monthly	Pan Evaporation (Inches)	Approximate Evaporation Loss (Ac.Ft./Acre)
January	1.35	0.09
February	2.23	0.15
March	4.13	0.26
April	5.94	0.40
May	8.32	0.55
June	9.29	0.62
July	10.03	0.67
August	8.58	0.57
September	6.43	0.43
October	4.35	0.29
November	2.19	0.15
December	1.02	0.08
Total	63.86(5.32 feet)	4.26

Surface Water Source. Three major sources of surface water are available in the area. They are: (1) the Kern River, (2) the Central Valley Project and (3) the State Water Project.

Historically, the Kern River has been the principal source of surface water to the Kern County portion of the San Joaquin Valley. It heads in the vicinity of Mt. Whitney in the Sierra Nevada, and has a drainage area of 2,420 square miles near Bakersfield. It flows in a south and southwesterly direction, entering the valley northeast of Bakersfield. In most years there is no flow in the Kern River past Bakersfield due to upstream diversions. During wet years, however, some water flows in the river toward Buena Vista Lake and Tulare Lake.

The Central Valley Project is a development of the United States Bureau of Reclamation. Water from that project is delivered to the Kern County area through the Friant-Kern Canal. This canal begins at Friant Dam and Millerton Lake and flows southerly to its terminus at the Kern River upstream of the project area. Some agricultural districts in Kern County have contracts with the United States Bureau of Reclamation for deliveries of Friant-Kern Canal water.

State Project water is supplied from the flows in the Sacramento San Joaquin Delta and releases of water from Oroville Reservoir on the Feather River. Water is diverted from the Delta and delivered through the California Aqueduct to Kern County, as well as to other areas.

Surface Water Quality. Of the three principal sources of water, Kern River and Friant-Kern Canal water are of better quality than State Project water. The quality of Kern River water near Bakersfield is excellent. Table 4 presents a summary of analyses of numerous samples collected from 1973 to 1975. The quality of all of the consituents shown are within the recommended limits for domestic use.

Friant-Kern Canal water quality is also excellent and within the limits of both domestic and Class I irrigation water. Table 5 presents a summary of analyses of the chemical quality of the Friant-Kern Canal water at Friant for 1974 and 1975.

Table 4

KERN RIVER WATER QUALITY
(1973-1975)

Constituents	Number of Analyses	Concentration (mg/l)		
		Minimum	Average	Maximum
Calcium	6	6.8	10.1	14
Magnesium	6	1.7	2.7	3.5
Sodium	6	7.6	11.6	14
Potassium				
Carbonate	6	0	0	0
Bicarbonate	7	31	52.6	70
Sulfate	5	3	6.4	9.2
Chloride	6	4.0	4.7	6.5
Nitrate	3	0.2	0.5	0.9
Flouride	2	0	0.1	0.1
Boron	4	0.2	0.2	0.2
Total Hardness	7	21	34.1	46
Total Disolved Solids	6	57	75.7	98
Spec. Conduct. (Micromhos)	7	72	117.6	156
pH (units)	7	7.5	7.5	8.0

Source: California Department of Water Resources

Table 5

FRIANT-KERN CANAL
WATER QUALITY
at FRIANT
(1974-1975)

Constituents	Number of Analyses	Concentration (mg/l) Minimum	Average	Maximum
Calcium	5	1.6	2.7	3.6
Magnesium	5	0.2	0.7	1.3
Sodium	5	1.7	2.6	4.2
Potassium				
Carbonate	5	0	0	0
Bicarbonate	5	10	14.6	19
Sulfate	5	0	1.0	3.3
Chloride	5	0	1.7	2.8
Nitrate	1	0.2	0.2	0.2
Total Dissolved Solids	5	17	25.6	44
Spec. Conduct. (Micromhos)	4	20	30.3	44
pH (Units)	5	7	7.1	7.4

Source: California Department of Water Resources

State Project water is of poorer quality than Kern River Water and Friant-Kern Canal water. A mixing of the waters from the different sources in the spreading area should create a water of better quality than the ground water. The use of State Project water for spreading is not expected to degrade the quality of the ground water within the basin. State Project water meets the Federal and State Drinking Water Standards and is considered a Class I irrigation water. Tabulated below is a summary of the chemical quality of certain constituents of State Project water sampled near the Buena Vista pumping plant in 1980 and as reported by the California Department of Water Resources.

	Concentration (mg/1)			
Constituents	Minimum	Average	Maximum	State Water Project Quality Objectives
Total Dissolved Solids	104	193	245	440
Total Hardness	44	75	95	180
Chloride	9	40	58	110
Sulfate	9	28	41	110
Sodium (%)	39	46	49	50
Boron	0.1	0.2	0.3	0.6

Ground-Water Conditions. Ground water is a major source of agricultural and municipal water in the Kern County portion of the San Joaquin Valley. The San Joaquain Valley is a topographic and geologic structural basin filled by thick deposits of sedimentary material eroded from the

adjacent mountains and deposited by streams. Unconsolidated continental sedimentary deposits form the principal aquifer underlying the valley. These deposits, which include stream alluvium and lake beds, are more permeable than the consolidated rocks of adjacent mountains.

The Kern County portion of the valley can be considered a separate ground-water basin because of thick, relatively impervious Tulare Lake bed deposits near the northern boundary of the County. The Sierra Nevada and its foothills form the ground-water basin boundary to the east, the San Emigdio and Tehachapi mountians to the south and the Coast Range on the west. The impervious rocks and deposits limit the underlfow out of Kern County.

The ground-water reservoir is a series of permeable sand and gravel lenses interbedded with less permeable finer materials. In the project area deposits consist of alluvial-fan material and associated lacustrine deposits. Alluvial fans are composed of silt, sand and gravel, and the lacustrine sediments are made up of fine sand, silt and clay. The deposits beneath the spreading area, classified texturally into a gravel to medium sand unit and a fine sand to clay unit, form an unconfined upper aquifer and a semi-confined to confined lower aquifer.

Well log information indicates that the base of the gravel to medium sand unit which comprises the unconfined upper aquifer varies from more than 85 feet above sea level to more than 75 feet below sea level. Electric logs of wells

in the area indicate that the upper portion of the sediments comprising the lower fine sand to clay unit are relatively impermeable and inhibit the downward movement of water, causing semi-confined presure conditions in the permeable deposits underlying it. These underlying permeable deposits comprise a lower aquifer. The relative impermeability of the upper portion of the fine sand to clay unit results in the restriction of the water to the unconfined aquifer. Although some water from the upper aquifer may reach the lower aquifer, the amount would probably be insignificant in the operation of a water-spreading and recovery system.

Recharge in the Kern County portion of the San Joaquin Valley ground-water basin is primarily through seepage from streams, unlined canals, excess irrigation water, and municipal and industrial waste water. The contribution from direct precipitation is less significant. The major source of recharge is from the Kern River which carries runoff waters from the Sierra Nevada. Other sources are smaller streams and percolation of irrigation water.

The City's 2,800-acre water spreading facility is situated on the Kern River Fan and overlies a ground-water mound or ridge which has existed historically along the Kern River for at least 40 years. Therefore, water spread in this area primarily moves in northerly and southerly directions from the 2,800-acres. The rate of movement, however, is very slow, perhaps up to 100 feet per year in the southerly direction and perhaps up to 600 or 700 feet per year in the

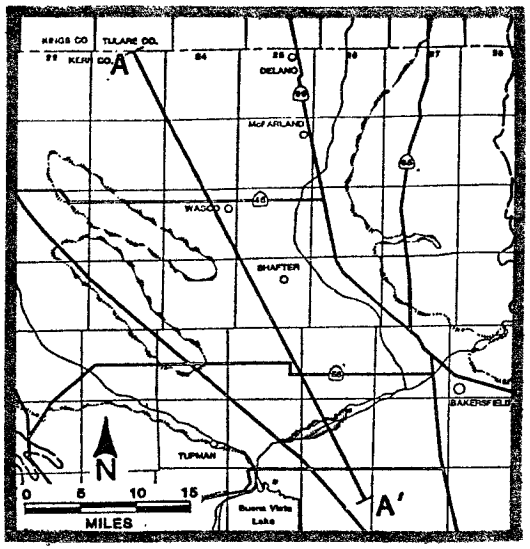
northerly direction. Ground water moving southerly cannot leave the basin because the basin boundaries in the south are well defined and impervious. Ground water moving northerly from the 2,800-acres cannot leave the Kern County portion of the basin beacuse since 1940 there has been a ground-water trough two to eight miles southerly of the north County line. This is probably a pumping trough, and ground water moving into the trough would be pumped from and used in the basin before passing the County line. Any ground water that might move beyond the trough is probably inhibited from leaving the County by the impervious nature of the Tulare Lake bed deposits.

Plate 4 is a graph showing a ground-water profile through the spreading area and for a distance of about 36 miles northwest of the spreading area to the north County line and to a point about eight miles south of the spreading area. The mounding of ground water along the Kern River and the ground-water trough south of the north County line are shown on Plate 4.

Over a long period of time ground-water levels have generally been declining in the Kern County portion of the San Joaquin Valley. These long-term declines indicate that ground-water uses exceed recharge and that an overdraft condition prevails, causing a decline in the quantity of ground water in storage.

Generally, in additon to declining ground-water levels and higher associated pumping costs, the overdraft

LOCATION OF SECTION A-A'



GROUND-WATER PROFILES ALONG SECTION A-A'

PLATE 4

condition also results in water quality degradation, land subsidence and the associated permanent reduction of ground-water storage capacity due to compaction of the aquifers.

Ground-Water Quality. Ground-water quality in the Kern County portion of the San Joaquin Valley is, in most areas, generally suitable for both agricultural and domestic uses. However, the quality has been deteriorating in many places (Leeds, Hill and Jewett, Inc., 1973).

During the middle to late 1950's the total dissolved solids in the ground water were generally less than 1,000 milligrams per liter (mg/1) throughout most of the Kern County portion of the San Joaquin Valley. At that time the main area in which the total dissolved solids exceeded 1,000 mg/1 was along the western and southwestern margins of the basin, and two small areas in the eastern portion of the basin.

The areas underlain by ground water with total dissolved solids of 1,000 mg/1 or greater increased significantly during the period from the middle 1950's to the late 1960's. In the western and southwestern portions of the basin, the total dissolved solids concentration not only increased in areas where it had previously exceeded 1,000 mg/1 but the degradation encroached eastward. In addition, many small areas in the northern and central portions of the valley area of Kern County that were not reported to be

underlain by ground water with total dissolved solids in excess of 1,000 mg/l in the middle and late 1950's were reported to have reached that level by 1970.

Based upon ground-water quality information from two wells located near the project site, as shown on Table 6, the ground-water quality appears to be good. However, ground-water quality can be expected to vary both areally and with depth.

Air Quality. The areas affected by the City's project are within the boundaries of the San Joaquin Valley air basin as designated by the California Air Resources Board. Air quality has been monitored in the Bakersfield area since 1964. The Bakersfield Air Monitoring Station (Chester Avenue) reports average concentrations for oxidant, carbon monoxide, nitrogen oxide, nitric oxide, oxides of nitrogen and hydrocarbons.

The maximum hourly average for the month and the monthly average of the daily maximum hourly average of oxidants, carbon monoxide, nitrogen dioxide, and oxides of nitrogen for February and June 1981 are shown in Table 7. An hourly average represents the average concentration for a 60 minute period. There would be 24 such measurements each day. The daily maximum hourly average is the highest of the 24 hourly averages reported during the day. One-hour average

Table 6

GROUND-WATER QUALITY
FROM SELECTED WELLS
NEAR PROJECT SITE
(1975)

Constituents	Concentrations (mg/l)	
	30S/25E-09L01	30S/25E-26A01
Calcium	15	20
Magnesium	0.3	1.5
Sodium	35	35
Potassium	0.7	0.6
Sulfate	10	7.0
Chloride	9.6	7.7
Nitrate	2.7	2.7
Boron	.04	.03
Total Hardness	39	56
Total Dissolved Solid	120	132
Specific Conductance (micromhos)	230	250
pH (units)	8.0	8.1

Source: California Department of Water Resources.

Federal and State ambient air standards are also shown in Table 7 for comparison. No State or Federal standards have been prescribed for nitric oxide and oxides of nitrogen.

As reported by the California Air Resources Board, hydrocarbon analyzers used by the air monitoring station are standardized against propane, while the State and Federal standards require correction for methane. The concentration of the gaseous contaminants in agricultural areas of the southern San Joaquin Valley are generally less than those measured for the City of Bakersfield.

The air monitoring station usually measures the suspended particulate matter every sixth day over a 24-hour period. The maximum 24-hour measurements and the monthly means for the suspended particulates are also shown in Table 7. The data in Table 6 indicates that the maximum hourly average of the particulates in both February and June 1981 exceeded State standards. The station also measures the concentration of lead several times each month. Maximum 24-hour measurements and the monthly means are shown on Table 7.

There is sufficient evidence to indicate that the presence of pollutants in the air is hazardous to human health. The increase in human respiratory ailments is generally related to high pollutant content of the air. In addition, the pollutants affect the quality of the environment and have a marked effect on crop yields. Air pollution causes necrosis, or bleaching, on plant leaves thus

Table 7

CONCENTRATION OF SPECIFIED AIR CONTAMINANTS AT BAKERSFIELD
CHESTER AVENUE AIR MONITORING STATION

	Oxidant (ppm)	Carbon Monoxide (ppm)	Nitrogen Dioxide (ppm)	Nitric Oxide (ppm)	Oxides of Nitrogen (ppm)	Particulate Matter[g] (ug/m3)[h]	Lead[g] (ug/m3)[h]
February 1981							
Maximum Hourly Average	0.05	9	0.07	0.40	0.44	183[d]	1.09 [d]
Average of Maximum Hourly Average	0.03	4	0.05	0.17	0.21	137[e]	0.82 [e]
June 1981							
Maximum Hourly Average	0.14	5	0.09	0.17	0.23	161[d]	0.41 [d]
Average of Maximum Hourly Average	0.08	2	0.06	0.07	0.13	136[e]	0.34 [e]
Ambient Air Quality Standards[a]							
California	0.12	40	0.25	[c]	[c]	100[f]	1.5 [i]
Federal (Primary)	0.12	35	[b]	[c]	[c]	260[f]	[c]

a/ One hour average.
b/ No standard set for one-hour average
c/ No standard prescribed.
d/ Maximum 24-hour sample collected during month.
e/ Average of five 24-hour samples.
f/ For 24-hour sample.
g/ Concentration determined by high-volume air sampling method.
h/ Micrograms per cubic inch
i/ For a 30-day average

Source: California Air Resources Board

reducing the effective leaf area for the functioning of photosynthesis, respiration and transpiration. Therefore, increased pollutants in the air will result in health hazards as well as economic losses.

Geological Conditions and Hazards. Geologically, the project area is situated at the south end of the Great Valley Geomorphic Province. This province is a large northwesterly trending geosyncline or structrual trough between the Coast Range of mountains on the west and the Sierra Nevada on the east. It extends from the San Emigdio Range on the south to an area north of Redding, a distance of approximately 600 miles. Its width averages about 50 miles. Geographically the province is divided at the delta region into the Sacramento Valley to the north and the San Joaquin Valley to the south. Geologically, the dividing line is generally considered to be the Stockton Arch, an uplift that extends from the slope of the Sierra to the Diablo uplift.

The Great Valley of California, which is almost entirely surrounded by mountains, is one of the most notable sturctural depressions on earth. Evidence of its existence as a marine basin as long ago as late Jurassic is present in the early folding of the Sierra Nevada (120 to 130 million years ago).

Erosion from both the Sierra Nevada and Coast Ranges resulted in the deposition of immense thicknesses of sediments in the valley. The axis of the syncline in the

southern San Joaquin Valley is much closer to the Coast Ranges than the Sierra Nevada. Streams flowing westerly from the Sierra Nevada have a much greater volume than those draining from the west. The structural features in conjunction with the dominance of drainage from the east side have given the valley an asymmetrical form.

Heavily laden streams from the Sierra Nevada have built very prominent alluvial fans along margins of the San Joaquin Valley. Two of these fans are so extensive that they reach all the way across the valley to form dams that restrict drainage to the north. The Kern River fan grew westward to the McKittrick Hills to form a barrier to drainage from the Buena Vista Basin to the south. The Kings River fan merged with one which was developed by Los Gatos Creek from the west to form the Tulare Lake Basin.

The thickness of sediments underlying the area varies from about 3,300 feet in the northern portion near Delano and 7,000 feet near First Point of Measurement on the Kern River to more than 35,000 feet in the Buena Vista-Kern Lake Area.

The south end of the San Joaquin Valley is bordered on the west, east and south by three major fault systems, all of which have been seismically active in recent geologic time. These are the San Andreas, Breckenridge-Kern Canyon and the Garlock faults, respectively.

The San Andreas Fault extends from the Gulf of California at least as far north as Cape Mendocino. It has a northwest-southeast trend parallel to the crest of the Coast Range. It has been active in historic time along its entire length. Movement along this fault is in a right strike-slip direction, with the western block, or Pacific Plate, being displaced northerly in relation to the eastern block, or Continental Plate. The rate of movement is about two inches per year. It has been estimated that the total lateral displacement since Cretaceous time has been approximately 300 miles.

The Breckenridge-Kern Canyon Fault is located in the southern Sierra Nevada to the east of the valley. It trends northerly from the south end of Walker Basin to the north of Mount Whitney, a distance of almost 100 miles. It is a high angle reverse fault with a total vertical displacement of probably as much as 4,000 feet. Seismic activity during historic time and fresh appearing escarpments and gun sights along the fault fit the description of a historically active fault as defined by the California Division of Mines and Geology (1973).

The Garlock Fault extends easterly from its point of intersection with the San Andreas fault, near Lebec, for a distance of approximately 150 miles. An apparent offset of dike swarms along the zone suggests left lateral displacements of as much as 40 miles. Recent movement of up to 2,000 feet is indicated by offset streams and fresh

appearing escarpments. Although very few earthquakes take place along the Garlock Fault, triangulation data indicate that deformation is occuring along the zone a few miles east of its intersection with the San Andreas Fault.

All three of these fault zones appear to be directly related to the uplifting of the mountain ranges in which they are located and the down-warping of the intermediate land mass which constitutes the San Joaquin Valley portion of the Great Valley Geosyncline. The forces which have resulted in the formation of these major fault zones and the continuing movement along them have had great influence localy in the valley floor in the form of folding and faulting of the thick section of sedimentary beds and the underlying basement complex.

None of these major faults or other lesser faults in excess of six miles in length is located in the immediate vicinity of the project. However, numerous smaller faults have been identified in the project area or immediate vicinity.

The principal geologic hazards to the area of interest are those related to seismic disturbances. Because of the pervasive nature of the stresses being applied to the general area as a result of activity along the major fault systems on three sides of the valley, earthquakes can be expected to occur. Based on historical data, the Kern County area is one of the most seismically active areas in southern California.

A study by C. R. Allen, et al. (1965), indicated that a Magnitude 6 earthquake can be expected within the area with a frequency of about once in 43 years per 1,000 square kilometers (625 square miles). Their area of study covered approximately 2,200 square kilometers (1,400 square miles). Seismic data collected for the period 1934 to 1963, shows that 64 to 265 equivalent Magnitude 3 earthquakes per year per 100 square kilometers (62 square miles) occurred in the area. It should be pointed out that the data are greatly influenced by the 1952 earthquake and aftershocks and they do not include data from the 1971 San Fernando earthquake.

Geologic conditions considered in the area are faults, rock types, shallow water tables, near surface clay beds and bodies of water. Because of the low relief in the valley floor, there are no known landslide prone areas or natural slope stability problems. However, in the dissected upland portion, small scale landslides may occur during times of seismic activity, particularily if the soils are saturated.

Known active faults in the general area that are considered to be capable of causing damage in the area are the San Andreas, Garlock, Breckenridge-Kern Canyon, White Wolf and Pond-Poso. In the event of movement, these faults are capable of producing earthquakes of estimted maximum magnitudes of 8.0, 8.0, 8.0, 7.5 to 8.0 and 7.0,

respectively. Earthquakes of these magnitudes could produce severe damage to structures within the area even though the epicenters may be several miles away.

