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Secretary of State

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IN WITNESS WHEREOF, I execute this certificate and affix the Great Seal of the State of California this day of

November 28, 2012

Debra Bowen

DEBRA BOWEN
Secretary of State

PWS-0089-0001

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

Report on

Feasibility of Serving The Antelope Valley-East Kern Water Agency From The State Water Facilities

JANUARY 1962

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
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Report on

Feasibility of Serving The Antelope Valley-East Kern Water Agency From The State Water Facilities

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CHAPTER I. INTRODUCTION

The Antelope Valley-East Kern Water Agency has asked the Department of Water Resources to consider it as a potential contractor for water from the State Water Facilities, and it has requested the speedy execution of a contract for water service. This report is designed to serve as a guide for the Antelope Valley-East Kern Water Agency and the Department of Water Resources in their negotiations toward that end.

Purpose of the Report

The purpose of this report is to investigate various aspects of the Antelope Valley-East Kern Water Agency, in order to show factual background data, expositions of current and projections of future economic conditions, and projections of future water needs in the Agency's area. In addition, this report covers the economic and financial feasibility of providing supplemental water to the area.

The Department of Water Resources has already undertaken a general investigation of the region in which the Agency is located. Appendix A of the Department's Bulletin No. 78, entitled, "Long Range Economic Potential of the Antelope Valley-Mojave River Basin" (prepared by the management consultant firm of Booz, Allen, and Hamilton and published in January 1959), considered the economic future of the Mojave Desert portions of Los Angeles, Kern and San Bernardino Counties, and provided a basis for projections of that area's imported water demands. Appendix D of the same bulletin, entitled, "Economic Demand for Project Water", and published in March 1960, modified the conclusions of Appendix A to bring the projections for the Antelope Valley-Mojave River area into conformity with the studies conducted for the balance of Southern California. The present report was prepared to enlarge upon and modify the general data appearing in Appendixes A and D and to provide data specifically applicable to the Antelope Valley-East Kern Water Agency.

Description of the Agency

History of Development and Formation.

The Antelope Valley-East Kern Water Agency was formed specifically for the purpose of contracting with the State for the purchase of supplemental water supplies from the State Water Facilities. It was one of the first agencies to be created with this function primarily in mind.

During the period of investigation by the department for its Bulletin No. 78, "Investigation of Alternative Aqueduct Systems to Serve Southern California", and appendixes thereto, the Antelope Valley-East Kern Water Basin Association was formed. The function of this association was to inform the local citizenry of the water problems of the area and to press for the formation of a water agency that would have the power to contract with the State for supplemental water supplies from the State Water Facilities. In 1959, the association's efforts resulted in the creation by the California Legislature of the Antelope Valley-East Kern Water Agency.

Taxing Powers and Ability to Contract with the State

The water agency was created by Chapter 2146, Sections 49-96, Statutes of 1959. This legislation prescribes the Agency's boundaries, organization, management, financing and other powers and duties.

The basic section of the enabling act is Section 61. Subsections 5, 6 and 14 of Section 61 give the Agency the power to acquire its own water supply and construct necessary transportation and distribution works, and also to contract for water supplies from other entities, including the State of California. This latter power is the one of most importance in relation to the present report. While consent of two-thirds of the electorate is required for certain contracts between the water agency and the United States or corporations formed under its laws, no such condition is imposed with respect to contracts

with the State of California. The Agency's Board of Directors may, by vote of a majority of its members, authorize execution of contracts with the State.

The Agency has broad powers to borrow money. It can issue general obligation bonds, revenue bonds, and negotiable promissory notes. Bonds must be approved in bond elections, and are limited to a five percent interest rate and a maturity of forty years. Issues of negotiable promissory notes are limited in amount but are not subject to authorization by election.

Section 61, subsection 9, of the enabling act provides that the Agency's Board of Directors may cause taxes to be levied for the purpose of paying any obligation of the Agency, including payments on bonded debt. Although the tax rate is limited to $0.10 per $100 assessed valuation for general administrative purposes, there are no rate limits on levies to meet payments on bonded debt or other contractual debts to federal, state, county or city governments.

Limitations as to Future Annexations

Under Sections 82 and 83 of the Agency's enabling act, additional territory may be annexed to the Antelope Valley-East Kern Water Agency, In the usual case, the annexation proceedings would be initiated by petition to the Agency, followed by approval of a majority of voters in the area to be annexed in an annexation election. In areas deemed uninhabited, annexation may be accomplished by petition and acceptance of such petition by the Board of Directors of the Agency.