The rock types underlying the area consist of sedimentary rocks superimposed on a crystalline basement complex. The near-surface sediments generally consist of unconsolidated to semi-consolidated material. These sediments are subject to differential compaction, subsidence and lurching in the event of earthquakes, as demonstrated by the losses suffered by agriculture during the 1952 earthquake. In certain areas these conditions are further complicated by the presence of shallow water tables and near-surface clay deposits.

Clays, particularly when saturated, are sometimes sensitive to vibrations and are subject to plastic flow during seismic activity. Near surface deposits of sensitive clay increase the risk of differential compaction, subsidence and lurching.

Two near-surface clay beds, whose thixotropic characteristics (the property of becoming fluid when shaken) are not known, exist within the general area but not under the spreading grounds. They are the "A" clay and "E" clay units. The "A" clay is present in the Buena Vista and Kern Lake areas and its boundaries closely coincide with the boundary of the shallow water table. It is described (Kern Council of Government, 1974) as being "dark green, plastic, silty, sandy, gypsiferous and highly organic." It occurs at

a depth of 10 to 60 feet below the surface and has a thickness which varies from a few feet to about 60 feet. The "E" clay is much more extensive in lateral distribution than the "A" clay. It is bluish, silty, sandy clay and is commonly known as "Blue Clay" to the water-well drillers. It occurs at depths of approximately 300 feet in the Arvin area and 780 feet at Buena Vista Lake, with respective thicknesses of about 30 and 60 feet.

A study made by Woodward-McNeill and Associates (1974) of the Buena Vista Aquatic Recreation Area indicates that there is a low probability that liquefaction would occur due to an earthquake similar to the 1952 event (magnitude 7.7) on the White Wolf Fault. However, they indicate that liquefaction is possible at that site from a major event on the San Andreas Fault.

It does not appear that there are any bodies of water of sufficient size within the area to create a significant hazard to the project from a seiche that might be created as a result of seismic activity. The overtopping of canal banks within the system during the 1952 (magnitude 7.7) earthquake was reported, however no significant damage resulted.

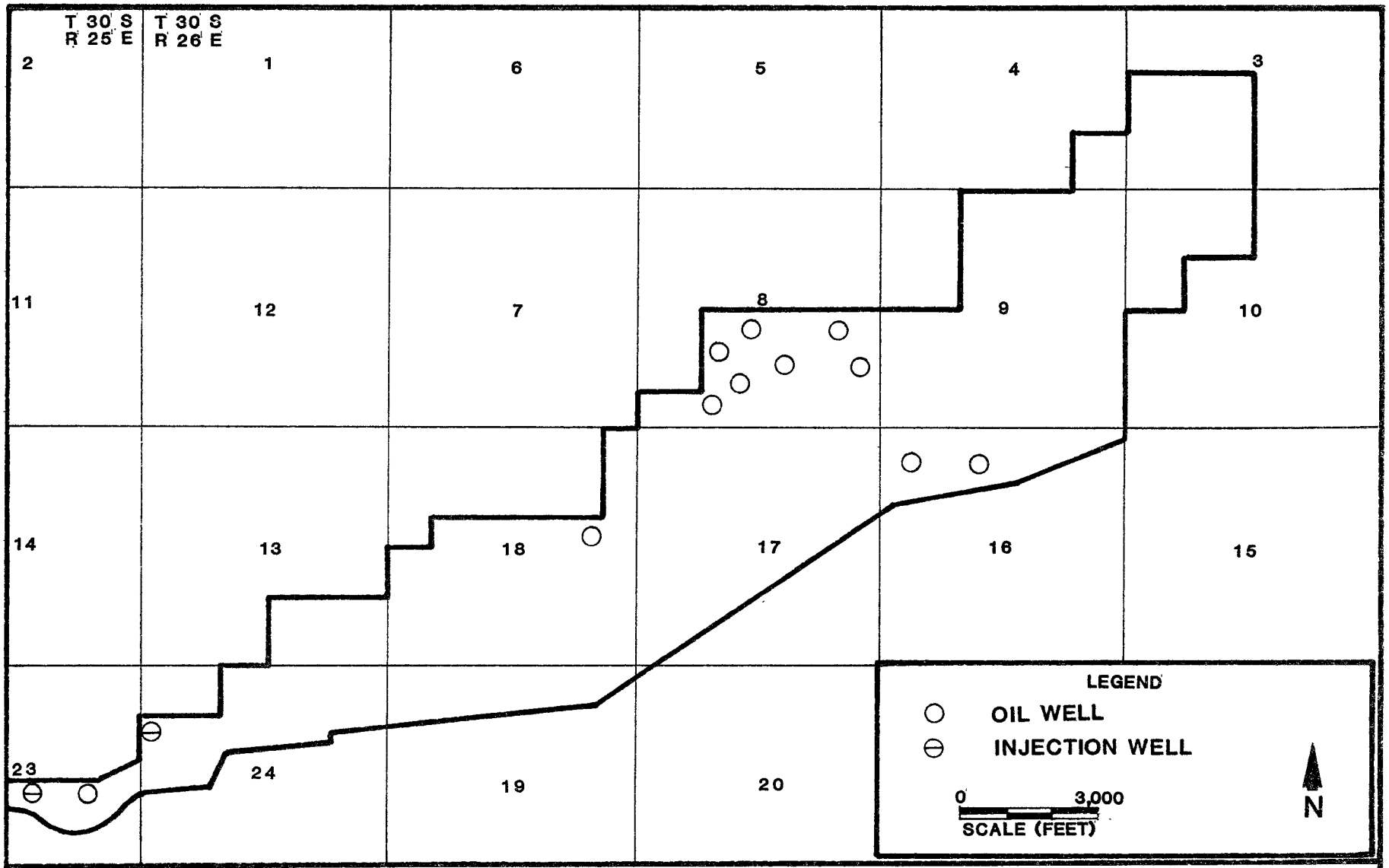
Seiches on bodies of water in the San Joaquin Valley were reported as a result of the January 9, 1857, earthquake on the San Andreas Fault. A run-up of approximately three miles on the east shore of Tulare Lake

was reported. Water in Buena Vista lake was reported thrown 20 feet into the air and the water in the Kern River reversed its flow and overtopped its bank by four feet.

The largest bodies of water near the area of interest are the Buena Vista Aquatic Recreation Lakes, located to the southwest of the project. These lakes cover a sizeable area and have relatively shallow depths. They are lcoated in an area of extremely low relief overlying shallow clay deposits and shallow water tables. These factors may all contribute to render these lakes vulnerable to seiche hazards.

Oil and Mineral Resources. Kern County has an abundance of oil and mineral resources, with oil being by far the most important. Several of the fields in the area are located within agricultural or residential areas and are operating compatibly in the multiple land use concept. Active exploration and development work is continuing throughout the area and additional new discoveries and expansions of oil fields are anticipated. As shown on Plate 5, there are presently active oil wells within the project area.

Mineral resources development near the area of study is limited to sand and gravel. Sand and gravel resources are found in terrace deposits along the margins of the valley. The most commercially suitable deposits are located to the north and east of Bakersfield. The City has a



LOCATION OF OIL WELLS IN PROJECT AREA

STETSON ENGINEERS INC.

PLATE 5

gravel operation in the bed of the Kern River. Sand and gravel deposits, scattered throughout the rest of the area, are of little commercial importance.

Ecological Characteristics

An ecological assessment of the City's ground-water spreading facility was conducted in late February through April, 1982. Federal and State laws require that biological surveys and impact assessments be conducted with regard to threatened or endangered species or their habitats. Although some information is available on the biology of the San Joaquin Valley region (Brode, 1976; Griggs, 1980; Lawrence, 1974; and Twisselmann, 1967), there exists no documentation of the plant and animal occurrences in the project area portion of the lower Kern River.

Linear transects as well as random walk surveys were conducted in late-February through mid-April, 1982, to determine the nature of the vegetation and to locate any populations of rare, endangered, or threatened plant species. Collections were made of those species in flower and have been deposited in the California State College, Bakersfield, herbarium collection.

In order to report the natural wildlife populations represented within the project area, four methods were used to inventory the mammals, birds reptiles, and amphibians

which occupy the area. Those methods included live-trapping, direct field notes, indirect field records and bibiliographic search.

Live-trapping the resident small mammals was carried out during the period of March and April, 1982. Sherman traps were employed to provide some indication of the species composition of the small mammals within the area. During the study period 120 trap nights of mammal trapping were sampled.

Direct field notes were recorded of the activity areas within the project area, indicating not only the numbers of birds or animals within the riparian river region, but also the nature of their behavior, such as nest building, feeding, nuptual display or territorial defense. Although this direct field note method is effective in the case of day-feeding birds and mammals, many species of vertebrates which are nocturnal require indirect inventory methods or nocturnal field work.

Indirect field records were appropriate to further inventory the wildlife populations. During this period of late winter and early spring, animal tracks were often in the fine grained mud of the silted riverbank or marshy basins. Animal droppings or scat samples also provided another indication of recent animal activity. Burrow systems also were found to be valuable as a means to identify the presence of such animals as badgers, Beechey ground squirrels, kit fox, pocket gophers, and kangaroo rats.

Bibliographic records of recent field studies within the southern Central Valley area were collected to gain the experience of other investigators working at other seasons of the year during the recent past. A study published in 1980 by the U.S. Fish and Wildlife Service, titled "California's Important Fish and Wildlife Habitat", represents one useful source, and the paper by Girggs (1980) on the Valley saltbush scrub, is also a significant report describing California's critical wildlife habitats.

Originally the southern San Joaquin Valley, which surrounds and includes the project area, was a region of broad arid plains. Much of the region had an extensive cover of saltbush species with occasional valley mesquite savanna. In certain areas these plains were transected by water courses from the nearby mountains. These water courses supported riparian and marshland habitats.

The historical development of this region significantly influenced the nature of the ecological characteristics in the project area in view of the variety of industrial and agricultural uses that have modified the region during the past 100 years or more. Grazing by sheep, cattle and horses has altered the nature of the vegetation by bringing in non-native grasses and forbs as well as denuding the soil due to to grazing and trampling. For several decades the land in the project area has been diked and used for spreading and storage of Kern River and other water. Oil field activities have also brought change. Oil field road

construction, storage yards, and diking of the river channel near drilling sites have influenced the river channel. In recent years the construction by the Crops of Engieners of a reservoir at Isabella and the associated system of canals, including many cement-lined canals, have impacted the regimen of the Kern River. During the past thirty years increased human pressures have been present in the project area with the cutting of cottonwood and mesquite. Shooting and hunting have influenced wildlife populations, and most recently, the use of the area by off-road recreational vehicles has accelerated erosion of the surface soil and damage to the plant cover.

Vegetation. Late February, March and early April surveys of the area revealed a fairly-complex assemblage of plant species. Within the project area boundaries there are three basin vegetation or habitat types: (1) riparian or streamside; (2) Valley mesquite-saltbush; and (3) freshwater marsh. Each type is discussed below:

1. Riparian or streamside. Most of the project area supports a regrowth of riparian species. Due to a lowering of the water table and to woodcutting activities in the last twenty years, most of the original large cottonwoods are gone. However, there are now many young cottonwoods, willows, and baccharis plants throughout the

project area, which is probably due to the recent water spreading activities which create a favorable environment for these species. This riparian vegetation is especially well developed in proposed recharge basins No. 1, 2, 8, 9, 10a, 10b, 11, and 12. Within this general riparian vegetation there are two phases. One is flat and open (especially in basins No. A, 11, and 12) with typical valley grassland species and occasional weakly developed vernal pools in these open flats between the cottonwoods and shrubs. The other phase has less regular terrain (especially basins No. 1 and parts of 8, 9, 10, and A, which is due to levee construction) with depressions and stream courses between the cottonwoods, willows and baccharis. Plant species seen and collected from the riparian habitats in February, March, and April, 1982 are listed in Table 8.

Two recent symposia on riparian ecosystems were held in 1976 and 1981 at the University of California, Davis. The need to preserve as much of the remaining riparian ecosytems as possible was emphasized at those meetings. Of the estimated 775,000 acres of riparian communities in 1848, only about 12,000 (1.5 precent) remain today. The remaining wooodlands have been extensively distrubed by wood cutting, channelization, and

Table 8

PLANT SPECIES OF THE RIPARIAN HABITAT
SEEN AND COLLECTED IN FEBRUARY, MARCH AND APRIL, 1982

WOODY

Baccharis emoryi	Baccharis
Cephalanthus occidentalis var. californicus	Buttonwillow
Nicotiana glauca	Tree tobacco
Populus fremontii	Fremont cottonwood
Salix sp.	Willow
Tamarix parviflora	Tamarisk

HERBACEOUS - WET AREAS

Artemisia douglasiana	California Mugwort
Calandrinia ciliata*	Redmaids
Eleocharis macrostachya	Common Spikerush
Elymus triticoides	Alkali rye
Epilobium paniculatum	Willow herb
Frankenia grandiflora	Alkali heat
Juncus balticus	Baltic rush
Lepidium dictyotum*	Peppergrass
L. lasiocarpum var. georginum*	Peppergrass
Mimulus guttatus	Common monkey flower
Orthocarpus linearilobus*	Owl's clover
Phacelia douglasii*	Douglas phacelia
Plagiobotrys arizonicus*	Arizona popcorn flower
Polygonum coccineum	Swamp knotweed
Psilocarpus tenellus var. tenellus*	Slender wooly heads
Sonchus oleraceus	Sow thistle
Urtica holosericea	Nettle
Veronica peregrina var. xalapensis*	Purselane speedwell
Xanthium strumarium	Cocklebur

* Vernal pools

HERBACEOUS - DRY AREAS

Amsinckia intermedia	Fiddleneck
A. menziesii	Fiddleneck
Astragalus hornii	Sheep loco
Bromus carinatus	California brome
B. mollis	Soft chess
B. rigidus	Ripgut
B. rubrens	Red Brome
Camissonia campestris	Suncups
Capsella bursa-pastoris	Shepherd's purse
Conyza canadensis	Horseweed
Crassula erecta	Pygmy weed

Table 8
(continued)

Descurania pinnata ssp. glabra	Tansey mustard
D. sophia	Descurania
Distichlis spicata var. stricta	Saltgrass
Eremalche parryi	Parry mallow
Erodium cicutarium	Red-stem filaree
E. obtusiplicatum	Filaree
Festuca megalura	Foxtail fescue
Gilia tricholor	Bird's eye gilia
Gnaphalium palustre	Lowland everlasting
Helianthus annuus	Sunflower
Hordeum leporinum	Foxtail
Lasthenia chrysostoma	Goldfields
Loeflingia pusilla	Loeflingia
Lupinus bicolor	Lupine
L. benthami	Bentham's lupine
Malva parviflora	Cheeseweed
Matricaria matricarioides	Pineapple weed
M. occidentalis	Alkali pineapple weed
Medicago hispida	Bur clover
Nemophila mensiesii	Baby blue-eyes
Orthocarpus purpurascens	Owl's clover
Pectocarya penicillata	Pectocarya
Salsola kali var. tenuifolia	Russian thistle
Shizmus arabicus	Sheep grass
Sisymbrium altissimum	Tumble mustard
S. irio	London rocket
S. officinale	Hedge mustard
Thelepodium lasiophyllum	California mustard

other activities (Smith 1976). Bakker (1971) states that no natural landscape in California has been more altered by man than has ripaian woodlands.

The riparian ecoystems, the woodlands that appear as greenbelts along permanent and intermittent water courses, sloughs, flood plains, and oxbows of the Kern and other Central Valley rivers, are by no means simple communities. Cheatham and Haller (California Fish and Game, 1965) identified four major Californian riparian habitats with eleven subhabitats. Of the 29 habitat types listed in the "Inventory of Wildlife Resources, California Fish and Wildife Plan, Vol. III." riparian habitats provide living conditions for a greater variety of wildlife than any other habitat type in Califfornia.

Ernest Twisselmann, author of "A Flora of Kern County", has indicated that the bottomland riparian coummunity of the Kern River is one of the five natural areas of the southern San Joaquin Valley in urgent need of preservation.

The Nature Conservancy has designed its California Critical Areas Program to preserve representative samples of eleven California ecosystems that are on the verge of extinction. The riparian woodland ecosystem is on the list, and

A. Starker Leopold has commented on the loss of this important ecosystem and the enciessity for its preservation (Seligmann, 1981).

2. Valley mesquite saltbush. An extensive amount of the vegetation in the project area is dominated by mesquite (Prosopis juliflora var. torreyana) and saltbush (Atriplex polycarpa and A. lentiformis) with large open areas between them. This vegetation type is best developed in basins No. 3, 4, 5, 6 and 7, and also has a wet and a dry phase. The dry phase has typical valley grassland species (brome grasses, filaree, goldfields, suncups and various mustards) in the open flats between the shrubs. This phase is mostly in basins No. 3, 4, and 5. The wet phase is best developed in basins No. 6 and 7 and have alkali rye, dock, nettle, mugwort, and wild lettuce in the undulating terrain between mesquites and saltbushes. Plant species seen and collected from the valley mesquite-saltbush habitat in February, March, and April are listed in Table 9.

The arid plains in the southern San Joaquin Valley were once covered with saltbushes and, in places, were dotted with large mesquite trees. Rapid development of irrigated agricultrue in the past 10 to 20 years has destroyed this native vegetation. In addition, where cultivation has not

Table 9

PLANT SPECIES OF THE MESQUITE-SALTBUSH HABITAT
SEEN AND COLLECTED IN FEBRUARY, MARCH AND APRIL, 1982

WOODY

Atriplex lentiformis	Quail brush
A. polycarpa	Saltbush
Baccharis emoryi	Baccharis
Cephalanthus occidentalis var. californicus	Buttonwillow
Haplopappus sp.	Goldenbush
Populus fremontii	Fremont cottonwood

HERBACEOUS - WET AREAS

Artemisia douglasiana	California mugwort
Eleocharis macrostachya	Common spikerush
Elymus triticoides	Alkali rye
Hesperocnide tenella	Western nettle
Heterotheca grandiflora	Telegraph weed
Juncus balticus	Baltic rush
Lactuca serriola	Wild lettuce
Mimulus guttatus	Common monkey flower
Polygonum coccineum	Swamp knotweed
Rumex salicifolius	Willow dock
Urtica holosericea	Nettle
Xanthium strumarium	Cocklebur

HERBACEOUS - DRY AREAS

Amsinckia menziesii	Fiddleneck
Bromus mollis	Soft chess
B. rigidus	Ripgut
B. rubens	Red brome
Camissonia campestris	Suncups
Capsella bursa-pastoris	Shepherd's purse
Distichlis spicata var. stricta	Saltgrass
Erodium cicutarium	Red-stem filaree
E. obtusiplicatum	Filaree
Festuca megalura	Foxtail fescue
Hordeum leporinum	Foxtail
Lasthenia chrysostoma	Goldfields
Loeflingia pusilla	Loeflingia
Lupinus bicolor	Lupine
Malva parviflora	Cheeseweed
Medicago hispida	Bur clover
Nemophila menziesii	Baby blue-eye
Orthocarpus purpurascens	Owl's clover
Pectocarya penicillata	Pectocarya
Shizmus arabicus	Sheep grass
Senecio vulgaris	Groundsel
Sisymbrium officinale	Hedgemustard

destroyed these mesquite savannas, grazing by livestock has prevented young mesquite from becoming established.

3. Freshwater marsh. Due to ground-water spreading activities, a few small areas in the project area (basin No. 10b) have enough water accumulating annually to support cattails, tule, spikerush, and marsh cress, all of which are typical of California's remnant freshwater marshlands. A list of plant species seen and collected from this habitiat during February through April, 1982, is preseted below.

Eleocharis macrostachya	Common spikerush
Rorippa palustris	Marsh cress
Rumex Violascens	Dock
Scirpus acutus	Tule
Tamarix parviflora	Tamarisk
Typha latifolia	Cattail

Freshwater marshlands once occupied extensive areas in the Central Valley where runoff accumulated. However, construction of major dams on principal rivers that once flowed freely into the valley creating a network of sloughs, marshes and playas has severely altered these habitats. Ground-water pumping in the valley has severely lowered the water table and has eliminated the natural marshlands. Only isolated low-lying areas

where irrigation water collects are able to support remnant marshland habitat. One of the best examples of this is the artifically maintained Kern National Wildlife Refuge about 40 miles north of the project area.