Territory may also be excluded from the water agency upon compliance with Sections 84 or 85 of the enabling act. Proceedings may be initiated by petition or on the resolution of the Board of Directors of the Agency. In inhabited areas the petition must be signed by at least ~~10~~ 5% amended percent of the number of voters voting for the office of governor at the last preceding election. Petitions for exclusion from uninhabited areas must be signed by property owners

representing at least one-fourth of the property affected, both by area and by assessed valuation. If inhabited areas are to be excluded, an election must be held, after the petition or resolution is accepted, in order to approve the exclusion. If the area is uninhabited, the Board of Directors, after holding hearings, may approve or disapprove the exclusion by its own resolution. Property which becomes excluded from the Agency's territory will remain taxable by the Agency for the repayment of bonded indebtedness existing at the time of the exclusion, until such indebtedness is fully repaid.

Description of the Service Area

Characteristics of the Locale

The lands of the Antelope Valley-East Kern Water Agency are located in the Mojave Desert portion of Los Angeles and Kern Counties, comprising that part of Los Angeles County north of the San Gabriel Mountains and the southeast corner of Kern County. The Agency's boundaries encompass about 1,360,000 acres of land, ranging from 2,900 to 3,500 feet in elevation. These boundaries cover two large inland ground water basins, the Antelope Valley, primarily in Los Angeles County, and the Fremont Valley, in Kern County. The area in which the Agency is located is shown on Plate 1, "Location Map", and a detailed map of the area is depicted in Plate 2, "Boundaries of the Antelope Valley-East Kern Water Agency".

The climate of the area is characterized by low humidity, low annual rainfall, wide fluctuations in daily temperature extremes, and frequent strong winds. Average annual precipitation is about 8 inches, and normally less than 1.5 inches of the total occurs between April and October. During summer months, maximum daily temperatures range between 70 and 100°F., and winter minimum temperatures are frequently below freezing.

History of the Area

The history of the region prior to 1875 is generally unknown. However, there are accounts extant of travels and expeditions in or through the area, by Fray Francisco Garces, a Spanish priest, in 1776, John C. Fremont in 1844, and the "Death Valley Party" in 1849. A Mexican land grant, known as Rancho La Libre, was made in the area in 1846. This grant was the first known economic activity there. In 1853, explorations for a railroad pass between the desert and the San Joaquin Valley were made by the War Department, and in 1855, surveyors of the U. S. General Land Office began subdivision of the entire region.

The years between 1875 and 1880 marked the real beginning of the economic development of the region. During this period, dry-farmed grain production began in the western end of the Antelope Valley and flowing wells were discovered in the vicinity of Lancaster. About this time, the Southern Pacific Railroad was completed to Mojave and prospecting began for gold and other minerals. In the late 1880's, a wave of farm land speculation hit the area following the passage of the Wright Act in 1887, which sought "to confer on farming communities powers of municipalities in the purchase, construction or operation of irrigation works". By 1890, six irrigation districts were formed under this act in the southern portion of the area and in 1891, it was estimated that there were over 50,000 acres under irrigation, all from surface water diversions. The inadequacy of these irrigation projects became apparent when a severe and prolonged drought hit the area in and following the year 1894. By 1905 almost all of the irrigated acreage in the valley had been abandoned.

The development of ground water extraction proceeded concurrently with attempts at irrigation from surface supplies, but at a much slower rate. In 1900, it was estimated that there were over 200 wells in the Antelope Valley,

although the best producers were in the lower portion of the valley on the poorest and most alkaline lands. However, as pumping technology progressed, a steady development of irrigation began, starting in about 1910. Irrigation of fruit tree acreage from surface water supplies experienced a small revival in the 1920's, but this development was cut short by the depression of the 1930's. Irrigated agriculture, however, continued to develop until the mid-1950's, when the acreage stabilized at about 77,000 acres.

With the notable exception of the communities of Mojave and Boron, urban development in the area up to World War II closely paralleled agricultural development. Palmdale, Lancaster, Littlerock and other communities began initially as small settlements to serve the farmers of the surrounding area. Mojave was developed as a railroad and mining center, while Boron was a center for borax mining operations. Since World War II, population and urban development have grown independently of farming, reflecting the great amount of military activity in the area, especially at Edwards Air Force Base, and the substantial urban growth of Southern California generally.

Primary Economic Development

The economy of the area within the Agency's boundaries is based primarily upon farming, military activity and industrial mineral extraction and processing. Manufacturing industry in the area has been relatively unimportant, although decided growth in this activity has been apparent during the past ten years.

Farming has been one of the most important factors in the area's development, and in spite of a continued imbalance between local water supplies and water consumption, irrigated farming has continued at its present rate for about the past 15 years. In 1957, 77,000 acres of the Agency's area were

devoted to irrigated agriculture, primarily to alfalfa and other field crops, while there were about 150,000 acres in all types of farming, including fallow lands.

Military activity within the Agency encompasses a large segment of the area's economy. The most important military development is Edwards Air Force Base, which extends across approximately 257,000 acres and provides employment for over 10,000 persons. Mining and processing of industrial minerals is the third of the basic economic developments of the area. The largest mining-processing operations are a cement plan in Mojave and a borate mine near Boron.

Classification of Lands

Of the 1,360,000 acres contained within the Antelope Valley-East Kern Water Agency, it is estimated that about 800,000 acres are susceptible to urban and/or agricultural development. This latter figure is exclusive of the 257,000 acres within the boundaries of Edwards Air Force Base, which are under the control of the Federal Government.

The Department of Water Resources has classified the lands within the region into the two broad categories of usable and nonusable lands, rather than in a more detailed classification. Of the 800,000 acres of land classified as usable, about 430,000 are in the Kern County portion of the Agency and about 370,000 are in Los Angeles County. These lands are classified as habitable or irrigable, and no differentiation is made between them as to topography or soil texture.

There are approximately 150,000 acres in the Los Angeles County portion of the Agency which are not susceptible to urban development or irrigated farming and an additional 150,000 acres of such land in the Kern County portion. Thus, there is a total of about 300,000 acres within the boundaries of the

Antelope Valley-East Kern Water Agency unsuitable for any kind of development, exclusive of the lands of Edwards Air Force Base.

Restrictions on Future Development

Future development in the area of the Antelope Valley-East Kern Water Agency will not be restricted by the availability of land, as there is an ample amount of usable land available to satisfy all the area's needs for many decades. Less than 20 percent of the usable land in the Agency, exclusive of Edwards Air Force Base, is currently in use.

Water supplies and climate, on the other hand, may be factors of importance with respect to restriction of the Agency's development. It appears that, without supplemental water supplies, the future development of the area will be severely hampered, as existing local water supplies are presently being substantially overdrawn. The advent of imported water into the Agency's area will assure the area's potential for future urban and industrial development. Climate is a restrictive factor from the standpoint of irrigated farming, as it limits production to crops which can pay only low water costs. It is also restrictive of urban development because the hot summers and cool winters, coupled with frequent windstorms, make the area less desirable for urban development than the more moderate coastal areas which compete with the region for population growth from in-migration.

Another factor that is restrictive of development is that the area has had a rather small industrial growth and thus has a small economic base for future development. Even though the percentage increases from this small base are expected to be substantial, the small size of the base will limit the numerical increase of basic industrial employment. Accordingly, growth may be limited to "overflow" development from the Southern California coastal plain.

Local Water Agencies

The Antelope Valley-East Kern Water Agency encompasses numerous water service entities within its boundaries, including both public districts and privately-owned water companies. The public districts in the agency are varied in form; they include four county waterworks districts, one county water district, three irrigation districts, three community services districts, and one public utility district. The largest public water districts in the area are shown on Plate 3, "Boundaries of Existing Water Agencies and Proposed Local Distribution Facilities". In addition, the area has forty mutual water companies and five private water companies.

These public and private water agencies are the basic entities for the provision of future water service to urban areas. Since the Antelope Valley-East Kern Water Agency does not contemplate consumer service, these local water agencies will continue their present role as suppliers for individual water consumption.

CHAPTER II. PRESENT AND FUTURE DEVELOPMENT OF ECONOMY

The economic history of the region in which the Antelope Valley-East Kern Water Agency is located began when farming and mining developed there in the latter part of the Nineteenth Century. Farming flourished for a short time, but by 1905 prolonged drought had nearly destroyed the agricultural industry of the area. After that time, however, farming again became significant, and was the primary characteristic of the region's economy until after World War II. Mining has continued to develop at a steady pace since the industry first became established. However, the emphasis on precious metals, evident in the early days, has given way to industrial mineral extraction. Since the war, military activity has become the principal segment of the area's economy, even though agriculture and mining continue to play important roles.

The area is expected to broaden its economic base in the next 30 years as it enters into another stage of its economic growth -- the development of manufacturing. Whereas military expenditures and mining are predicted to continue to expand at a modest rate, and farm production is expected to decline, manufacturing is estimated to substantially increase its activity in the next three decades, and become an important and well established part of the area's economy.

Population

Population within the Antelope Valley-East Kern Water Agency has increased substantially in the past twenty years and particularly in the past decade. The Agency's population has increased at a rate about four times greater than that of the State as a whole during the past ten years, and has well exceeded the rate of growth of the metropolitan Los Angeles area during that period. In 1940, the area had a population of 9,800. By 1950, the population

increased 111 percent to 20,700, and increased another 214 percent by 1960 to 65,000.