Wildlife. Amphibians, reptiles, birds, and mammals are all found within the project area. Food gathering activities, nesting and projection of the young, as well as protective cover from predators and severe weather, are all provided for in the three unique habitat types in the area. Vegetation cover, water flow, and the sandy soil as a burrowing substrate all contribute to this.

Riparian animal populations are adapted to both the intermittent flow of the Kern River and to the variations of summer and winter temperatures as well. Wildlife species of the riparian habitat are listed in Table 10.

Freshwater marsh wildlife populations are currently limited by increased water use from the river. Originally comprised less than one percent of the California wildlife region, the area of freshwater marsh habitat has been reduced to less than one-thrid of its original size. Animal species of the marsh habitat are listed in Table 11.

Valley mesquite-saltbush wildlife populaitons are the most depleted of the three habitat-related populations in this part of California. Species of this habitat type are

Table 10

WILDLIFE OF THE RIPARIAN STREAMSIDE HABITAT

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE A=Abundant C=Common R=Rare
Osprey Fish Eagle	Pandion haliaetus	R
Southern Bald Eagle*	Haliaetus leucocephalus	R
Peregrine Falcon*	Falco peregrinus	R
White-tailed Kite	Elanus leucurus	C
Red-tailed Hawk	Buteo jamaicensis	C
Sharp-shinned Hawk	Accipiter striatus	C
Sparrow Hawk, Kestrel	Falco sparverius	C
Great Horned Owl	Bubo virginanus	C
Barn Owl	Tyto alba	C
Belted Kingfisher	Megaceryle alcyon	C
Red-shafted Flicker	Colaptes cafer	C
Nuttall's Woodpecker	Dendrocopos nuttallii	C
Pine Siskin	Spinus pinus	A
Scrub Jay	Aphelocoma coerulescens	C
Starling	Sturnus vulgaris	A
Phainopepla	Phainopepla nitens	C
Western Robin	Turdus migratorius	C
Black Phoebe	Sayornis nigricans	C
Western Kingbird	Tyrannus verticalis	C
Common Bushtit	Psaltriparus minimus	C
Hermit Thrush	Hylocinchla guttata	C
Cedar Waxwing	Bombycilla cedrorum	C
Bullock's Oriole	Icterus bullockii	C
Red-winged Blackbird	Agelaius phoeniceus	A
Orange crowned Warbler	Vermivora celata	C
Audubon's Warbler	Dendroica auduboni	A
House Finch	Carpodacus mexicanus	A
Dark backed Goldfinch	Spinus psaltria	C
Northern Junco	Junco oreganus	A
Ruby crowned Kinglet	Regulus calendula	C
Fox sparrow	Passerella iliaca	C
White-crowned Sparrow	Zonotrichia leucophyrys	A
Western Aquatic Garter Snake*	Thamnophis couchi gigas	C
Pacific Newt	Taricha torosus	C
Bullfrog	Rana catesbeiana	C
Mosquito Fish	Gambusia affinus	A
Western Sucker	Catostomus occidentalis	A
Sculpin*	Cottus gulosus	C
Small-mouth Bass	Micropterus dolomieui	C
White Catfish	Ictalurus catus	C
Hardhead*	Mylopharodon conocephalus	C

*Species not sighted during present survey but are reported in the literature as occurring in this habitat.

Table 11

WILDLIFE OF THE FRESHWATER MARSH HABITAT

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE A=Abundant C=Common O=Occasional R=Rare
Muskrat*	Ondatra zibethica	O
Mexican Free-tailed Bat	Tadarida mexicana	C
Striped Skunk	Mephitis mephitis	O
Long-tailed Weasel*	Mustela frenata	O
Mallard Duck	Anas platyrhynchos	C
Lesser Scaup Duck	Aythya affinis	O
Horned Grebe	Podiceps auritus	O
Pied-billed Grebe	Podilymbus podiceps	O
American Coot, Mudhen	Fulica americana	C
Common Gallinule	Gallinula chloropus	O
Cooper's Hawk	Accipiter cooperi	R
Marsh Hawk, Northern Harrier	Circus cyaneus	R
Great blue Heron	Ardea herodius	O
Black-crowned Night Heron	Nycticorax nycticorax	O
Green Heron	Butorides virescens	O
Killdeer	Charadrius vociferus	A
Greater Yellow Legs	Totanus melanoleucus	C
Spotted Sandpiper	Actitis macularia	O
Long-billed Curlew*	Numenius americanus	O
Black-necked Stilt	Himantopus mexicanus	O
White-tailed Kite	Elanus leucurus	O
Cliff Swallow	Petrochelidon pyrrhonota	C
Barn Swallow	Hirundo rustica	O
Long-billed Marsh Wren	Telmatodytes palustris	O
Western Toad	Bufo boreas	C
Spade-foot Toad	Scaphiopus hammondi	O
Pacific Tree Frog	Hyla regilla	C

*Species not sighted during present survey but are reported in the literature as occurring in this habitat.

listed in Table 12. A report (Griggs, 1980) on this habitat type, indicates that over 25,000 acres of mesquite has been agriculturalized in the past seven years, and the habitat is now on the verge of extinction. The valley mesquite-saltbush vegetation that formerly grew on the Tule Elk Preserve near Tupman is now compeltely gone due to the lower ground-water levels. The loss of this mesquite-saltbush wildlife habitat would seem to have a direct bearing on a significant number of animals now cited both by federal and state authorities as rare and endangered. The San Joaquin antelope squirrel, the valley race of kit fox, the giant kangaroo rat, and the blunt-nosed leopard lizard are all found in this endemic habitat type. This unique and threatened habitat type, therefore, will require a careful management plan to insure long term viability.

Endangered or Threatened Plants. No plant species considered by Federal or State agencies to be rare or endangered were located in the project area during the February, March and April survey. There are five species that presumably could occur in the area. Three of these are possibly present and two are unlikely present. These are listed as follows:

1. Cirsium Crassicaule (Slough Thistle). None were found during the survey. Stream banks and water courses are likely habitats for this

Table 12

WILDLIFE OF THE VALLEY MESQUITE-SALTBUSH HABITAT

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE A=Abundant C=Common R=Rare
Audubon Cottontail	Sylvilagus audubonii	A
Black-tailed Jackrabbit	Lepus californicus	C
Beechey Ground Squirrel	Citellus beecheyi	C
Antelope Ground Squirrel*	Ammospermophilus nelsoni	R
San Joaquin Kangaroo Rat	Dipodomys nitratoides	C
Giant Kangaroo Rat*	Dipodomys ingens	R
California Pocket Mouse	Perognathus californicus	C
Deer Mouse	Peromyscus maniculatus	A
Pocket Gopher	Thomomys bottae	A
Badger	Taxidea taxus	C
San Joaquin Kit Fox	Vulpes macrotis var. mutica	R
Coyote	Canis latrans	C
California Quail	Lophortyx californicus	C
Ring-necked Pheasant	Phasianus colchicus	C
Turkey Vulture	Cathartes aura	C
California Condor*	Gymnogyps californianus	R
Burrowing Owl	Athene cunicularia	R
Common Raven	Corvus corax	C
Roadrunner	Geococcyx californianus	C
Mourning Dove	Zeniadura macroura	A
Anna Hummingbird	Calypte anna	C
California Thrasher	Toxostoma redivivum	C
Loggerhead Shrike	Lanius ludovicianus	C
Western Meadowlark	Sturnella neglecta	A
Horned Lark	Eremophila alpestris	A
Brewer's Blackbird	Euphagus cyanocephalus	A
Brown Townee	Pipilo fuscus	C
Song Sparrow	Melospiza melodia	C
Golden-crowned Sparrow	Zonotrichia atricapilla	C
Lark Sparrow	Chondestes grammicus	C
Blunt-nosed* Leopard Lizard	Crotaphytus wislizenii silus	R
Western Fence Lizard	Sceloporus occidentalis	A
Western Skink Lizard	Eumeces skiltonianus	A
Whiptail Lizard	Cnemidophorus tigris	C
Side blotched Lizard	Uta stansburiana	A
Gopher Snake	Pituophis melanoleucus	C
Patch-nosed Snake*	Salvadora hexalepis	R

*Species not sighted during present survey, but are reported in the literature as occurring in this habitat.

species which is listed in the California Natural Diversity Data Base as rare and endangered. This species blooms from June to August so it would not be recognizable in late winter or early spring when the survey was conducted. The nearest known population is along the Buena Vista slough, nine miles northeast of the project area.

2. Erigonum gossypinum (Cottony Buckwheat). None were found during the survey. This species is confined to dry sandy places in Kern County and blooms in summer and early fall. It is listed by the California Natural Diversity Data Base as rare but not endangered. Sandy dry habitats occur throughtout the study site and since this species is present in the sandy bluffs near Hart Park about 15 miles upstream, it is possible that it may also grow in the project area. However, it does not become recognizable until the summer months.

3. Atriplex vallicola (Lost Hills Saltbush). None were found during the survey. Dried rainpools and flats with valley grassland species occur in the project area and these are possible habitats for this rare and endangered spieces. It also flowers in summer and fall and would not be recognizable until late May. The nearest known population is near Lost Hills about 18 miles northwest of the project area.

4. Cordylanthus mollis var. hispidus (Hispid Birds' Beak). This species, which is also listed as rare and endangered, grows in alkali sinks southeast of Bakersfield and booms in summer and fall. Since there are no well developed alkaline habitats in the project area it is not likely that this species is present.

5. Atriplex tularensis (Bakersfield Saltbush). This species is listed as presumed extinct. It grows (or grew) along the borders of alkali sinks and was last seen in the alkali sinks south of Bakersfield in 1921. Since there are no alkali sinks in the project area, it is not likely that this species is presnt.

In summary, no species of plants listed as rare, threatened, or endangered were found in the project area during the study period of February through April. However, since the habitats for Slough Thistle, Cottony Buckwheat, and Lost Hills Saltbush seem to occur in the project area, further surveys in summer and fall months may be necessary to determine if any populations of these species exist in the project area.

Endangered or Threatend Wildlife. The project area contains habitats that could support a total of ten species of wildlife which are designated as rare or endangered by either the Federal or State of California authorities. Each of the ten are described below in terms of its dependency or frequency of use of the project area. A summary of these rare or endangered species is listed in Table 13.

1. Ammospermophilus nelsoni (San Joaquin Antelope Squirrel). This local burrowing mammal was initially discovered at a site eight miles northeast of Bakersfield. It requires the dry saltbush mesquite areas as well as grasses and forbs for food. The project area is within the range of this striped back, daytime feeding squirrel, but no colonies were located during the cold observation periods of February, March, and April, 1982. Recent intensive cultivated farming activity on both sides of the site have clearly limited much of the existing optimal habitat for this local mammal.

2. Dipodomys ingens (Giant Kangaroo Rat). This endangered nocturnal rodent has been collected in Kern County both at Buena Vista Lake and in the Buttonwillow region. Dry shrub covered regions with abundant seed food supply has provided the natural habitat for the species. The approximately

Table 13

SUMMARY OF THE RARE, ENDANGERED AND THREATENED WILDLIFE SPECIES WHICH THE HABITATS PRESENT IN THE PROJECT AREA COULD SUPPORT

NAME	PROTECTION STATUS*	VULNERABILITY
Ammospermophilus nelsoni San Joaquin antelope squirrel	Rare-State	Habitat reduction burrow damage.
Dipodomys ingens Giant Kangaroo Rat	Endangered-State	Habitat loss in shrub reduction
Vulpes macrotis mutica San Joaquin Kit Fox	Endangered-Federal and State	Possible habitat loss, modification
Crotaphytus wislizenii silus Blunt-nosed Leopard Lizard	Endangered-Federal and State	Some habitat change and burrow damage
Athene cunicularia Burrowing Owl	Endangered-Federal	Alteration of some burrows
Haliaetus leucocephalus Southern Bald Eagle	Endangered-Federal and State	Basins will provide some habitat benefit
Accipiter cooperi Coopers Hawk	Endangered-Federal	Minor habitat modification
Circus cyaneus Marsh Hawk Northern Harrier	Endangered-Federal	Recharge basins improve habitat
Falco peregrinus Peregrine Falcon	Endangered-Federal	Recharge basins improve habitat.
Pandion haliaetus Osprey	Endangered-Federal	Basins will benefit osprey habitat.

*The categories of protection status cited above are based on the September 1980 publication of the U.S. Dept. of the Interior Fish and Wildlife Service, "Important Fish and Wildlife Habitats of California."

1,600 acres within the project area which will not be diked and used for percolation basins will provide some habitat for the giant kangaroo rat. This rodent has been found to be one of the most important prey animals for the local kit fox. This mammal was not observed in the project area during the spring 1982 survey.

3. Vulpes macrotis var. mutica (San Joaquin Kit Fox). This San Joaquin Valley carnivore has been widely publicized as rare and endangered, and much of the orignal habitat that supported the kit fox - kangaroo rat relationship in the mesquite-saltbush open ground has been modified by farms and dissected by paved roads. John Reed, staff member of the California Department of Fish and Game, has made repeated sightings of the nocturnal kit fox on the 2,800-acre site. Kit foxes have been observed to make adjustments to habit modification, as found by Jack Zaninovich in finding them in burrows along fencerows, where the soil was elevated above the vineyards.

4. Crotaphytus wislizenii silus (Blunt-nosed Leopard Lizard). This large lizard is cited as endangered by both the Federal Fish and Wildlife Service and the State Fish and Game Department. Typically it forms burrow systems in the upper walls of gullies or shallow washes within the

mesquite-saltbush habitat. Agriculture and road building have displaced much of the original land occupied by the leopard lizard. No sightings of this lizard were made during the spring 1982 survey.

5. Athene cunicalaria (Burrowing Owl). Rare among the nocturnal owls is this day-feeding species that spends much of its time below ground in the burrow systems of such animals as the Beechey ground squirrel. Rodent control measures and hatitat reduction by recently opened farm acreage have contributed to the diminished numbers of this "picket-pin" owl. The daylight feeding hours of this species avoids the nocturnal prey sought by the larger barn owl and the greathorned owl. Burrowing owls search out lizards, large insects, and some small rodents. This owl was observed in the project area during the spirng 1982 survey.

6. Haliaetus leucocephalus (Southern Bald Eagle). The white-face eagle, emblem of the United States of America, lives around large lakes and rivers. A variety of forces have acted to diminish the numbers of the bald eagle in recent years. Chlorinated hydrocarbon insecticides have caused some serious poisoning of this large fish-eating eagle which suffers from the biological

magnification of low dosage insecticide application that is muliplied in the tissues of fish feeding on insects, and finally in the fish-eating eagle tissues. Habitat loss and some direct shoting are additional factors in the population decline. Any increase in total water surface which results from the recharge basins that are proposed will represent a form of habitat improvement for those wildlife species which feed on the fish and crustaceans to be found in the freshwater ponds or marshes. This eagle was not sighted in the project area during the spring 1982 survey. However, some were observed a few miles upriver from the project area.

7. Accipiter cooperi (Cooper Hawk). This hawk is a swift, low flying raptor which is recognized by the barred tail with a rounded tip. Although this hawk is cited federally as endangered, the evidence suggests that the smaller birds which have been found in stomach and pellet analysis at Yosemite (including remains of chipmunk, robin, stellar jay, flicker, tanager, and warblers) are themselves threatened by the Cooper hawk. This hawk was observed beneath the cottonwood tree canopy flying in search of prey along the Kern River. Habitat alterations from this project would unlikely affect this species.

8. Circus Cyaneus (Marsh Hawk). The March hawk or northern harrier is a small slender hawk with a white rump patch, that is well adapted to the project area. It flies low, near the ground in search of rodents or large insects for food, which it finds both in marsh and grasslands areas. Several sightings of this hawk were made on the study site during the spring 1982 survey.

9. Falco perigrinus (Peregrine Falcon). This rare falcon is sometimes called the duck hawk because of the tendency to capture other birds in flight, including waterfowl. This falcon is only occasionally observed along the Kern River. It has experienced a servere population decline during the peak of the DDT application phase in agriculture. Now, once again the numbers of falcons are returning to near normal. No sightings of this falcon were made on the study site during the spring 1982 survey. However, some were observed about five miles northwest of the project area.

10. Pandion haliaetus (Osprey or Fish Eagle). The slender osprey captures fish with its talons after a spectacular dive from high above the water surface. As the proposed project provides more water surface and river channel, the osprey will

benefit from the enhanced feeding area. Sightings were made of this bird flying high above the project area during the spring 1982 survey.

11. Gymnogyps californianus (California Condor). The California Condor would be only a rare visitor in the valley floor as most of its feeding carrion search lies along the foothills where both deer and cattle carcases may be located. This bird was not sighted in the study area during the spring 1982 survey.

Valley Fever

Coccidioidomycosis, referred to as valley fever, is a disease caused by a single species of fungus (coccidiodes immitis). The spores of the fungus are found in the semi-arid regions in the southwestrn part of the United States and it is endemic to Kern County. Man acquires the infection by inhaling spores from contaminated soil, particularly during the dry and dusty season. Although everyone living in the valley has some contact with the disease-causing organism, dissemination does occur more frequently in those whose occupation results in continous exposure to dust and soil, as for example, agricultural and construction workers.

Cultural Characteristics

The cultural factors considered in the use of the proposed 2,800-acre ground water recharge site pertain to man and his use of the environment. They include matters related to population, land use, recreation and other features affecting man's relationship to the environment.

Population. The area surrounding the project site is rural with population scattered in farmsteads and small communities. Present census data show that about 244,000 people reside within the urban Bakersfield area. The urban Bakersfield area, with over 56 percent of the people living in Kern County, includes the City of Bakersfield proper and nearby areas. The remainder of the population resides in the rural area and small cities and communities. There are few people residing in the area surrounding the 2,800-acre project site.

Land Use. Land use in the County varies from one place to another. The area around the project site is generally agricultural. Producing oil wells and storage tanks are scattered throughout the area with some active wells within the project area.

Under the City's plan of development, the project land in and adjacent to the Kern River channel would be used for ground-water replenishment and subsequent extraction. The

spreading of water would benefit agricultural land around the project area by enhancing ground-water elevations and supplies.

Recreation. Recreational activities within the project site are many. Hiking, horseback riding, picnicking, and wildlife observation are some of the activities that now occur. Present uses of the area are controlled by a security patrol and signage on a portion of the project site. Hunting and off-road vehicle uses are not currently allowed.

Archeological Characteristics

When the first non-Indians arrived in the area it was occupied by Yokut Indians who were divided into tribes, each of which occupied rather well-defined areas. The major tribe, the Yowlumne, ranged north to Poso Creek, southeasterly to the old headquarters of the Tejon Ranch, eastward up Kern Canyon to just above Miracle Hot Spring, and westward a short distance beyond the site of the California State College campus. The Tuhohi occupied the Kern River downstream of the Yowlunme, to and around Buena Vista Lake and Bull Sloughs and north past Goose Lake. The northern and eastern shores of Kern Lake were occupied by the Hometwoli. The Tulamni were found south and west of Buena Vista Lake, for the most part beyond the area of this project, and ranged north to the McKittrick area.

Five population centers developed from the clustering of settlements in particurlarly favorable portions of the area. A 1975 investigation by Dr. William Wake indicated that none of these settlements or other archeological sites were present in the spreading area or immediate vicinity.

Not all of the known sites were indicated in Dr. Wake's investigation because they had not been published and it was not possible to interview the persons who knew their locations. In all probability, a fairly large number of very small sites have not yet been found. However, it is not likely that new major centers will be found.

Temporary or seasonal campsites, for convenience, were found in low waterside locations during the dry periods of late summer and fall. These sites had to be abandoned during the winter and spring because of flooding. Much, but not all of the valley population moved into these sites for part of each year. The settlements, whether permanent or temporary, were characteristically marked by large piles of fresh water clam shells and other debris.

Burial grounds tended to be located from a few hundred feet to about a thousand yards from the villages, situated on rises that provided a sweeping panorama of plains and mountains and were well above flood waters, or were in cliff caves at considerable height above rivers or lakes.

Historical Features

Kern County is rich in its historic past. Scattered throughout the mountains, valleys, and deserts lie rich deposits of ancient fossil life. The well-known Pleistocene animal remains of the McKittrick brea pits are only one evidence of the County's remote past. Undated Indian campsites dot the land, many of them now occupied by modern communites whose citizens today know little or nothing of their historic predecessors.

The modern era began with the arrival of the Spanish, Don Pedro Fages being the first known non-Indian man to look upon the tremendous expanse of the future county. He gave the valley its first name, "Buena Vista", meaning "good view". He was soon followed by other Spanish explorers.

The sudden appearance in the valley of the American "mountain-man" Jedediah Strong Smith in 1827 heralded the imminent American invasion. The hills and valleys soon became well-known to trappers from the east, as well as to agents and surveyors of the United States government. Among these was the noted explorer John C. Fremont. One of his associates was the topographer Edward M. Kern, after whom Kern River and Kern County were named.

California was acquired by the United States through war with Mexico. Shortly after, with the discovery of gold on the upper Kern River, the county became rapidly populated with communities springing up along the Kern River. In 1866 Havilah became the first county seat.

Fort Tejon was established by the Unted States Army for the suppression of rustling and the protection of Indians on the Sebastian Reservation. The fort was an important military, political, and social center during the early days of statehood. It was abandoned in 1864.

Not long after Colonel Drake's oil discovery in Pennsylvania, petroleum deposits were explored in western Kern County. This activity led directly to the development of the present world-renowned oil fields.

The memory of this distinctive heritage of Kern County is being perpetuated through the California Historical Landmark program. There are numerous Historical Landmarks in the County but none in the immediate vicinity of the project area.

ENVIROMENTAL IMPACT OF PROPOSED ACTION

The environmental impacts of the project, both beneficial and adverse, short term and long-term, and direct and indirect are described in this section.

Ground-Water Conditions

The impacts of the ground-water spreading and recovery operations in the project area were evaluated in terms of: (1) impact on ground-water elevations immediately beneath the spreading area; (2) impact on ground-water elevations in the area surrounding the spreading area and (3) ground-water mound development beneath the spreading area.

The evaluation consisted of four parts: geology; hydrology; utilization of a ground-water model; and comparison of various theoritical spreading and recovery scenarios with a no action program. The geologic investigation furnished information on the transmissivity and storage characteristics of the aquifer. Logs of individual wells were not available to provide detailed subsurface information. Most of the geologic information for the study area was obtained from the U.S. Geological Survey Open File Report entitled "Gournd-Water Geology and Hydrology of the Kern River Alluvial-Fan Area, California" (1966).

The hydrologic information on seepage from unlined canals, deep percolation of irrigtion water, surface delivery of irrigation water, ground-water pumpage, seepage from other spreading operations on lands surrounding the project area were not available. Also, subsurface inflow and outflow to the study area could not be accurately determined. Therfore, it was necessary to estimate existing average hydrologic conditions (input and output) utilizing historic change in ground-water storage.

A mathematical model of the ground-water reservoir was utilized to compare various potential spread and recovery programs with a no-action program. The results of the model study are applicable for the purpose of comparison and not necessarily for an accurate forecasting of future ground-water conditions.

For the purpose of this evaluation a study area of about six miles by eight miles was arbitrarily selected as shown on Plate 6. The project area falls within the boundaries of this selected study area. The ground-water reservoir beneath the study area does not have its own defined natural boundaries but is part of Kern County portion of the San Joaquin Valley ground-water basin. For purposes of this evaluation, the study area can be treated as a separate unit insofar as the subsurface boundary flows are assumed to remain unchanged through the study period. The areal extent of the study area beyond the project boundary should minimize the boundary effects on the area of

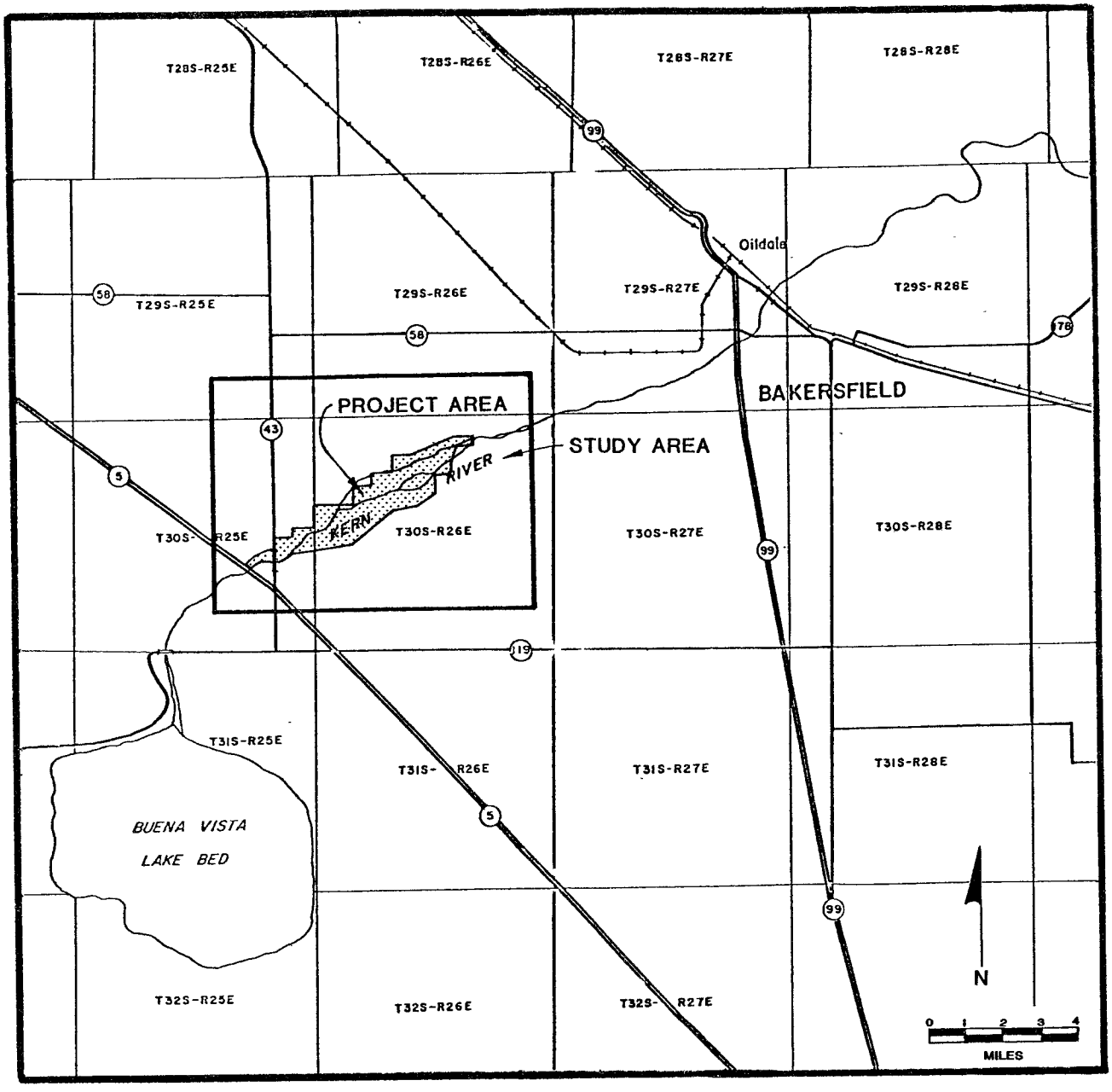
investigation. The study area, as shown on Plate 6, was divided into 192 equal subareas called nodes. The size of each node was about one-fourth of a section, or 160 acres.

The alluvial deposits of the Kern River fan form a relatively large ground-water reservoir beneath and surrounding the study area. The transmissivity of the upper unconfined aquifer, the rate at which water is transmitted through the aquifer, ranges from less than 50,000 gallons per day per foot (gpd/ft) to more than 400,000 (gpd/ft) in the study area. The specific yield of the saturated deposits averages about 15 percent. The specific yield is measured by the water yielded from water bearing material by gravity drainage as the water table declines.

The water demand in the study area is primarily for agricultural use. The primary sources of water for agriculture are surface deliveries of Kern River water and ground-water. The ground-water reservoir in the area is replenished mainly by seepage from the Kern River channel and water spread on the area, deep percolation of irrigation water, seepage from unlined canals and laterals and existing spreading operations.

Information on the historical amounts of surface water use for irrigation, ground-water pumping, seepage losses from the unlined canals, uncontrolled seepage loss from the Kern River, and percolation from spreading operations outside of the Kern River channel were not readily available for this study. In absence of such information,

PLATE 6



GROUND-WATER MODEL STUDY AREA

STETSON ENGINEERS INC.

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the historical change in ground-water storage was utilized to approximate the net effect of pumping, replenishment, and subsurface flows in the area. The historical period from 1969-70 to 1974-75 was selected for this purpose.

Although the average annual runoff of Kern River for the period from 1969-70 to 1974-75 avaraged about 87 percent of long term average, the fluctuation in water supply was not as drastic as compared to the conditions in other recent periods. During the period 1969-70 to 1973-75 a steady decline in the ground-water elevations is believed to have occurred in the study area without interruption by frequent above normal recharge events. The net change in the ground-water storage between spring 1970 and spring 1975 was utilized for this study to represent base conditions before the intensive formal use of the project area for spreading.

Various scenarios of spreading and recovery were considered for the evaluation of the impacts on the ground-water basin for a study period of 10 to 20 years depending upon the scenario evaluated. Based on historical records of natural Kern River flow, about two years out of five years were above long term average runoff. For the purpose of analysis, it was assumed that Kern River water would be available for spreading at a frequency of about two years out of five years of the study period. Two of the scenarios condsidered consisted of spreading for two years followed by recovery for three years, repeating in cycles of five years. In another scenario it was assumed that water

from sources other than the Kern River would be available for spreading in the project area. Therefore, spreading was alternated with recovery from one year to another.

Another scenario assumed that recharged water would be left in storage without recovery during the 20 year study period. Similarly, in another scenario only one-half of the recharged water would be recovered. The remaining one-half would be left in the ground for long-term storage. Under this scenario recharge would take place for two years followed by partial recovery in three years in five-year cycles.

The various spreading and recovery scenarios are summarized below:

1. Spread 60,000 acre-feet per year for two years followed by recovery of 40,000 acre-feet per year for three years.
2. Spread 90,000 acre-feet per year for two years followed by recovery of 60,000 acre-feet per year for three years.
3. Alternate from year to year the spreading and recovery of 60,000 acre-feet per year.
4. Spread 90,000 acre-feet for two years followed by no recovery and no recharge for three years.
5. Spread 120,000 acre-feet per year for two years followed by recovery of 40,000 acre-feet per year for three years.

The total quantity of water recharged and recovered during a 10 year period for various scenarios are summarized below:

Scenarios No.	Recharged (Acre-Feet)	Recovered (Acre-Feet)
1	240,000	240,000
2	360,000	360,000
3	300,000	300,000
4	360,000	None
5	480,000	240,000

Recovery wells were sized to a capacity of 3,000 gallon per minute (gpm) producing about 2,500 acre-feet per year each. The wells were assumed to be located along the Kern River Canal and Cross Valley Canal in order to minimize the construction of delivery facilities. The wells along the Kern River Canal, located on the southern boundary of the project area, were assumed to be constructed first. The combined production capability of the wells along the Kern River Canal was assumed to be about 40,000 acre-feet per year. The wells along the Cross Valley Canal would provide an additional production capability of 20,000 acre-feet per year for a total of 60,000 acre-feet per year. Additional wells could be placed in and around the project area to further increase the recovery capability of the system. The wells should be placed in such locations that they are protected from flooding and with minimal interference between wells.

Changes in ground-water storage are directly related to changes in ground-water elevations in the area. The estimates of future water levels were based on the ground-water elevations maps by the California Department of Water Resources for the spring of 1982. The State map was interpolated where the lines of equal ground-water elevation were not available. Changes in ground-water elevation during the study period, as well as continous hydrographs of ground-water elevations for locations in the northwest quarter of Sections 7, 16 and 22 of T.30S. and R.26E., were estimated from the model runs. The hydrograph locations in Sections 7 and 22 are away from the project area and recovery wells along the Kern River Canal and Cross Valley. The hydrograph location in Section 16 would be directly affected by both recharge and recovery because it is located within the project boundaries.

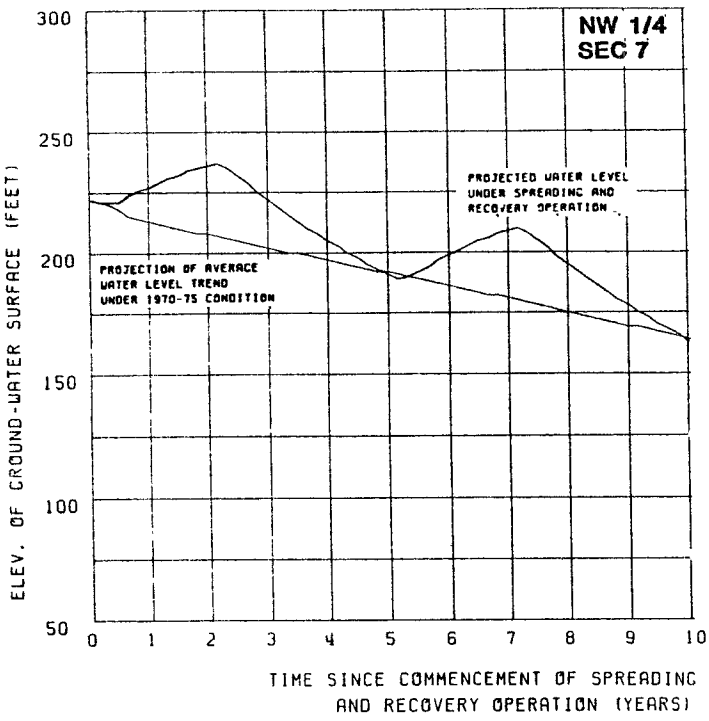
For the purpose of this study it was assumed that spreading or recovery of water would take place uniformly through out the year. In actuality the spreading may take place in a few months during a year and recovery may also take place during a few months of the year. It was also assumed that water would be spread over the total area of the developed spreading grounds in the project area, whereas water may actually be spread in only one portion of the spreading area while the remaining area may not be used at

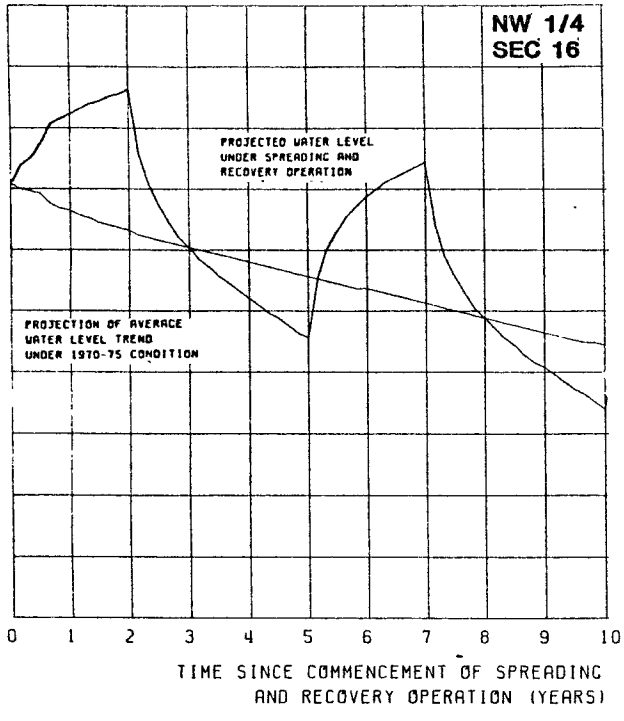
times. However, for comparison purposes the above assumptions are not considered significant to the results of the study over a long period of time.

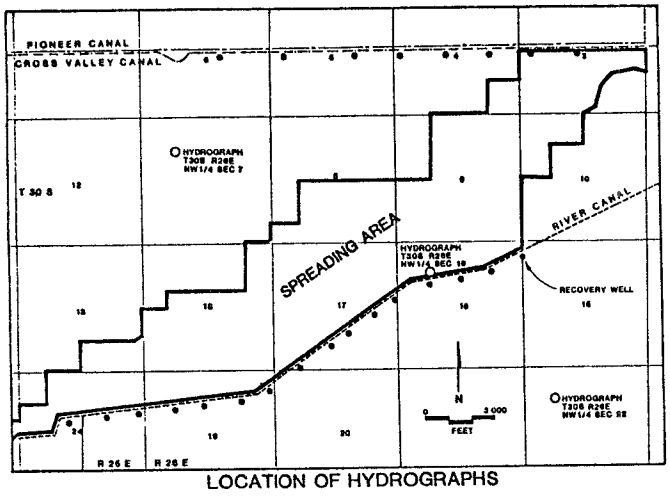
The impacts of various spreading and recovery scenarios are compared with a no action program, the results of which are shown graphically on Plates 7 through 11. Under the assumed no-action program, namely no spreading and no recovery, there would be a general continous decline in the ground-water levels in the study area. This is exhibited by the lower lines on the hydrographs shown on Plates 7 through 11.

The first scenario, which assumes the spreading of 60,000 acre-feet per year for two years followed by the recovery of 40,000 acre-feet per year for three years, would not affect ground-water levels in the outlying areas as shown by hydrographs in Sections 7 and 22 on Plate 7. On the average, the ground water levels in the outlying areas would remain higher than the levels under no spreading and no recovery operations. The areas directly influenced by the recovery operations may from time to time experience ground-water levels that would be lower than the levels expected if there was no spreading and no recovery. But this would be more than offset by the benefits of spreading. Both of these phenomena are exhibited by the hydrograph of Section 16 as shown on Plate 7.