Proximity to the City of Los Angeles appears to have been influential in determining the location of population within the Agency, for increases in population have been at a greater rate in the Los Angeles County portion of the Agency than in Kern County. Between 1950 and 1960, the Los Angeles County share of the Agency's population increased from 62 to 72 percent, indicating a trend which is estimated to continue for at least the next two decades. Furthermore, the area's population has shown indications of more urban concentration during the past ten years. Since 1950, the number of residents in the leading urban communities in the Agency has risen from 57 to 64 percent of the area's total population.

Most of the population increases in the Agency have occurred through in-migration rather than by natural increase. Data from the Los Angeles County Planning Commission indicate that 85 percent of the population increase in the Antelope Valley area of Los Angeles County between 1950 and 1960 was due to in-migration. Net natural population increase, i.e., the excess of births over deaths, has taken place in the area at the rate of 290 persons per thousand in the past decade.

While the makeup of the change in population is of interest, it is not practicable to forecast future population changes in areas such as that encompassed by the Antelope Valley-East Kern Water Agency by separate and independent analyses of factors of natural increase and in-migration applicable only to the particular area. Valid population forecasts must consider the interrelationships between adjacent areas, their respective resources, states of development, external and internal economic and demographic pressures, and many other factors.

Studies of this nature were performed by the Department of Water Resources for many subdivisions of Southern California and were reported in Bulletin No. 78, Appendix D. While these projections for the area which includes the Agency served as the basis for the forecast of population for the Agency, the projections were modified to take into consideration the different areas involved and the effect of the 1960 census of population, not available during the Bulletin No. 78 studies.

The forecast of population growth in the area of the Antelope Valley-East Kern Water Agency includes the assumptions that it will continue to increase in population at a higher rate than the Southern California area generally, that the population in the southern portion of the Agency will continue to grow at a faster rate than in the northern portion, and that in-migration will continue to provide the bulk of population growth during the next three decades.

Table 1, below, shows the historical and projected populations in the Antelope Valley-East Kern Water Agency. This is shown graphically in Figure 1.