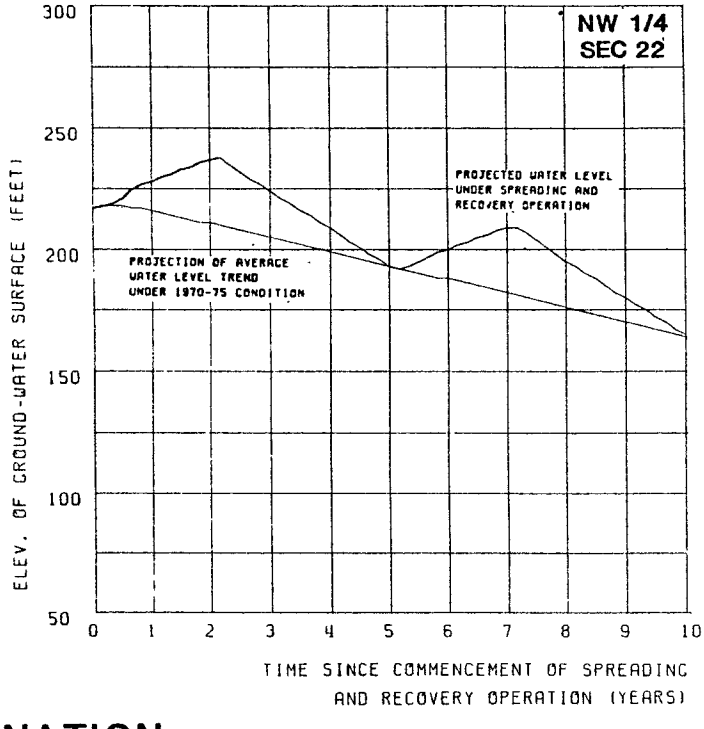
PLATE 7







LOCATION OF HYDROGRAPHS



EXPLANATION

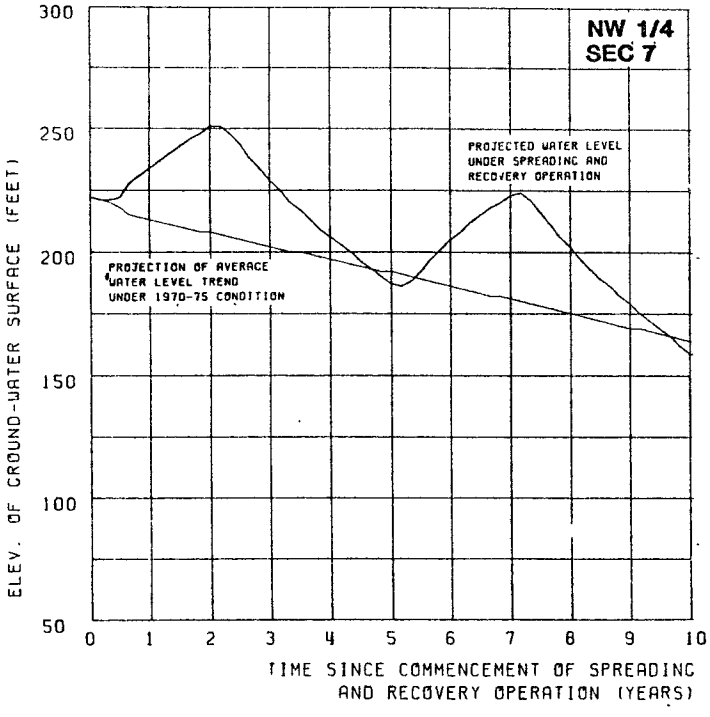
HYDROGRAPHS SHOWING COMPARISON OF NO RECHARGE AND NO RECOVERY OF SPREADING 60,000 ACRE-FEET PER YEAR FOR TWO YEARS FOLLOWED BY RECOVERY OF 40,000 ACRE-FEET PER YEAR FOR THREE YEARS

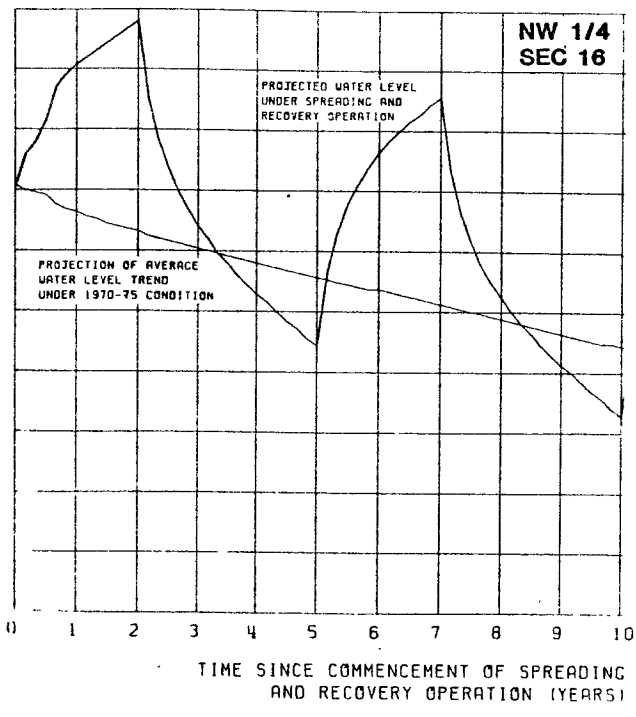
PROJECTED WATER LEVELS

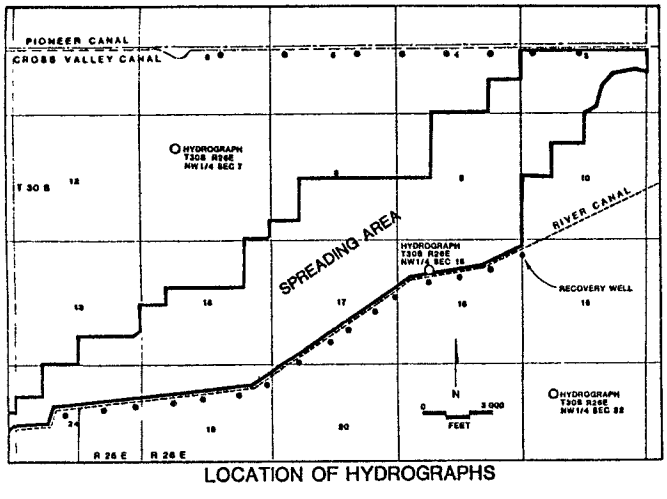
RECHARGE 60,000 ACRE-FEET RECOVER 40,000 ACRE-FEET

STETSON ENGINEERS INC.

PLATE 8







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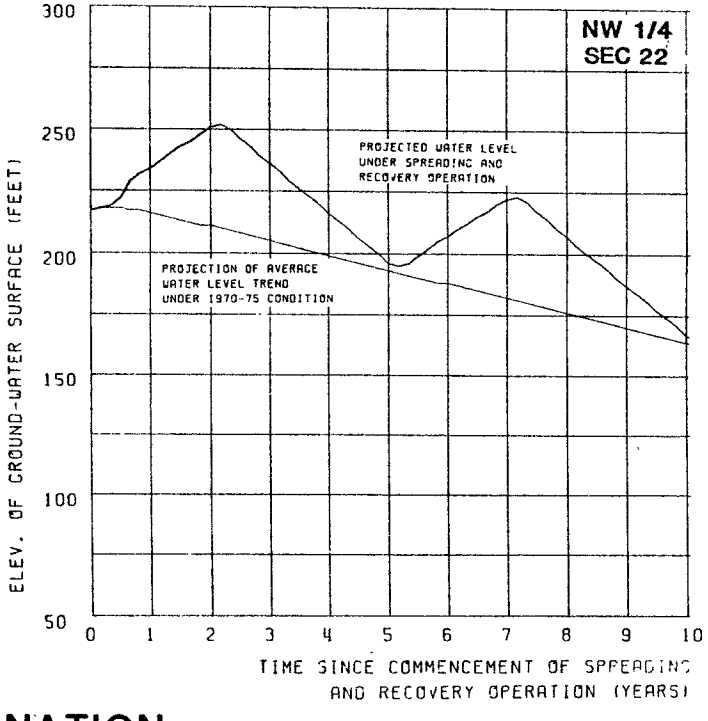


EXPLANATION

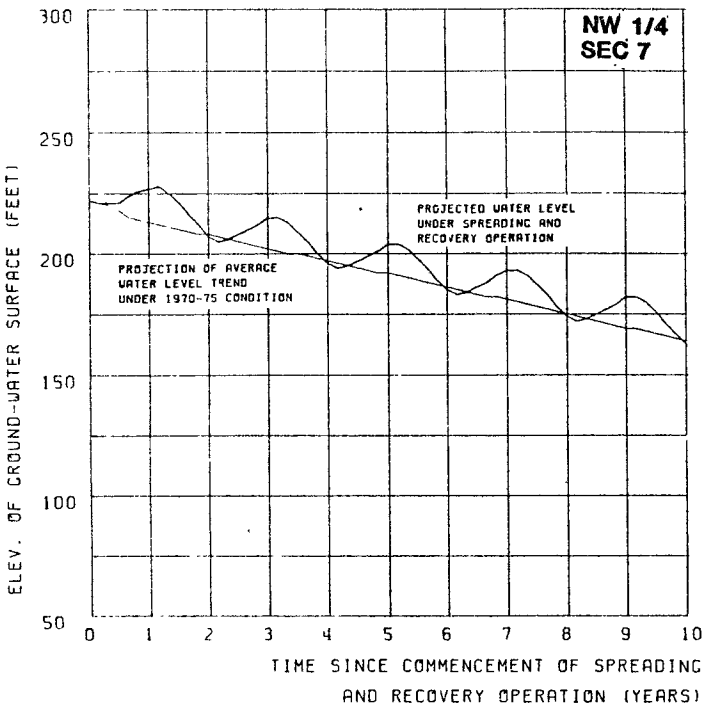
HYDROGRAPHS SHOWING COMPARISON OF NO RECHARGE AND NO RECOVERY OF SPREADING 90,000 ACRE-FEET PER YEAR FOR TWO YEARS FOLLOWED BY RECOVERY OF 60,000 ACRE-FEET PER YEAR FOR THREE YEARS

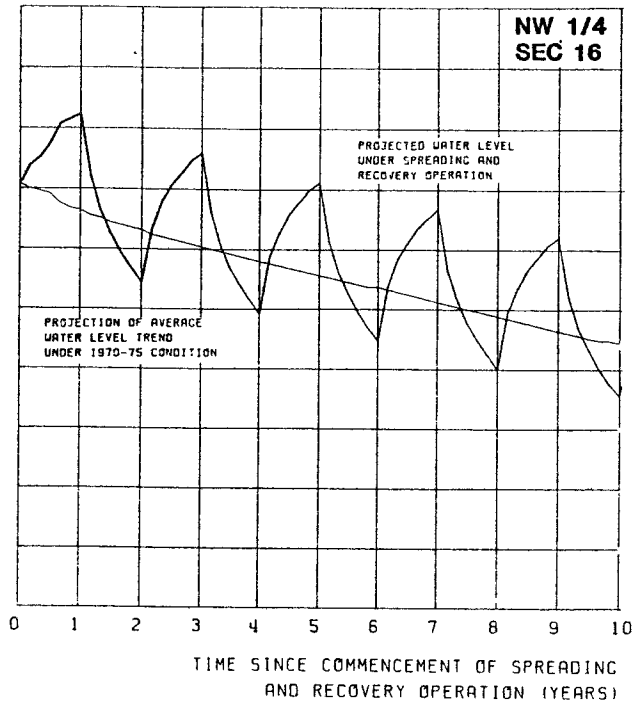
PROJECTED WATER LEVELS

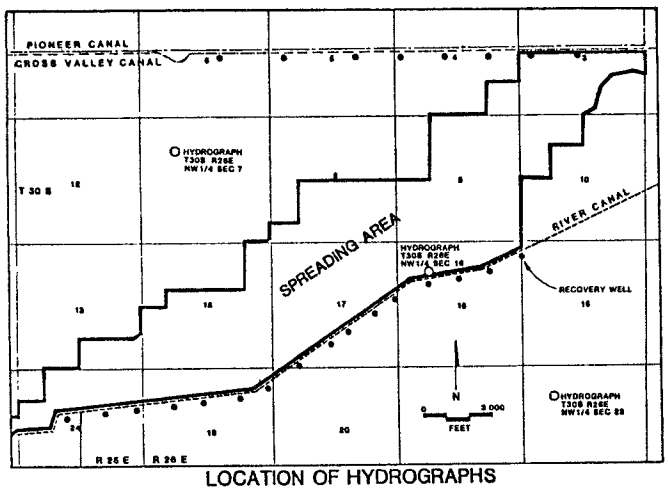
RECHARGE 90,000 ACRE-FEET RECOVER 60,000 ACRE-FEET

STETSON ENGINEERS INC.

PLATE 9







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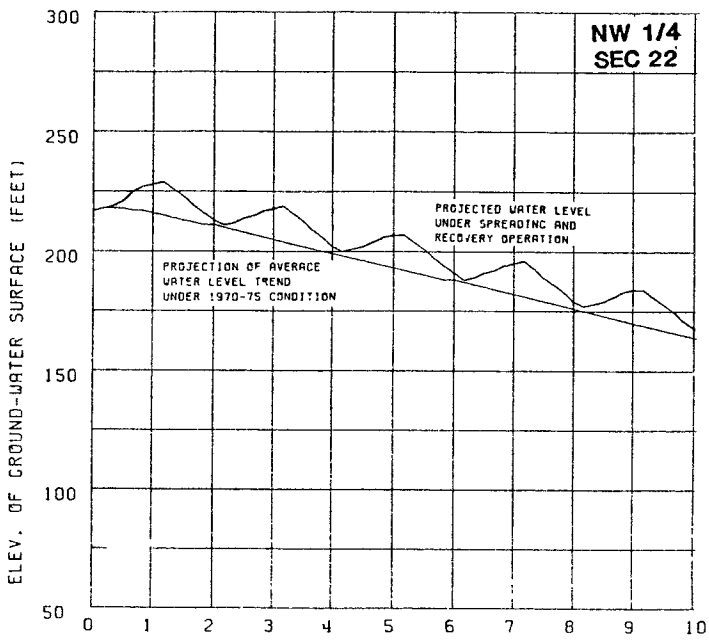


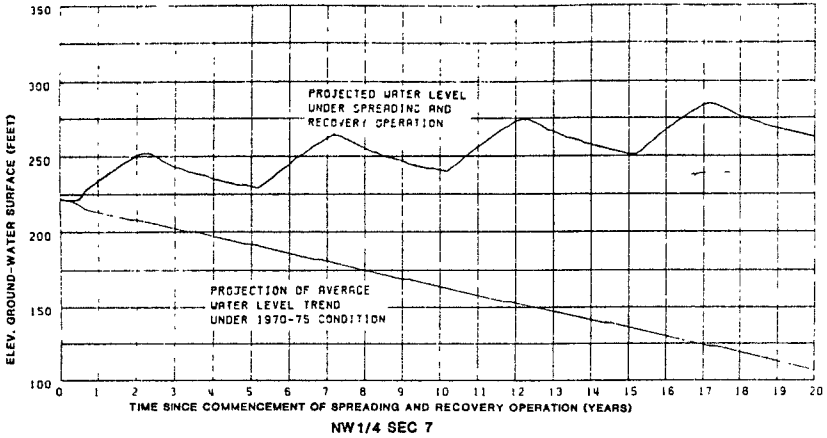
EXPLANATION

HYDROGRAPHS SHOWING COMPARISON OF NO RECHARGE AND NO RECOVERY WITH ALTERNATE SPREADING AND RECOVERY OF 60,000 ACRE-FEET PER YEAR

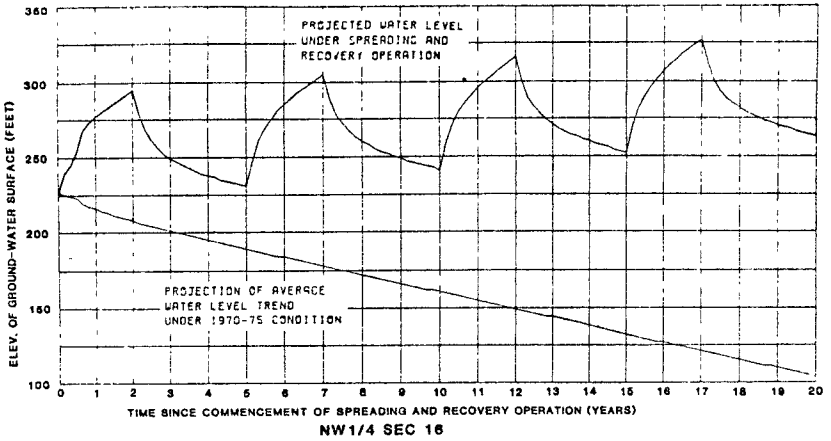
PROJECTED WATER LEVELS

RECHARGE 90,000 ACRE-FEET RECOVER 60,000 ACRE-FEET

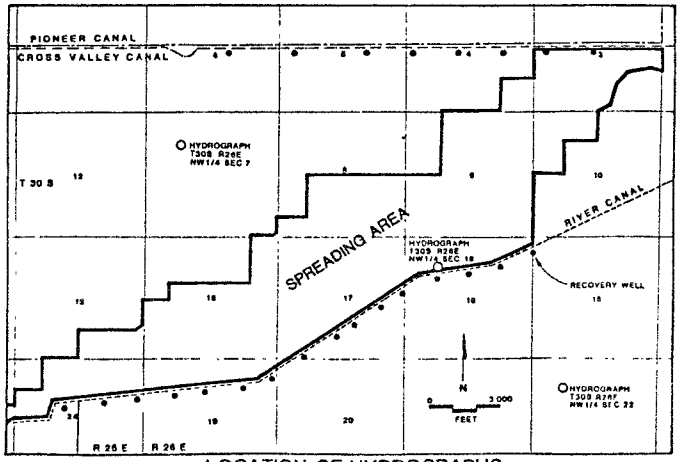
STETSON ENGINEERS INC.



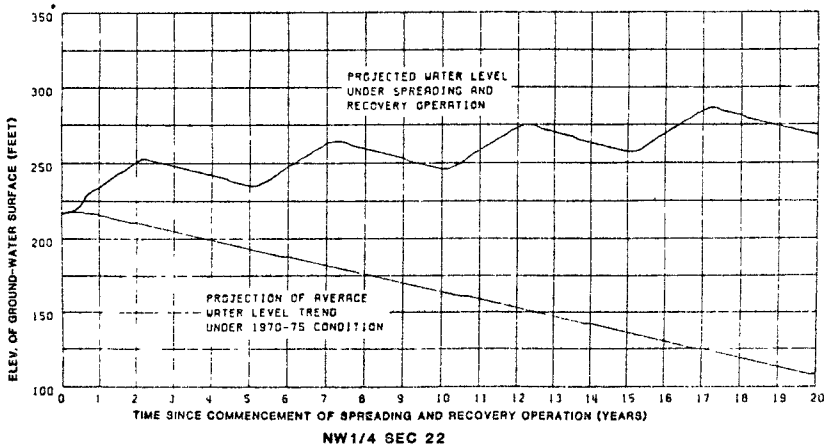
NW1/4 SEC 7



NW1/4 SEC 16



LOCATION OF HYDROGRAPHS



NW1/4 SEC 22

EXPLANATION

HYDROGRAPHS SHOWING COMPARISON OF NO RECHARGE AND NO RECOVERY WITH SPREADING 90,000 ACRE-FEET PER YEAR FOR TWO YEARS FOLLOWED BY NO RECOVERY FOR THREE YEARS

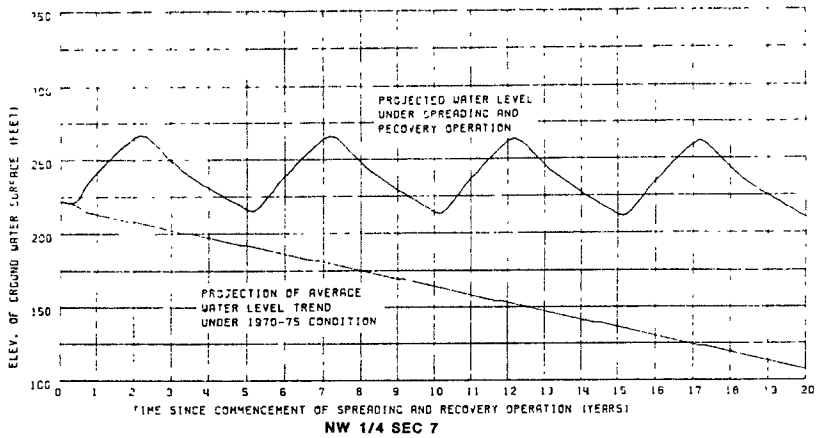
PROJECTED WATER LEVELS

RECHARGE 90,000 ACRE-FEET

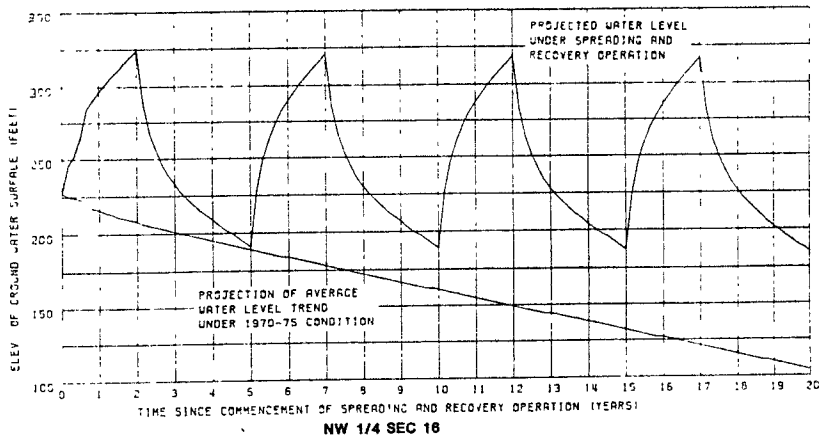
NO RECOVERY

STETSON ENGINEERS INC.