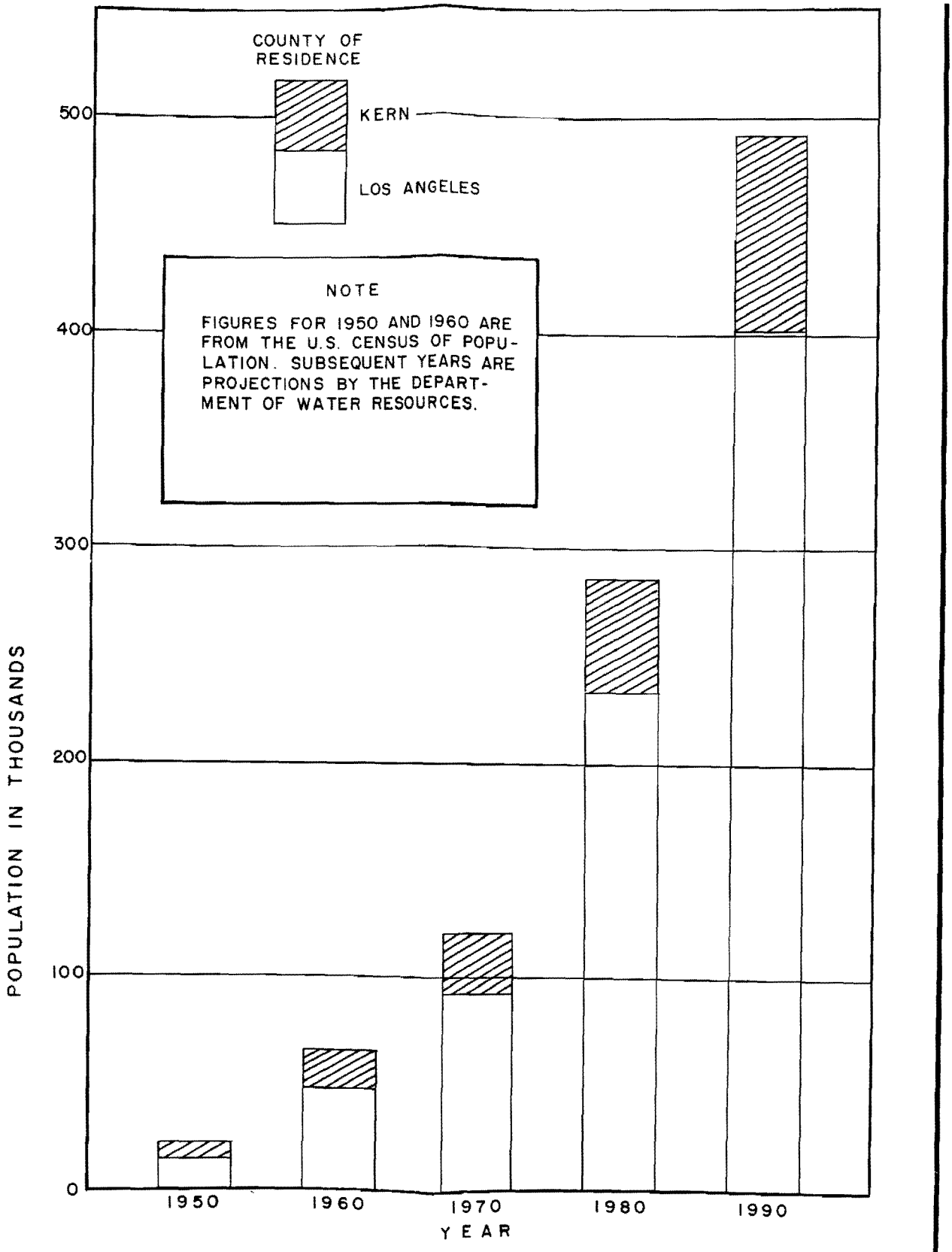
Syllabus (over Figures in red)
S-115

TABLE 1

HISTORICAL AND PROJECTED POPULATION
1940-1990

Year	Los Angeles County area	Kern County area	Total Agency area
	Historical		
1940	5,600[1]	4,200[1]	9,800
1950	12,800	7,900	20,700
1960	46,900	18,100	65,000
	Projected		
1970	92,000	28,000	120,000
1980	232,000	53,000	285,000
1990	401,000	89,000	490,000

[1] Estimated



HISTORIC AND PROJECTED POPULATION IN THE ANTELOPE VALLEY — EAST KERN WATER AGENCY

Urban Development

The boundaries of the Antelope Valley-East Kern Water Agency encompass no incorporated cities, but nevertheless there are several well-defined urban communities in the area, the most important of which are Lancaster and Quartz Hill in Los Angeles County, and Rosamond, Mojave and Boron in Kern County. The location of these communities is shown on Plate 4, "Present Land Use, 1960". In 1950, these five communities had a total population of 11,900. By 1960, the population of these communities had increased to 41,700. Thus, of the 44,300 increase in population between 1950 and 1960, about two-thirds occurred in the Agency's urban areas.

The community of Lancaster is the largest urban settlement in the region and has had the region's largest population increases. Three-quarters of all urban population growth within the Agency between 1950 and 1960 took place in this community. Lancaster is not only the administrative headquarters for the northern portion of Los Angeles County, but it is also the commercial, residential and transportation center of the area. Within this community there are few manufacturing activities; exclusive of employment at Air Force Plant 42, only 5 percent of employed Lancaster residents are engaged in manufacturing. However, most of the 3,300 employees at Air Force Plant 42, which is located near Palmdale but is within the water agency area, reside in Lancaster. It is expected that this community will continue to be the predominant community in the Agency during the next three decades.

Quartz Hill is a small community of about 3,300 persons, located about six miles southwest of Lancaster. In the past it was a community entirely independent of Lancaster, but recent urban expansion of the two communities has tended to merge Quartz Hill with its larger neighbor. Barring future incorporation of either of these communities, it is anticipated that their merger will be complete within the next three decades.

Boron is located in Kern County on U. S. Highway 466, just north of Edwards Air Force Base and west of the San Bernardino County line. Until the development of Edwards Air Force Base, Boron's economy was almost completely dependent upon borate mining. Today, however, its economic position has been changed by the expansion of the air base's activity. The population of Boron increased substantially from 1950 to 1960, from nearly 600 to about 3,200, primarily due to expansion programs of Edwards Air Force Base, but also due to expansion of the area's borate mining facilities.

Rosamond is in Kern County, eleven miles north of Lancaster on U. S. Highway 6. This community increased its population from nearly 500 persons in 1950 to 2,100 in 1960, primarily because of the establishment of several small manufacturing plants in the area, upon which its economy is dependent.

Mojave is located in the northerly portion of the Antelope Valley-East Kern Water Agency area and with a population of 2,600, is the largest community in that area. Mojave's population increase between the last two census enumerations was well below the average for the area and the other major communities within it. This was largely the result of the deactivation of the Marine Corps Auxiliary Air Station in 1959. Presently, the economy of Mojave is founded on railroad and freight yard activities, small mining operations, and manufacturing based upon the extraction of industrial minerals.