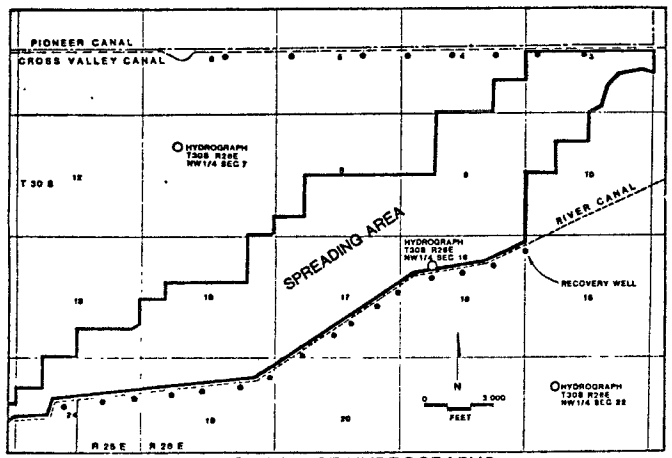
PLATE 10



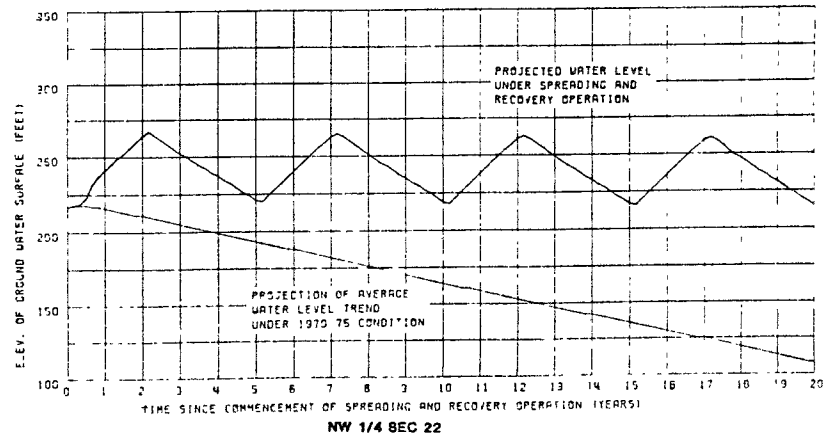
NW 1/4 SEC 7



NW 1/4 SEC 18



LOCATION OF HYDROGRAPHS



NW 1/4 SEC 22

EXPLANATION

HYDROGRAPHS SHOWING COMPARISON OF NO RECHARGE AND NO RECOVERY WITH SPREADING 120,000 ACRE-FEET PER YEAR FOR TWO YEARS FOLLOWED BY RECOVERY OF 40,000 ACRE-FEET PER YEAR FOR THREE YEARS

PROJECTED WATER LEVELS

RECHARGE 120,000 ACRE-FEET

RECOVER 40,000 ACRE-FEET

STETSON ENGINEERS INC.

PLATE 11

The effect of spreading 90,000 acre-feet per year for two years followed by recovery of 60,000 acre-feet per year over three years on the ground water elavations (the second scenario) would be similar to that of the first scenario discussed above. The only difference would be that the magnitude of fluctuations of the ground-water levels under the second scenario would be higher as shown on Plate 8.

The spreading of 60,000 acre-feet in one year and recovering the same quantity in the following year, the third scenario, would also tend to improve ground-water conditions in areas away from the project as exhibited by hydrographs in Sections 7 and 22 shown on Plate 9. In the immediate vicinity of the spreading and recovery project area, water levels will be higher than the projected historical background levels due to mound development and lower, at times, due to recovery operations. This is exhibited by the hydrograph of Section 16 shown on Plate 9.

The fourth scenario, spreading of 90,000 acre-feet per year in the project area for two years followed by no recovery and no recharge for three years, would enhance the ground-water conditions in the area. This would not only overcome the projected existing decline in water levels, but it would result in raising the ground-water levels as shown by the hydrographs on Plate 10.

In the case where a portion of the recharged water is left in the ground, the fifth scenario, the ground-water conditions would also improve. This is exhibited by the hydrographs shown on Plate 11 which reflect the results of spreading 120,000 acre-feet per year for two years followed by the recovery of only one-half of the spread water over the next three years.

Evaluation of the above scenarios indicates that utilization of the project area for spreading and recovery would have minimal adverse impact on the ground-water levels in the area surrounding the project lands. In most cases there are beneficial effects to the surrounding areas by further improving the ground-water elevations and in some cases keeping the ground-water levels higher during and immediately following the period of spreading operations.

There may arise a situation when surplus water is recharged to be banked over a long period. This water may be recovered 10 to 15 years after it is recharged. The effect of such long-term storage and eventual recovery on ground-water elevations in the project area was evaluated by assuming 180,000 acre-feet of recharge over a period of two consecutive years. The recharged water would be left in the ground for a period of ten years followed by recovery over a period of three years (about 60,000 acre-feet per year). The result of this study indicates that the ground-water levels during the recharge period and the following ten years of storage would be comparatively higher than the levels under

a no action alternative. During the recovery period, water levels in the recovery-pumping areas would be lower than the levels under a no action alternative. However, the water levels in those areas would gradually rise as the pumping ceased. A program of recharge and long-term storage would, in general, improve ground-water conditions in the project area and the surrounding lands.

Continuous spreading of water will induce mound development beneath the spreading area. Mound development is affected by the depth to the ground-water table. Based on ground-water levels of spring 1982, the potential for mound development under the spreading area was tested utilizing calculations from the ground-water model. Continuous spreading at the rate of about 0.8 foot per day over the entire spreading area (about 30,000 acre-feet per month) for four months could create mounds reaching to or near ground surface. This would indicate that the spreading basins should be rested after about four months or the spreading rate decreased to provide an opportunity for mound dissipation. The spreading could also be alternated among the several basins by leaving some areas vacant to prevent severe mounding. The total spreading capability under continuous operation of all spreading basins was estimated to be about 120,000 acre-feet for a period of four months. Spreading operations coupled or immediately followed by pumping would retard the general mound development, thus increasing the total spreading capability.

Ground-Water and Surface Water Quality

The water spread by the proposed project should be of better quality than that of the native ground water in the surrounding area. The quality of the ground water is expected to improve because of the recharge operations.

No impact on surface water quality is expected to occur. Kern River flow is regulated by Lake Isabella and flow does not regularly occur at the project site. Flow does occur at the project site during periods of high flow or during controlled releases, but surface water quality is not expected to be affected by project operations.

Flow Alterations

Diversion of Kern River flows into the spreading grounds should not adversely affect the amount of water reaching downstream users. Flow does not normally occur in the river at the spreading area due to regulation of flow at Isabella Dam and diversion by upstream users. When flow does exist at the project area it is usually due to (1) mandatory releases from Lake Isabella or (2) flow conveyed to the spreading area -- either Kern River water or imported water intended for spreading. Water diverted into the spreading basins would percolate into the ground-water aquifer, benefiting all overlying users. Any flow not diverted into the recharge area would pass downstream allowing for additional ground water recharge to occur in the river channel.

During periods of no natural flow in the Kern River at the project site, small flows may occur at the lower end of Basin No. 7. These flows would be caused by drainage of an upper recharge basin, or diversion of excess water into the recharge area. Since these flows would be small and infrequent there would be no impact downstream of the project site.

Flooding

Project development would not induce flooding of lands adjacent to the project that would not other wise occur in the absence of the project. The proposed project would confine the Kern River to the primary flood plain in some portions of the 2,800 acre site. It is anticipated this would not cause significant deposition or degradation. A minimum of 500 feet would separate the two river levees, allowing for flows larger than the capacity of the main channel to spread out into the portion of the primary flood plain not utilized by the recharge project. The U.S. Corps of Engineers estimates that the Kern River channel capacity in the reach from the head of Jerry Slough to Second Point is about 4,600 cfs.

Deposition of sediments behind the levee in Basin "A" should not cause a significant problem with sedimentation of the Kern River. All sediments deposited in Basin "A" would be those carried naturally by the Kern River. During periods of high flow these sediments would be transported

downstream as they would have been without the project. During drought conditons or periods where flows do not exceed 3000 cfs or cause failure of the levee creating Basin "A", the sediments that may accumulate would be mechanically removed.

Recreation

The project spreading operations would regulate somewhat the opportunities for recreational activities in the project area. The area not used for spreading operations could be available for educational and recreational nature walks and other non-destructive uses. Some recreational activities, such as hunting and off-road vehicles, which are now presently prohibited, would continue to be prohibited in the project area.

Project Site Safety

The project area is now patrolled and would continue to be patrolled. The principal safety problem would be unauthorized use of the property. Continued patrolling and the existing fencing of the basin areas would provide site safety. Controlled access and as few access gates as possible would improve the safety of the area.

Change in Land Use

The proposed project would change the existing use of some lands within the project area. Other lands within the project area are presently being used as recharge facilities, while the remainder exists in its natural condition. It is open space and would remain as such with the proposed spreading operation.

Urban Growth

The spreading program is not expected to enhance urban growth in the area. The project site is in an agricultural area. The improvement of ground-water conditions is expected to enhance agricultural water use. The program is not considered to directly influence urban growth in the area.

Reduction of Non-Renewable Natural Resources

Maintenance vehicles and mechanized equipment used to construct and maintain the levees would utilize fossil fuel which is a non-renewable resource. However, the amount of energy used by the project is considered insignificant in comparison to total energy used in the Bakersfield area. The recharge program would reduce the rate of decline in water levels and, therefore, reduce the energy requirement to pump water from existing wells in the basin.

Erosion Hazard

Erosion hazard should be minimal throughout the project area. The levees would protect the spreading basins from flood flows except in extreme cases. The unprotected area of the project site would not be subjected to any more erosion hazard than before consturction of the project.

Land Alterations

It is proposed to keep 1,223 acres of the 2,760 acre project area in its natural state. The 1,537 acres of spreading grounds and levees would be left as much as possible in their natural state. The project area is subject to inundation in years of heavy runoff. The area of the spreading grounds would be protected by the levees and flooding in this area is not expected to occur except on rare occasions. The remaining project area is not protected and natural scouring and deposition by flood flows can occur.

Geologic Hazards

The proposed project would result in higher water levels beneath the spreading area. These higher ground-water levels could potentially contribute to liquefaction should a substantial earthquake occur. Other potential hazards resulting from higher ground-water levels include settlement and construction difficulties. Damage from liquefaction is usually to large structures. Since the spreading area is within the area subject to flooding, it is not expected that

any large sturctures would be built over the area of potential high water levels. Therefore, higher water levels are not anticipated to be a problem.

Seiches, resulting from ground motion, could cause wave damage to the spreading area levees. Damage from seiches is expected to be restricted to project facilities in the immediate area. There are no structures in the immediate vicinity of the spreading area that would be potentially subject to damage from seiches or levee breaks from wave action.

Visual

There would be a change in the visual appearance of the bed of the Kern River. The levees would be constructed from material available in the river bed and therefore would blend with the river bed. Ponded water in the spreading basins would enhance the visual outlook of the area. Use of the river bed for the purpose of spreading would discourage introduction of refuse and litter.

Health Hazard

The spreading operation may be conducive to the breeding and propagation of mosquitoes in the area. Standing water provides a habitat for laying and hatching of eggs but water to be conserved by the project would usually be flowing from upper basins to lower basins as the water percolates to

the ground-water basin. Monitoring for mosquitoes or other insect propogation would be done by the City, and necessary effective means taken to eradicate them.

Ecological System

The proposed development of ground-water spreading basins would alter the habitats on a portion of the area due to dike construction and flooding. Noise generated by use of mechanized equipment could temporarily interfere with the wildlife in the surrounding environment. Much of the area has been diked and flooded for years. The riparian habitat is likely to increase in total habitat area as the recharge functions are developed more fully within the project area. Wildlife species as the osprey, the southern bald eagle, the marsh hawk, and the peregrine falcon would all find more food gathering territory as the riparian streamside habitat is increased. These wilflife species tend to be negatively impacted by human changes in riparian habitat management, therefore, the proposed project would be beneficial.

Valley mesquite-saltbush habitat appears to be most impacted by the proposed project. However, the present plan of utilizing only a portion of the project area for ground-water recharge would permit preservation of some valley mesquite-saltbush habitat within the project area, thereby protecting it from further agricultrual or urban development. Some of these plants may re-establish themselves on the levees surrounding the basins as high

water-tables resulting from this project would provide a year around underground water supply to the root zone of the valley mesquite.

The valley mesquite-saltbush habitat is already in such diminished status that the California Department of Fish and Game has issued a report on the region in respect to the federally protected habitat loss of the San Joaquin Leopard Lizard. This local reptile was originally found throughout the valleys and surrounding foothills of central and southern California. By the early 1960s over 50 percent of the original habitat of this endangered reptile had already been lost to agriculture, urban development and off-road vehicle recreation. During the past fifteen years, construction of the California Aqueduct system and Interstate #5 have further reduced this natural habitat in the Central Valley by 17 percent, to the extent that the California Department of Fish and Game estimates that less than 5 percent of the San Joaquin Valley lands are curretnly undeveloped and available as natural habitat for native wildlife species. The proposed diking of shrub covered areas would modify the habitat of the San Joaquin Leopard Lizard.

Other federally designated species of local wildlife which require shrub covered terraces may be displaced by the project. However, many areas of open space would remain unaffected. Like the blunt-nosed leopard lizard, the giant kangaroo rat and the San Joaquin kit fox, all need extensive open spaces above the river flow, with

grass and shrub vegetative cover. Both the kit fox and blunt-nosed leopard lizard have adopted to existing water spreading operations by relocating to higher ground from time to time.

The planned use of the project area as a recharge facility would represent an enhancement of the freshwater marsh components of the region. In view of the severe reduction of the marsh habitat type within the Central Valley of California, and in view of the need for greater marsh area as habitat for several of the state and federally cited wildlife species, the increased marsh acreage is an ecological asset. The federally protected cooper's hawk and the marsh hawk would both benefit by the increased marsh habitat development. The other species which would likely benefit by the project include the great blue heron, the green heron, the common gallinule, the spotted sandpiper, the black-necked stilt, and the grceful white-tailed kite.

It is also possible that the presence of large ponded areas would attract rafts of resting water fowl. The availablility of that resting area may reduce hunter success rates on nearby private hunting clubs. Failing economics could force the closing of some clubs which would result in the overall reduction of wetland habitat. This is not expected to be a significant impact of the project.

Air Quality

Use of mechanized equipment for construction of levees and land grading would temporarily introduce some pollutants from their exhaust and dust. However, the total amount will be negligible and have no significant effect on the environment. There also will be increased noise during construction of the levees, but it would be localized and temporary.

Archeological Resources

Although there are no known archeological sites in the project area it is possible that some exist that have not been destroyed by the flow of the Kern River. A site could accidentally be discovered during construction.

Oil and Mineral Resources

The project area would remain subject to deed restrictions allowing for mineral rights and unlimited access to oil and gas recovery facilities. Implementation of the proposed project could impact access and operation of both existing and future oil and gas well sites.

ADVERSE EFFECTS WHICH CANNOT BE AVOIDED IF THE PROJECT IS IMPLEMENTED

The environmental impacts of the proposed action were discused in the preceeding section. Evaluation of the adverse effects indicates that the impacts would not be significant on the surrounding environment. However, there is the possibility of increased mosquito breeding, which if controlled, could be reduced to insignificant levels. In addition, there would be the removal of some vegetation, possible, but not likely, disturbance of archeological resources, and restricted access and operation of existing and future oil and gas wells.

MITIGATION MEASURES PROPOSED TO MINIMIZE THE IMPACT

As discussed in the previous section the only anticipated possible impacts are increased mosquito breeding, removal of some vegetative cover, disturbance of archeological resources and restricted access and operation of oil and gas wells.

Increased Health Hazards

Mesquito production in the spreading basins would be controlled by City inspection, and periodic dewatering of the baisns and, if required, by spraying. Most mesquito breeding occurs in shallow standing water and in gradually reduced shorelines. Flow of water from one basin to another would provide circulation in most of the basin areas.

Ecological System

The effect on the density of vegetation in the project area can be minimized by removing only the vegetation in the areas utilized for direct spreading. The existing vegetation along the banks and adjacent to the spreading areas would be left undisturbed. Specifically a long-term management plan of habitat maintenance would be undertaken.

The management measures which are proposed as appropriate for maintaining the land left in its present state as well as lands occupied by the recharge facility are as follows:

1. Diking and topsoil grading would be done in such a way that there is minimal damage to woody vegetation such as mesquite, cottonwood, and saltbushes.
2. Scraping of riparian vegetation along the banks of river channels and marsh areas would be avoided where possible.
3. Annual flooding of basins would be managed so that certain basins would be designated to be filled as often as possible to enhance the continuity of marsh habitat.
4. Vehicular access to the project area would be limited by fencing and patrols.
5. Sheep grazing would be prohibited.
6. Hunting and firewood cutting within the project area would be prohibited.
7. Long term access for educational field trips by organized community and educational units would be provided.

The significant benefits served by remaining habitat of undeveloped land in providing space for wildlife species include the following features:

1. Space available for normal growth and territorial activity;
2. Nutritional requirements are met such as food, minerals and water;
3. Sites available for breeding and rearing the young; and
4. Cover and shelter, as well as the chemical and physical requirements of climate and soil

Archeological Resources

It is not anticipated that any unique archeological resources would be encountered in the project area. If such a resource is encountered during construction, appropriate action , as per Section 21083.2 of the Public Resources Code, would be initiated. Should archaeological sites accidentally be discovered during construction an immediate evaluation of the find would be made to determine if the find is a unique archaeological resource. Construction would continue on other parts of the project while an archaeological investigation takes place.

Oil and Mineral Resources

Any impact on access and operation of both existing and future oil and gas wells could be mitigated by diking around existing sites and construction of raised pads at future sites. Access roads could also be raised above high water levels and project dikes could be designed to also serve as access routes. Provisions would be made for water and animal passage should any of the raised access roads act as barriers.

ALTERNATIVES TO PROPOSED ACTION

Various alternatives considered for the use of the City's water spreading facility are discussed below.

No Action

Under the no-action alternative the property could be developed for irrigated agricultrue which would have several adverse impacts. No water would intentionally be recharged on the property. Rather the property could be developed for farming by constructing levees parallel to the thread of the river to protect such farming from most overflows of the river. The land would be cleared, wells drilled and intensive farming developed similar to that in the nearby areas. The City could either engage in the farming as a City Enterprise, lease the land to others to farm or sell the land to others for farming or other types of development.

If the land is developed to farming it will destroy the natural habitat and increase the overdraft on water supplies of the basin. There would be the usual air pollution and degradation of quality of water in the basin as a result of such development.

Another no-action alternative would be to continue to operate the current level of water spreading without the

formalized plan under the proposed project which would result in much less water being conserved through spreading and would leave the area not used for spreading in its current state, open to trespass by off-road vehicles and other factors which damage the natural habitat.

More Intensive Water Spreading Development

A plan could be developed to maximize the water spreading facility to use virtually all of the land in the project area for water spreading and eliminate the natural habitat. Although this may lead to increased water conservation it would destroy one of the few remaining areas of riparian habitat in the San Joaquin Valley.

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

There would be no significant short term effect on the environment in the use of flood plain lands for spreading. There would be some minor effects due to construction and repair of dikes.

The long-term productivity of the ground-water basin would be enhanced because of assured supplies of better quality ground water and lower energy costs, as well as guaranteeing a lasting natural habitat for wildlife of the area.

IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

There would be no significant irreversible environmental change due to implementation of the proposed action.

GROWTH-INDUCING IMPACT OF THE PROPOSED ACTION

The project could induce economic growth by providing the participating entities with a supplemental supply of water. This would allow the entities, if they so chose, to encourage the development of new lands by continuing to overdraft the ground-water basin. However, the eventual depletion of ground-water supplies as a result of such conduct would restrict the entities' ability to continue such practices.

The assured supplemental water supply from Kern River, if applied properly, should enhance the economic viability of the districts and the agricultural lands therein by preserving the existing agricultural and other water-using developments.

CONSULTATION AND REPORT PREPARATION

The City of Bakersfield in the preparation of its project and/or in preparing the Draft Environmental Impact Report contacted and/or met with the following organizations or their representatives.

City of Bakersfield, Planning Department
State of California, Office of Planning and Research
State of California, Department of Transportation
Kern County Planning Department
State of California, Department of Fish & Game
Department of Water Resources, Reclamation Board
Kern County Health Department
Kern County Water Agency
State of California, Department of Boating and Waterways
State of California, Central Valley Regional Water Quality Control Board
Kern Delta Water District
Rosedale-Rio Bravo Water Storage District

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APPENDIX J
NOTICE OF PREPARATION

RECEIVED
AUG 30 1982
STETSON ENGINEERS
SAN FRANCISCO

TO: State Clearinghouse Agency, Kern River Levee District, Kern County Planning, Health, Agriculture, Council of Governments and Water Agency, U.S. Corps of Engineering, Soil Conservation Service
(Responsible Agency)

FROM: City of Bakersfield
Planning Department
(Lead Agency)
1501 Truxtun Avenue
Bakersfield, CA 93301
(805) 326-3733

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report

The City of Bakersfield will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germaine to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the probable environmental effects are contained in the attached materials. A copy of the Initial Study [X] is, [ ] is not, attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but not later than 45 days after receipt of this notice.

Please send your response to the Planning Department at the address shown above. We will need the name for a contact person in your agency.

PROJECT TITLE: 2,800-acre Groundwater Recharge Project

PROJECT APPLICANT, IF ANY: City of Bakersfield

DATE August 24, 1982

SIGNATURE L. Dennis Pisila

TITLE PRINCIPAL PLANNER

TELEPHONE (805) 326-3672

Reference: California Administrative Code, Title 14, Sections 15035.7, 15054.3, 15066

APPENDIX I

ENVIRONMENTAL CHECKLIST FORM
(To be completed by Lead Agency)

I BACKGROUND

1. Name of Proponent: City of Bakersfield
2. Address and Phone Number of Proponent:
   1501 Truxtun Avenue
   Bakersfield, California 93301
3. Date of Checklist Submittal: July 1, 1982
4. Agency Requiring Checklist: City of Bakersfield
5. Name of Proposal, if applicable: groundwater recharge spreading area on 2,800 acres of City-owned land and associated pumping facilities

II ENVIRONMENTAL IMPACTS
(Explanations of all "yes" and "maybe" answers are required on attached sheets.)

	YES	MAYBE	NO
1. Earth Will the proposal result in:			
a. Unstable earth conditions or in changes in geologic substructures?			X
b. Disruptions, displacements, compaction, or overcovering of the soil?	X		
c. Change in topography or ground surface relief features?	X		
d. The destruction, covering, or modification of any unique geologic or physical features?			X
e. Any increase in wind or water erosion of soils, either on or off the site?		X	
f. Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake?		X	
g. Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards?			X

SEE ATTACHED 8/12 LETTER FROM KERN CO WATER AGENCY

	YES	MAYBE	NO
2. Air Will the proposal result in:			
a. Substantial air emissions or deterioration of ambient air quality?			X
b. The creation of objectionable odors?			X
c. Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?			X
3. Water Will the proposal result in:			
a. Changes in currents, or the course or direction of water movements, in either marine or fresh water?	X		
b. Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?	X		
c. Alterations to the course or flow of flood waters?	X		
d. Change in the amount of surface water in any water body?		X	
e. Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?			X
f. Alteration of the direction or rate of flow of ground waters?		X	
g. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?		X	
h. Substantial reduction in the amount of water otherwise available for public water supplies?			X
i. Exposure of people or property to water related hazards such as flooding or tidal waves?			X
j. Will the proposal result in water service from any public or private entity?			X
4. Plant Life Will the proposal result in:			
a. Change in the diversity of species or number of any species of plants (including trees, shrubs, grass, crops, microflora and aquatic plants)?	X		

	YES	MAYBE	NO
4. Plant Life (continued)			
b. Reduction of the numbers of any unique, rare or endangered species of plants?	____	X	____
c. Introduction of new species of plants into an area, or in a barrier to the normal replenishment of existing species?	X	____	____
d. Reduction in acreage of any agricultural crop?	____	____	X
5. Animal Life Will the proposal result in:			
a. Change in the diversity of species or numbers of any species of animals (birds, land animals including repitles, fish and shellfish, benthic organisms, insects or microfauna)?	X	____	____
b. Reduction of the numbers of any unique, rare or endangered species of animals?	____	X	____
c. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?	____	X	____
d. Deterioration to existing fish or wildlife habitat?	____	X	____
6. Noise Will the proposal result in:			
a. Increases in existing noise levels?	____	____	X
b. Exposure of people to severe noise levels?	____	____	X
7. Light and Glare Will the proposal produce new light or glare?	X	____	____
8. Land Use Will the proposal result in a substantial alteration of the present or planned land use of an area?	X	____	____
9. Natural Resources Will the proposal result in:			
a. Increases in the rate of use of any natural resources?	____	X	____
b. Substantial depletion of any nonrenewable natural resource?	____	____	X
10. Risk of Upset Does the proposal involve a risk or an explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions?	____	____	X

	YES	MAYBE	NO
11. Population Will the proposal alter the location, distribution, density or growth rate of the human population of an area?	____	X	____
12. Housing Will the proposal affect existing housing, or create a demand for additional housing?	____	____	X
13. Transportation/Circulation Will the proposal result in:			
a. Generation of substantial additional vehicular movement?	____	____	X
b. Effects on existing parking facilities, or demand for new parking?	____	____	X
c. Substantial impact upon existing transportation systems?	____	____	X
d. Alterations to present patterns of circulation or movement of people and/or goods?	____	____	X
e. Alterations to waterborne, rail or air traffic?	____	____	X
f. Increase in traffic hazards to motor vehicles, bicyclists or pedestrians?	____	____	X
14. Public Services Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:			
a. Fire protection?	____	____	X
b. Police protection?	____	____	X
c. Schools?	____	____	X
d. Parks or other recreational facilities?	____	____	X
e. Maintenance of public facilities, including roads?	X	____	____
f. Other governmental services?	____	____	X
15. Energy Will the proposal result in:			
a. Use of substantial amounts of fuel or energy?	____	X	____
b. Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?	____	X	____

	YES	MAYBE	NO
16. Utilities Will the proposal result in a need for new systems, or substantial alterations to the following utilities:			
a. Power or natural gas?	____	____	X
b. Communications systems?	____	____	X
c. Water?	____	X	____
d. Sewer or septic tanks?	____	____	X
e. Storm water drainage?	____	____	X
f. Solid waste and disposal?	____	____	X
17. Human Health Will the proposal result in:			
a. Creation of any health hazard or potential health hazard (excluding mental health)?	____	X ℓ	±
b. Exposure of people to potential health hazards?	____	____	X
18. Aesthetics Will the proposal result in the obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view?	____	____	X
19. Recreation Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?	X	____	____
20. Archeological/Historical Will the proposal result in an alteration of a significant archeological or historical site, structure, object or building?	____	X	____
21. Mandatory Findings of Significance			
(a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	X	____	____

	YES	MAYBE	NO
21. Mandatory Findings of Significance (continued)			
(b) Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)	____	X	____
(c) Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)	____	____	X
(d) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	____	____	X

III DISCUSSION OF ENVIRONMENTAL EVALUATION

IV DETERMINATION
(To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐ I find the proposed project COULD NOT have a significant effect on the environment, and a Negative Declaration will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case bacause the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION WILL BE PREPARED.

☒ I find the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

Date JULY 13, 1982

James D. Morris
(Signature)

For DEWEY SCEALES, Planning Director

APPENDIX "I"

Environmental Checklist Form

II ENVIRONMENTAL IMPACTS
(Explanations of YES and MAYBE answers)

1. Earth Will the proposal result in:

b. Disruptions, displacements, compaction, or overcovering of the soil?

YES Grading will be required to form levees and ponds to divert and hold water.

c. Change in topography or ground surface relief features?

YES Grading will reduce slight variations in topography which now exist on the site. Levees of various height will be formed.

f. Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake?

MAYBE Confining portions of the river to the primary floodplain may effect the amount of deposition of sediment in the main channel.

3. Water Will the proposal result in:

a. Changes in currents, or the course or direction of water movements, in either marine or fresh water?

YES Levee construction along portions of the river will control the direction of flow along that portionof the river.

b. Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?

YES The amount of absorption will increase on the project site as a result of spreading ponds. The volume of groundwater should increase, however this depends on withdrawal rates.

c. Alterations to the course or flow of flood waters?

YES Levee construction will confine the flow of flood water to the primary floodplain in some areas.

II ENVIRONMENTAL IMPACTS

3. Water (continued)

d. Change in the amount of surface water in any water body?

MAYBE Withdrawals from the Kern River to flood spreading ponds may reduce the amount of water reaching downstream environs.

f. Alteration of the direction or rate of flow of ground waters?

MAYBE Additions to groundwater supplies may alter the direction or rate of flow of groundwater, however this depends on withdrawal rates.

g. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?

MAYBE Additions from the proposed spreading areas may increase the amount of groundwater, however withdrawals will decrease groundwater supplies. The impact of current and future demands on the water table is not known.

4. Plant Life Will the proposal result in:

a. Change in the diversity of species or number of any species of plants (including trees, shrubs, grass, crops, microflora and aquatic plants)?

YES The amount of water available for plant life will increase as a result of the spreading ponds. Plants tolerant to wet environments will replace some members of the existing plant species.

b. Reduction of the numbers of any unique, rare or endangered species of plants?

MAYBE Unique plant communities existing on the site may be damaged as a result of site preparation and flooding.

c. Introduction of new species of plants into an area, or in a barrier to the normal replenishment of existing species?

YES Water tolerant species of plants will inhabit spreading ponds. Water in ponds will block the normal replenishment of existing species.

II ENVIRONMENTAL IMPACTS (continued)

5. Animal Life Will the proposal result in:

a. Change in the diversity of species or number of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms, insects or microfauna)?

YES Formation and flooding of spreading ponds will result in a change in the diversity of species and cause a reduction in the numbers of some species.

b. Reduction of the numbers of any unique, rare or endangered species of animals?

MAYBE The project may reduce the numbers of some species which are considered rare and endangered as a result of habitat modification.

c. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?

MAYBE Wetlands provided by the project may draw new species to the area (especially waterfowl). Recharge basins and fencing may restrict the movement of some animals.

d. Deterioration to existing fish or wildlife habitat?

MAYBE The proposed project will probably result in a tradeoff of wildlife species. Some of the existing wildlife habitat will be replaced by wetlands habitat.

7. Light and Glare Will the proposal produce new light or glare?

YES Sun reflecting off the water will create glare, however the impact is insignificant.

8. Land Use Will the proposal result in a substantial alteration of the present or planned land use of an area?

YES The property now provides open space which acts as a floodplain for the Kern River and supplies habitat for wildlife, some species of which are on the rare and endangered species list. The proposed project will modify these uses through the construction of levees and formation of spreading ponds.

II ENVIRONMENTAL IMPACTS (continued)

9. Natural Resources Will the proposal result in:
a. Increases in the rate of use of any natural resources?

MAYBE The project may result in an increase in the rate of groundwater withdrawals.

11. Population Will the proposal alter the location, distribution, density or growth rate of the human population of an area?

MAYBE The availability of increased groundwater volumes may have a growth inducing impact. Specific locations are not known.

14. Public Services Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:

e. Maintenance of public facilities, including roads?

YES The project will require the maintenance of levees, fencing, and possibly pumping facilities.

15. Energy Will the proposal result in:
a. Use of substantial amounts of fuel or energy?

MAYBE Energy will be consumed in unknown amounts to withdraw water from the groundwater table.

b. Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?

MAYBE Pumping facilities will require unknown amounts of energy.

17. Human Health Will the proposal result in creation of any health hazard or potential health hazard?

MAYBE Increased surface waters may increase the breeding of mosquitos which hold the potential to create and spread diseases.

19. Recreation Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?

YES Existing recreational opportunities will be reduced due to fencing to keep out trespassers. The quality and quantity of allowed recreational and educational uses may increase as a result of increased wetlands habitat and the seclusion of the area.

20. Archaelogical Will the proposal result in an alteration of a significant archaeological or historical site, structure, object or building?

MAYBE 1,200 acres of grading could uncover Indian or other prehistoric artifacts or remains.

II ENVIRONMENTAL IMPACTS (continued)

21. Mandatory Findings of Significance

(a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

YES The project has the potential to reduce the amount of area available for foraging for rare and endangered animal species (such as the San Joaquin Kit Fox), through the formation of spreading basins over approximately 1,200 acres. The impact on the plant community will probably be a conversion from existing species to more water tolerant species found in wetland environs. There will likely be a tradeoff resulting in a different type of habitat for plant and wildlife species adapted to the wetter environment, at the cost of existing species. The extent of the tradeoff and its impact on rare and endangered and/or unique species should be determined.

(b) Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)

MAYBE The spreading of water to recharge the groundwater table is a necessary project due to overdraft of existing resources at the present time. Long-term impacts of recharging the groundwater supply may result from a possible growth-inducing impact of the project as a result of increased water availability. Increased growth could result in water usage which would neutralize the effect of the recharge project and once again create an overdraft situation.

CITY OF BAKERSFIELD
RESOLUTION 24-77
APPENDIX H

Date Filed July 1, 1982

Environmental Information Form
(To be completed by applicant)

GENERAL INFORMATION

1. Name and address of developer or project sponsor: City of Bakersfield, Planning Dept. 1501 Truxtun Avenue, Bakersfield, CA 93301

2. Address of project: _____
Assessor's Block and Lot Number _____

3. Name, address, and telephone number of person to be contacted concerning this project: Dennis Pisila, Principal Planner, 1501 Truxtun Avenue, Bakersfield, CA 93301 805/326-3733

4. Indicate number of the permit application for the project to which this form pertains: N/A

5. List and describe any other related permits and other public approvals required for this project, including those required by city, regional, state and federal agencies: The appropriate government agencies including the copies of engineers and State Reclamation Board will review the project. Public hearings will be held on environmental documents.

6. Existing zoning district: unzoned

7. Proposed use of site (Project for which this form is filed): water spreading area for groundwater recharge

PROJECT DESCRIPTION

8. Site size. 2,800+AC 1,200± acres of recharge basins

9. Square footage. N/A

10. Number of floors of construction. N/A

11. Amount of off-street parking provided. N/A

12. Attach plans. YES

13. Proposed scheduling. Early 1983 - begin project.

14. Associated projects. See project description.

15. Anticipated incremental development. See project description.

16. If residential, include the number of units, schedule of unit sizes, range of sale prices or rents, and type of household size expected. N/A

17. If commercial, indicate the type, whether neighborhood, city or regionally oriented, square footage of sales area, and loading facilities. N/A

18. If industrial, indicate type, estimated employment per shift, and loading facilities. N/A

19. If institutional, indicate the major function, estimated employment per shift, estimated occupancy, loading facilities, and community benefits to be derived from the project. N/A

20. If the project involves a variance, conditional use or rezoning application, state this and indicate clearly why the application is required. N/A

Are the following items applicable to the project or its effects? Discuss below all items checked yes (attach additional sheets as necessary).

YES	NO		
X		21.	Change in existing features of any bays, tidelands, beaches, lakes or hills or substantial alteration of ground contours. stream
	X	22.	Change in scenic views or vistas from existing residential areas or public lands or roads.
X		23.	Change in pattern, scale or character of general area of project.
	X	24.	Significant amounts of solid waste or litter.
	X	25.	Change in dust, ash, smoke, fumes or odors in vicinity.
X		26.	Change in ocean, bay, lake, stream or ground water quality or quantity, or alteration of existing drainage patterns.
	X	27.	Substantial change in existing noise or vibration levels in the vicinity.
	X	28.	Site on filled land or on slope of 10 percent or more.
	X	29.	Use or disposal of potentially hazardous materials, such as toxic substances, flammables or explosives.

Cont.

YES	NO		
___	X	30.	Substantial change in demand for municipal services (police, fire, water, sewage, etc.).
___	X	31.	Will the proposal result in: Water service from any public or private entity? (If so, give the name of the entity and provide a letter from that entity outlining its current and future water supply and demand requirements).
X	___	32.	Substantially increase fossil fuel consumption (electricity, oil, natural gas, etc.).
___	X	33.	Relationship to a larger project or series of projects.

ENVIRONMENTAL SETTING

34. Describe the project site as it exists before the project, including information on topography, soil stability, plants and animals, and any cultural, historical or scenic aspects. Describe any existing structures on the site, and the use of the structures. Attach photographs of the site. Snapshots or polaroid photos will be accepted. SEE ATTACHED

35. Describe the surrounding properties, including information on plants and animals and any cultural, historical or scenic aspects. Indicate the type of land use (residential, commercial, etc.), intensity of land use (one family, apartment houses, shops, department stores, etc.), and scale of development (height, frontage, setback, rear yard, etc.). Attach photographs of the vicinity. Snapshots or polaroid photos will be accepted. SEE ATTACHED

CERTIFICATION:

I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this initial evaluation to the best of my ability, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Date: JULY 12, 1982

James D. Morin
(Signature)

For: DEWEY SCARLES,
PLANNING DIRECTOR

APPENDIX "H"

YES ANSWERS

21. The secondary floodplain will be modified to accommodate spreading ponds. (See attached documents.)

23. Much of the project site will serve as a spreading area for groundwater recharge. It will be modified from its natural state. (See attached documents.)

26. The purpose of the project is to recharge the groundwater resource. (See attached documents.)

32. Pumping facilities will require energy to operate.

Exhibit B

MASTER SPREADING AGREEMENT

MASTER SPREADING AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 19__, by and between the City of Bakersfield, a Municipal Corporation, hereinafter referred to as "City", and _____, a _____, hereinafter referred to as "Spreader".

WHEREAS, the City owns approximately 2800 acres of land overlying the Kern County Groundwater Basin, hereinafter referred to as "City Spreading Area", which lands are set forth on a map entitled Exhibit "A" attached hereto and incorporated by reference herein;

WHEREAS, City has entered into Agreement No. 77-07 W.B. dated November 9, 1977, which Agreement has been amended as set forth in Agreement No. 78-12 W.B. dated June 27, 1978 and Agreement No. 81-76, dated April 15, 1981. All of the above said Agreements are jointly referred to herein as the "Basic Spreading Agreements";

WHEREAS, from time to time City has spreading capacity excess to its own needs on City Spreading Area, and excess to requirements of its prior Contractors under the Basic Spreading Agreement, hereinafter referred to as "Excess Spreading Capacity";

WHEREAS, Spreader wishes to enter into an Agreement with the City to utilize the City Spreading Area for spreading of water into the Kern River Groundwater Basin;

WHEREAS, City is willing to permit the use of City's Excess Spreading Capacity by Spreader and other interested users, hereinafter referred to as "Participating Entities", subject to appropriate financial conditions and arrangements;

NOW, THEREFORE, IT IS HEREBY AGREED AMONG THE PARTIES as follows:

ARTICLE 1. FACILITY CONSTRUCTION, MAINTENANCE AND FINANCING.

(a) The City shall annually determine what new or additional water spreading facilities will be needed to accomodate the anticipated spreading of the City, its prior contractors and the Participating Entities.

(b) Spreader shall pay that proportionate share of the City's annual cost to spread water as the amount of such waters spread shall bear to the total waters spread for all users, which costs shall include administration.

(c) Spreader shall pay the sum of $ _____ annually as its agreed share of the amortized costs of long-term spreading facilities constructed on City's Spreading Area.

(d) Spreading requests for all Participating Entities shall be estimated annually prior to March 1. Bills based on

estimates shall be sent by the City to each Participating Entity as costs are incurred. Adjustments shall be made annually as of February 15 to correct for actual participation for the preceding calendar year. Requests may be modified during the year subject to availability of capacity and prior City approval.

(e) City may require Spreader to contribute labor, material, equipment or other services necessary or required to construct or maintain the spreading facilities subject to City supervision and approval. The value of such services shall be credited to the Spreader.

ARTICLE II. OPERATION AND USE OF LAND AND FACILITIES.

Spreader shall have the right under City operation to spread water on the City Spreading Area subject to all the limitations expressed in this Agreement, including the following:

(a) Recovery will be limited to the net amount of water placed in underlying storage. Spreader will keep a positive balance in its account at all times.

(b) Spreader agrees that it will not claim credit for normal, natural and/or unavoidable losses and will not claim credit under this Agreement for percolation of water in the City Spreading Area which would have occurred under pre-existing conditions and is therefore not supplemental groundwater recharge.

(c) Spreader shall have the right to use up to ten (10%) of the City's excess spreading capacity on any given day. Other Participating Entities may be granted similar rights in

similar amounts. Spreader shall also have the right, correlative with all other Participating Entities, to use the unused right of any other Participating Entity, or the City's unused reserved rights, if any, on any given day or over any given period, with the prior consent of the City.

(d) Kern River native water will be given first priority for spreading within any excess spreading capacity.

ARTICLE III. SPREADING FEE.

(a) In addition to the payments required pursuant to Article I, Spreader shall pay to City the following fee:

(1) For water spread for subsequent irrigation use: $_____ per acre foot.