Table 2 shows historical and projected population estimates for present urban areas within the Antelope Valley-East Kern Water Agency, together with estimates for military and present rural areas:

TABLE 2

HISTORICAL AND PROJECTED POPULATION OF
PRESENT COMMUNITIES, MILITARY BASES, AND RURAL AREAS
1940-1990

Community	Population					
	1940	1950	1960	1970	1980	1990
Lancaster	3,100	7,500	30,500	64,000	168,000	287,000
Quartz Hill	700	1,300	3,300	6,000	22,000	45,000
Boron	150	600	3,200	5,500	6,500	10,000
Rosamond	100	500	2,100	4,000	15,000	35,000
Mojave	1,100	2,000	2,600	3,000	9,500	18,000
Subtotal	5,150	11,900	41,700	82,500	221,000	395,000
Edwards AFB	1,500	2,000	7,700	12,000	12,000	12,000
Present Rural Areas	3,150	6,800	15,600	25,500	52,000	83,000
Total	9,800	20,700	65,000	120,000	285,000	490,000

Agriculture

Agricultural production in the Antelope Valley-East Kern Water Agency area has historically been based on livestock raising and the growing of irrigated and nonirrigated field and forage crops. Poultry, cattle, and sheep have been the predominant livestock enterprises in the area, while farming has been dominated by the production of alfalfa hay, wheat and barley.

Although the region receives scant rainfall, irrigation of farmlands in the Agency has not been a universal practice; the majority of orchard and grain acreage has traditionally been dry-farmed. Most of the value of crop production, however, stems from irrigated agriculture. Over 85 percent of all irrigated crop land is in alfalfa hay, irrigated grain and irrigated grain hay, with the balance accounted for by potatoes, onions, melons, cotton, sugar beets, and milo.

Interest in other irrigated crops has arisen in the area from time to time, but the initial optimism with which these crops were met was proved to be unwarranted by the subsequent lack of success in their production.

Irrigated Agriculture

In general, it appears that the expansion of population and urbanization and the continued lowering of ground water tables have begun to affect irrigated agricultural production. Irrigated farming in the Agency increased in acreage after World War II until 1957, when a maximum of 77,000 acres was reached. Since that time, irrigated acreage has declined to the present 59,000 acres. This decline has been caused not only by the local factors of lowered ground water tables and urban encroachment, but also by the continued cost-price squeeze which has affected the agricultural industry for the past several years.

The future of irrigated agriculture in the Antelope Valley-East Kern Water Agency area is uncertain, although factors which tend to restrain irrigated farming appear to be of more force than those which tend to promote its further development. These restraining factors include climate, soil characteristics, competition from other areas, relatively high investment costs, low payment capacities for irrigation water, urban encroachment, and water supply. On the other hand, the major factors that tend to promote irrigated farming in the area are the ample supply of available land, a growing demand by the area's expanding livestock industry for locally produced animal feedstuffs, and the possibility of augmented water supplies caused by increased ground water recharge from urban use of imported water from the State Water Facilities or from urban water reclamation projects. These promotive factors do not seem to be as influential in the area's agricultural future as do those factors which tend to restrain agricultural development.

Agricultural Payment Capacities for Project Service. A prime factor in the projection of future agricultural acreages under irrigation is the amount of water available for irrigation purposes, which, in large measure, is dependent upon the cost of water service and the farmer's capacity to pay for water service for irrigation. In order to determine whether serving the area within the Antelope Valley-East Kern Water Agency with water from the State Water Facilities for irrigation purposes is economically justified, the payment capacities of the area's leading crops were determined, in order that they could be compared with the probable cost of water service. Payment capacity, determined by subtracting all production and overhead costs except water costs from gross income, was computed for the general area in which the water agency is located and was tabulated in Appendixes A and D of the department's Bulletin No. 78. Since the determination of payment capacities was made in these appendixes, the department has made modifications in its methods for computing payment capacity. These modifications have been applied to the results obtained earlier in order to reflect the department's methodology in the presentation of payment capacity in this report. The basic yield, price, and cost data for major irrigated crops in the area were left unchanged. Table 3 below indicates payment capacities for the main irrigated crops produced within the water agency's area.

TABLE 3

PAYMENT CAPACITIES OF MAJOR IRRIGATED CROPS

Crop	Payment capacity per acre-foot of applied water
Alfalfa Hay	$ 4.25
Irrigated Pasture	7.75
Milo	10.70
Wheat	19.50
Cantaloupe	21.00
Onions	34.70
Potatoes	37.40

The payment capacities shown above are lower than the estimated cost of water service from the State Water Facilities as developed in Chapter IV and shown in Table 16. Therefore, it was concluded that water from the State Water Facilities should not be imported for use by irrigated agriculture.

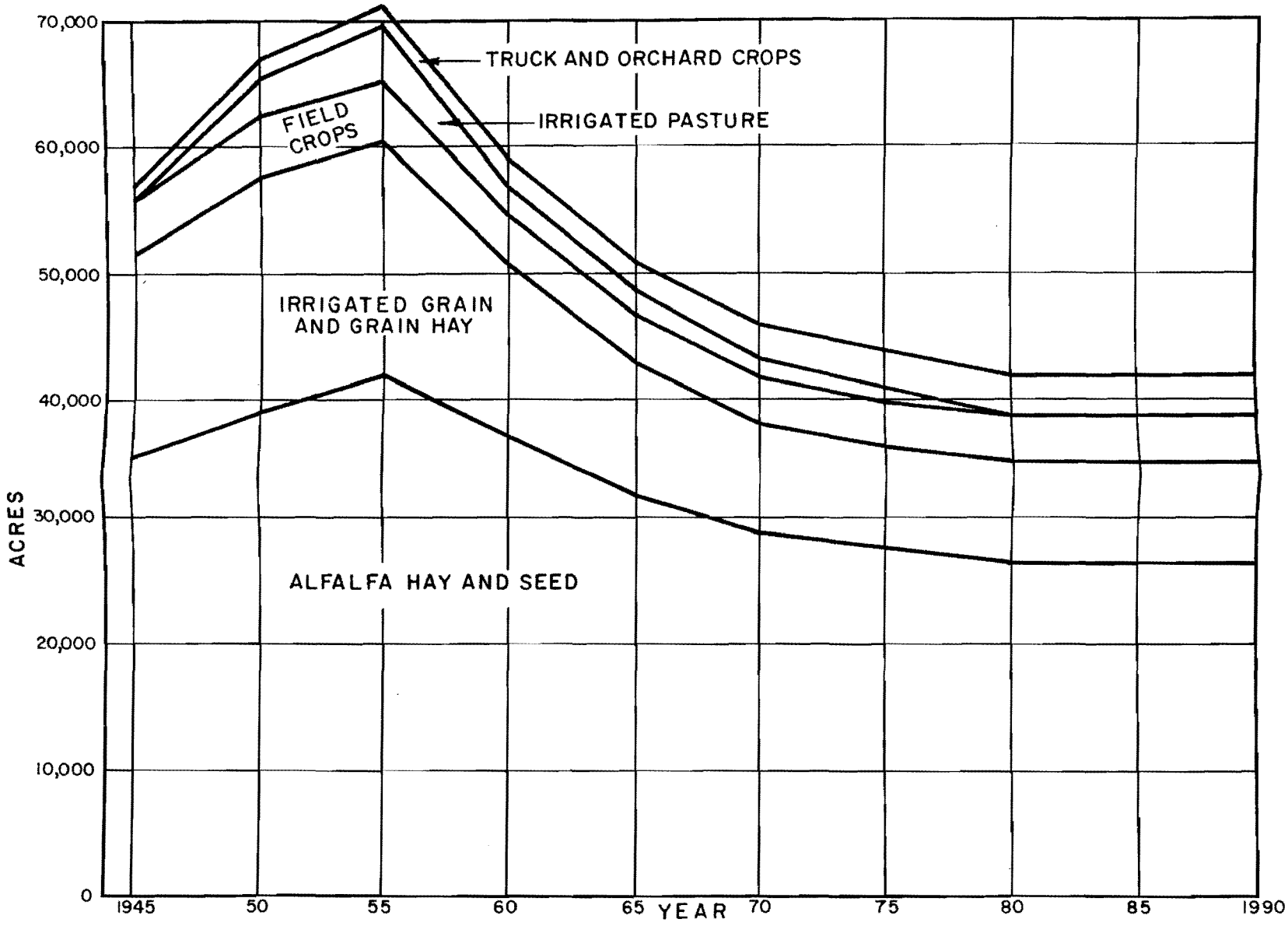
Projections of Irrigated Agricultural Acreages. In making projections of irrigated crop acreages in the water agency area, several influencing factors were given consideration, including land availability and urban encroachment, climatic conditions, crop adaptability, historical agricultural development patterns, markets for farm products, availability of local water supplies, water costs, and payment capacity for water service. Consideration of these factors led to the conclusion that irrigated farm acreages would probably decline during the next 30 years. The factors that were instrumental in making this conclusion were the conditions of water supply and the likelihood of urban encroachment on farm lands in the area. As long as overdrafting of the ground water basins persists and ground water levels continue to lower, irrigated acreage will be

forced out of production as pumping depths exceed economic limits. As water costs continue to increase because of increased pumping depths, re-location and re-development of farms displaced by urban land encroachment will be discouraged. This trend toward a decreasing irrigated acreage in the area will not be alleviated by the introduction of imported water from the State Water Facilities because the probable cost of water importation would exceed the capacity of farmers growing adaptable crops to pay for imported water service. Therefore, it was concluded that irrigated farm acreages would not receive imported water service and acreages were predicted to continue the downtrend begun in recent years. Estimates of historical and projected irrigated agricultural acreages in the Agency appear in Table 4 and Figure 2.