(2) The charge herein is subject to escalation on the basis of the July 1, 19____, Price Index "All Commodities" classifications for the Wholesale Price Indices for Major Commodity Group published by the U.S. Bureau of Labor Statistics. Adjustments will be made in January of each year.

(b) All charges and fees payable pursuant to this Agreement are due and payable by Spreader to City within thirty (30) days after mailing of notice by City.

ARTICLE IV. TERM.

This Agreement shall be for a term beginning on the date of execution hereof and ending on July 1, 2012.

ARTICLE V. GENERAL CONDITIONS:

(a) All rights created in this Agreement shall be subject to the City's reserved rights to spread, percolate and later recover water from the City Spreading Area, hereinafter referred to as the City's "Reserved Rights". The City's Reserved Rights shall continue to have the first priority for use of the City Spreading Area and facilities for spreading and recovery of water.

(b) All rights created in this Agreement shall also be subject to those rights granted to the Olcese Water District and the Buena Vista Water Storage District, hereinafter referred to as "City's Prior Contractors" under and pursuant to the Basic Spreading Agreements.

(c) Water spread pursuant to this Agreement shall not be extracted from storage by Spreader and used outside the boundaries of the Spreader nor outside the boundaries of the County of Kern without the prior approval of the City.

(d) Kern River water spread pursuant to this Agreement shall not be used by Spreader on any land not overlying the Kern River Groundwater Basin not historically supplied with such water without the prior approval of the City.

(e) No water other than Kern River water shall be spread under this Agreement without the prior consent of the City.

(f) This Agreement shall not be interpreted to limit in any manner any rights of City to spread in, recover, transfer, exchange, or convey water from the City Spreading Area

without restriction. Spreader agrees not to contest such rights of City.

(g) Participating Entities shall not enter into any sale or exchange agreements relating to water stored pursuant to this Agreement without prior City approval.

(h) No water stored pursuant to this Agreement shall be extracted from storage and used for purposes other than irrigation without the prior consent of City.

(i) This Agreement shall be subject to the terms and conditions of the City contracts with North Kern Water Storage District (No. 76-89); Cawelo Water District (No. 76-62); Kern-Tulare Water District (No. 76-61); Rag Gulch Water District (No. 76-63); and Rosedale-Rio Bravo Water Storage District (No. 76-180) to the extent any provision herein is inconsistent with the terms of said contracts.

(j) This Agreement shall also be subject to any federal, state or local regulations or local restrictions limiting in any way the performance by City of the terms of this Agreement.

(k) Spreader shall indemnify City, its officers and employees, against any liability for injury to, or death of, any person or damage to any property caused by a negligent or a wrongful act or omission occurring in Spreader's performance of this Agreement.

(l) If City is compelled to resort to litigation for performance of conditions of this contract, including any

payment due the City, court costs and attorney's fees shall be paid by Spreader.

(m) Any material breach of the terms and conditions of this Agreement shall render this Agreement inoperative at the option and at the sole discretion of the City.

(n) In no event shall City be liable for any damage which may result from City's non-negligent performance of any order or direction to it.

(o) It is anticipated that water will be extracted by Spreader under this Agreement by wells owned by Spreader, or by landowners within Spreader's boundaries. As a consequence, Spreader agrees to provide City, by April 1st of each year, with an annual report of pumping from all wells owned or controlled by Spreader, and all wells owned by landowners within the District specifying therein the amount of water stored pursuant to this Agreement which has been extracted in the preceding calendar year.

(p) City shall be responsible for, and shall maintain records of all spreading on the City's spreading area and the recovery of all such water wherever extracted. Spreader shall have access to such records.

(q) Any notice, billings, or correspondence required herein may be given by mail, postage prepaid, directed as follows:

Spreader:

_____

_____

_____

City:

Bakersfield Water Board
1501 Truxtun Avenue
Bakersfield, CA 93301

(r) The term "Spreader" as used herein includes the successors, assigns or any landowner within the Spreader's boundaries, who extracts water from the groundwater basin based on any right resulting from the storage of water by Spreader under this Agreement.

(s) This Agreement may not be transferred or assigned, either voluntarily or involuntarily, by Spreader to any other party without the prior written consent of City.

IN WITNESS WHEREOF, the parties hereunto have set their hands the day and year first hereinabove written.

_____

By _____

_____

CITY OF BAKERSFIELD

By _____
Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

_____
Assistant City Manager-Finance

Exhibit C

DRAFT SPREADING

AND EXTRACTION AGREEMENT

SPREADING AND EXTRACTION AGREEMENT

THIS AGREEMENT, is made and entered into this ___ day of _____, 19___, by and between the City of Bakersfield, a Municipal Corporation ("City"), and the Kern County Water Agency, a political subdivision of the State of California ("Agency").

FACTS UPON WHICH THIS AGREEMENT IS BASED:

1. The City owns approximately 2800 acres of land overlying the Kern County Groundwater Basin ("City Spreading Area") which lands are set forth on a map entitled Exhibit "A," attached to, and incorporated by reference in, this Agreement.

2. The City has entered into Agreement No. 77-07 W.B. dated November 9, 1977, which Agreement has been amended as set forth in Agreement No. 78-12 W.B. dated June 27, 1978 and Agreement No. 81-76, dated April 15, 1981. All of these Agreements are jointly referred to in this Agreement as the "Basic Spreading Agreements."

3. From time to time the City has spreading capacity excess to its own needs on the City Spreading Area, and excess to requirements of others under the Basic Spreading Agreements ("Excess Spreading Capacity").

4. Agency wishes to enter into an Agreement with the City to utilize the City Spreading Area for spreading of State Project Water, or, subject to City's consent, based on

considerations of water quality, which consent shall not unreasonably be withheld, any other imported water or Kern River water purchased or exchanged for imported water, all of which is collectively referred to in this Agreement as "Water."

5. The City is willing to permit the use of City's Excess Spreading Capacity by Agency and other interested users ("Participating Entities"), subject to appropriate financial conditions and arrangements.

IT IS THEREFORE AGREED BETWEEN THE PARTIES AS FOLLOWS:

ARTICLE I. USE OF LAND AND FACILITIES

The Agency shall have the right under City direction, supervision and control, to enter onto the City Spreading Area for the purpose of constructing temporary water spreading facilities, including diversion structures and measuring devices. All such facilities and improvements shall be constructed at the sole expense of the Agency and shall be and remain the property of the City. The Agency shall have the right under City operation to use City's Excess Spreading Capacity to spread water owned by Agency on the City Spreading Area subject to all the limitations expressed in this Agreement.

ARTICLE II. ANNUAL OPERATION AND MAINTENANCE COSTS

(a) The Agency shall pay that proportionate share of the City's annual, actual cost to spread water as the amount of such water spread by and on behalf of the Agency shall

bear to the total water spread for all users during the calendar year, which costs shall include administration applicable to such spreading.

(b) Spreading requests for all Participating Entities shall be estimated annually prior to March 1. Bills based on estimates shall be sent by the City to each Participating Entity as costs are incurred. Adjustments shall be made annually, if necessary, as of February 15 based on actual participation for the preceding calendar year. Requests may be modified during the year subject to availability of capacity and prior City approval.

(c) The Agency may, subject to the City's consent, approval and supervision, in lieu of payments pursuant to paragraph (a) of Article II of this Agreement, contribute labor, material, equipment or other services necessary or required to operate or maintain the spreading facilities.

ARTICLE III. SPREADING FEE

(a) In addition to the payments required pursuant to Article II of this Agreement, the Agency shall pay to the City a fee for each acre foot of water spread consisting of the following components:

1. A Spreading Component of $4.37 per acre foot.

2. A Facilities Improvement Component, to be determined annually by City, not to exceed fifty percent (50%) of the Spreading Component set forth in subparagraph 1 of this paragraph (a) of Article III.

3. Both components of the fee provided for in this paragraph (a) are subject to escalation on the basis of the January 1, 1981, Price Index "All Commodities" classifications for the Wholesale Price Indexes for Major Commodity Group published by the U.S. Bureau of Labor Statistics. Adjustments will be made in January of each year or as soon thereafter as is possible based on the January 1, Index. Fees payable during a calendar year shall be based on the January 1, Index for that year.

(b) All charges and fees payable pursuant to this Agreement are due and payable by the Agency to the City within thirty (30) days after mailing of notice by the City.

(c) The City shall hold the Facilities Improvement Component paid by the Agency in trust and expend such funds only for spreading facility improvements in the City Spreading Area, pursuant to the City's general plan for such improvements. The City may advance funds for such improvements and be reimbursed from such trust funds as received.

(d) At any time that funds collected under the facilities improvement component, including interest, if any, earned on those funds, remain unexpended for a period of five (5) years from date of receipt of such funds, the fee for such component shall be suspended until such funds have been expended. The calculation of "funds expended" will be based upon first funds collected equal first funds expended. Any

unexpended funds, including interest, if any, earned on those funds, remaining on June 30, 2012, shall be refunded to the contributors of such funds in proportion to the contributions made by such contributors which have not been expended.

(e) The Agency may, subject to the City's consent, approval and supervision, in lieu of payments pursuant to subparagraph 2 of paragraph (a) of this Article III, contribute labor, material, equipment or other services necessary or required to construct facility improvements. The value of such services shall be credited to future Agency payments under Article III(a)2.

(f) The City's determination as to whether in kind contributions of labor, material, equipment and other services shall be attributed to operation and maintenance or facility improvements shall be final.

(g) In lieu of paying the Spreading Component provided for in subparagraph 1 of paragraph (a) of this Article III, at the time of spreading, the Agency may:

1. Delay the payment of the Spreading Component until the Agency assigns the water spread to a member unit, at which time the spreading component will be due and payable; or

2. Delay payment of the spreading component to the time of extraction; subject, however, to the following conditions:

(A) Water spread by the Agency must be extracted within ten (10) years of the date spread at which time the Spreading Component will be due and payable; or

(B) One-half (½) of all water spread by the Agency and not extracted within the said ten (10) year period shall become the property of the City in lieu of receipt of the Spreading Component and Agency hereby assigns all of its right, title and interest to such water in the event such conditions occur; and

One-half (½) of all water spread by Agency and not extracted within said ten (10) year period, shall be deemed dedicated to the public for general improvement of groundwater basin levels and Agency hereby waives any further right to extract such water in the event such conditions occur.

3. All Spreading Component payments if delayed shall be subject to the escalation provided for in subparagraph 3 of paragraph (a) of this Article III, adjusted to the time such Spreading Component becomes due and payable. No action by the Agency to delay the payment of the Spreading Component shall in any way affect the obligation of Agency to pay the Facilities Improvement Component provided for in subparagraph 2 of paragraph (a) of this Article III at the time of spreading.

ARTICLE IV. TERM

This Agreement shall be for a term beginning on the date of its execution and ending on July 1, 2012. If at the time of termination of this Agreement, any spreading or extraction facilities ("the Remaining Facilities") exist

(a) which were constructed under this Agreement using either the funds of the Agency or the Facilities Improvement Component paid by the Agency, and

(b) which have been in existence for less than ten (10) years,

the City shall reimburse the Agency for the actual cost of construction of the Remaining Facilities less ten percent (10%) for each year or part of a year that the remaining facilities have been in existence. This obligation of City to reimburse the Agency for the unamortized costs of the Remaining Facilities shall not apply if the City and the Agency agree to extend the term of this Agreement or otherwise extend the right of the Agency to continue to spread water in the City Spreading Area under similar terms and conditions.

ARTICLE V. GENERAL CONDITIONS

(a) All rights created in this Agreement shall be subject to the City's reserved rights to spread, percolate, recover, transfer, exchange, or convey water in or from the City Spreading Area (the City's "Reserved Rights"). This Agreement shall not be interpreted to limit in any manner the

City's Reserved Rights. Agency agrees not to contest the Reserved Rights of City. The City, pursuant to its Reserved Rights, shall continue to have the first priority for use of, and facilities located on, the City Spreading Area for spreading and recovery of water except as otherwise explicitly agreed to in paragraph (a) of Article VII of this Agreement

(b) All rights created in this Agreement shall also be subject to those rights granted to the Olcese Water District and the Buena Vista Water Storage District, under and pursuant to the Basic Spreading Agreements.

(c) Whenever Kern River native water is available for spreading by any participating entity, it will be given priority for spreading over any non-Kern River water to be spread by the Agency.

(d) The Agency's priority to spread under this Agreement shall follow the prior rights set forth in paragraphs (a)(b) and (c) of this Article V.

(e) It is understood that the Agency does not intend to use or permit its successors or assigns to use water spread and extracted under this Agreement outside the boundaries of the Agency and that its policy in this respect is in harmony with the policy of the City.

(f) If any Kern River water, other than Kern River water simultaneously and equally exchanged for imported water, is spread and extracted pursuant to this Agreement it

shall not be used by the Agency, its sucessors or assigns, on any land not overlying the Kern County Groundwater Basin without the prior approval of the City.

(g) The Spreading Component of the fee charged herein is based on anticipated irrigation use and light commercial, industrial, municipal and domestic uses. It is therefore agreed that if Agency sells or assigns any water stored pursuant to this Agreement it shall provide that, if the water is used for any other use, including oil field or other heavy industrial uses, directly or indirectly by exchange or otherwise, such use shall require the prior consent of the City which shall be granted upon the payment of a revised spreading fee to the City commensurate with the value of the storage to the ultimate user, as determined by the City. This paragraph shall not apply to any water sold or delivered to a member unit of the Agency in satisfaction of that member unit's "Table 1 Entitlement" as set forth in that member unit's contract with Agency for State Project Water.

(h) This Agreement shall be subject to the terms and conditions of the City contracts with North Kern Water Storage District (No. 76-89); Cawelo Water District (No. 76-62); Kern-Tulare Water District (No. 76-61); Rag Gulch Water District (No. 76-63); and Rosedale-Rio Bravo Water Storage District (No. 76-180) to the extent any provision of this Agreement is inconsistent with the terms of those contracts.

(i) This Agreement shall be subject to any federal, state or local regulations or local restrictions limiting in any way the performance by the City of the terms of this Agreement. The Agency shall be responsible for compliance with all federal, state and local regulations and restrictions. The City shall function as the "Lead Agency" for purposes of preparation and processing of documents to comply with California Environmental Quality Act requirements, subject to coordination with and financial participation by Agency.

(j) The Agency shall indemnify, defend (upon written request of the City), and hold harmless the City, its officers, employees, and agents from any and all loss, damage, liability, claims, or causes of action of every nature whatsoever from damage to or destruction of, or interference with the use of ownership of property or for personal injury including that incurred by City's officers, employees, and agents arising out of, caused, or resulting from the Agency's actions during use of the City's land for the purpose herein authorized.

(k) If a material breach of the terms and conditions of this Agreement is communicated in writing to Agency, and Agency fails to cure said breach within a period of thirty (30) days after receipt of said notice, City may at its option and in its sole discretion declare this Agreement terminated.

(l) It is anticipated that water spread under this Agreement will either be sold, assigned or extracted by the Agency. The Agency agrees to provide the City, by April 1 of each year, with an annual report specifying therein the amount of water stored pursuant to this Agreement which has been sold, assigned or extracted during the preceding calendar year.

(m) The City shall be responsible for, and shall maintain records of all spreading on the City's spreading area and recovery, sale or assignment of all such water. The Agency shall have access to such records.

(n) Any notice, billings or correspondence required herein may be given by mail, postage prepaid, directed as follows:

AGENCY: Kern County Water Agency
4114 Arrow Street
Post Office Box 58
Bakersfield, CA 93302

CITY: Bakersfield Water Board
1501 Truxton Avenue
Bakersfield, CA 93301

(o) If either party is compelled to resort to litigation for performance of conditions of this contract, including any payment due, the prevailing party shall be entitled to court costs and reasonable attorneys' fees.

(p) This Agreement may not be transferred or assigned, either voluntarily or involuntarily by Agency to any other party without the prior written consent of City. This

provision shall not apply to the sale or assignment of rights to water stored as contemplated by this Agreement.

ARTICLE VI. EXTRACTION FACILITIES

(a) The Agency shall have the right, under City direction, supervision and control, to enter onto the City Spreading Area for the purpose of constructing and installing wells, pumps and pipelines for the extraction of water ("Extraction Facilities"). All Extraction Facilities shall be constructed at the sole expense of Agency.

(b) Agency shall furnish a schedule and plan for all Extraction Facilities construction and use to the City within sixty (60) days after execution of this agreement and periodically thereafter at City's request. Such plans shall be coordinated with all other planned use of the City's Spreading Area and Extraction Facilities and shall be subject to augmentation and approval by the City, prior to construction, which approval shall not be unreasonably withheld. Periodically, but no less often than annually, City shall provide Agency with a schedule of use of all such Extraction Facilities.

(c) Agency shall have the right under City operation to extract, from wells constructed pursuant to this Agreement, water previously spread by Agency on the City Spreading Area, subject to all the limitations expressed elsewhere in this Agreement, and expressly including the following:

(1) Extraction by the Agency, its successors or assigns, of the water spread under this Agreement shall be limited to the net amount of water placed in groundwater storage. The Agency will keep a positive balance in its account at all times. The City acknowledges the right of the Agency to recover said water.

(2) The Agency agrees that it will not claim credit for normal, natural and/or unavoidable losses and will not claim credit under this Agreement for percolation of water in the City Spreading Area which would have occurred under pre-existing conditions and is therefore not supplemental groundwater recharge.

(3) The Agency and its successors or assigns shall take precautions when extracting water spread under this Agreement to avoid unreasonable adverse effect on the rights of other groundwater users.

(4) Any water extracted from the spreading area by the Agency will be limited to water owned by the Agency at the time of extraction.

(5) The Agency will convey all Extraction Facilities (except pumps) to the City upon completion of construction and the City will thereafter operate and maintain the Extraction Facilities. Any construction guarantees for any Extraction Facilities will be assigned to City.

(6) Any pumps installed by Agency shall remain the property of Agency, but shall be leased to City, without cost, for the duration of this Agreement for use in operating the Extraction Facilities. Such pumps may be relocated or removed by Agency, subject to City's written advance consent, which shall not be withheld unless removal or relocation would result in loss of any preplanned use by City or any other entity as contemplated by paragraph (b) of Article VI and paragraph (a) of Article VII of this Agreement.

(7) Agency shall provide measuring devices for the water recovered from the City Spreading Area and and City shall maintain records of such recovery. Agency shall have access to such records.

ARTICLE VII. OPERATION AND USE OF EXTRACTION FACILITIES

(a) Agency will retain a first priority for use of any Extraction Facilities constructed by Agency for recovery of spread water. Subject to the priority rights of Agency, City may use, or permit any other entity contracting with City to use, the Extraction Facilities constructed or installed by Agency, subject to payment by such other entity (not including City) to Agency of a reasonable and equitable charge for the use of the Extraction Facilities to defray a prorata portion of their amortized costs of construction or acquisition.

(b) The periodic operation and maintenance costs ("O&M Costs") of the Extraction Facilities shall be shared by the

City, the Agency and any other entity utilizing such facilities proportionally based on the amount of water extracted by each. Such annual costs shall include administration. The O&M Costs shall be estimated by the City and shall be payable monthly to the City upon demand. No oversight by the City in making such demand shall relieve the Agency from such payments. O&M Costs accounts shall be adjusted annually by the City based on actual use.

ARTICLE VIII. USE OF RIVER CANAL

(a) Subject to the rights of the City and the rights of any other entity under the 1964 Amendment of the Miller-Haggin Agreement, or prior City contracts, Agency may use the River Canal for transportation of water pumped from the City Spreading Area.

(b) Use of the River Canal by the Agency shall be scheduled through the City, shall be arranged so that it will not interfere with other uses of the River Canal by the City or by any other entity with prior rights, and will be subject to the usual transportation costs provided for in Paragraph 5(h) of the 1964 Amendment of the Miller-Haggin Agreement.

(c) Subject to other prior contractural commitments, the City agrees to permit the use of any City conveyance facilities on the City spreading area, other than the River Canal, for the purposes of transporting Agency water to the extent of any excess capacity available in such facilities from time to time. If such facilities are used, a reasonable

charge for such use will be determined by City and paid by Agency.

EXECUTED this ___ day of _____, 19___.

KERN COUNTY WATER AGENCY

By_____

_____

CITY OF BAKERSFIELD

By_____
Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

_____
Assistant City Manager-Finance