TABLE 4

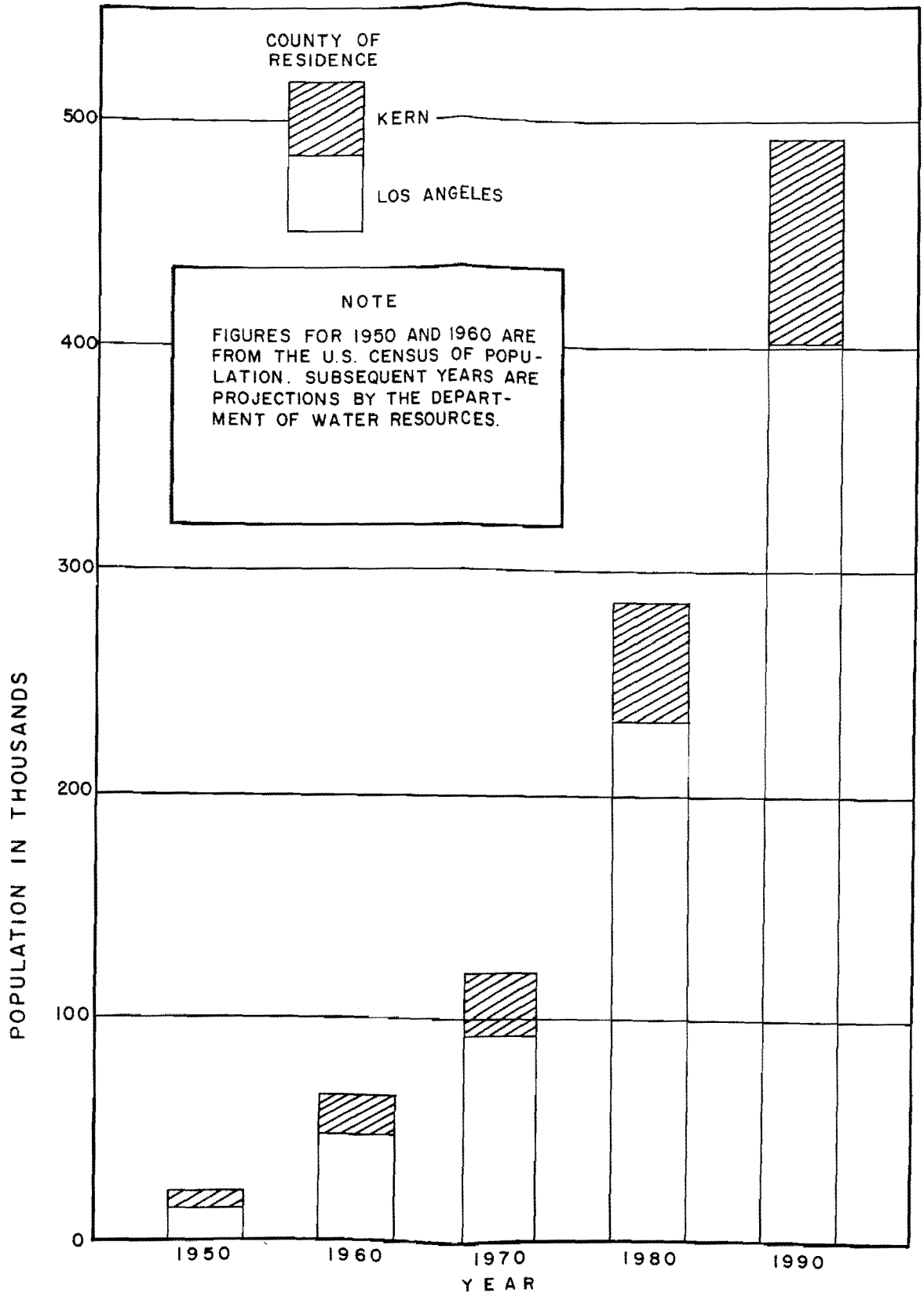
HISTORICAL AND PROJECTED ACREAGES
OF IRRIGATED CROPS
1945-1990

Year	Alfalfa	Irrigated pasture	Field crops	Grain and grain hay	Truck crops	Orchard crops	Total
				Historical			
1945	35,000	0	4,300	16,300	400	700	56,700
1950	39,000	2,900	4,900	18,700	600	1,000	67,100
1955	42,000	4,500	4,900	18,300	400	1,100	71,200
1960	37,000	2,100	3,800	14,000	1,300	800	59,000
				Projected			
1965	32,000	1,800	3,800	11,000	1,500	900	51,000
1970	29,000	1,500	3,800	9,000	1,700	1,000	46,000
1975	27,500	1,000	3,800	8,700	1,900	1,100	44,000
1980	26,500	0	3,800	8,400	2,200	1,100	42,000
1985	26,500	0	3,800	8,400	2,200	1,100	42,000
1990	26,500	0	3,800	8,400	2,200	1,100	42,000



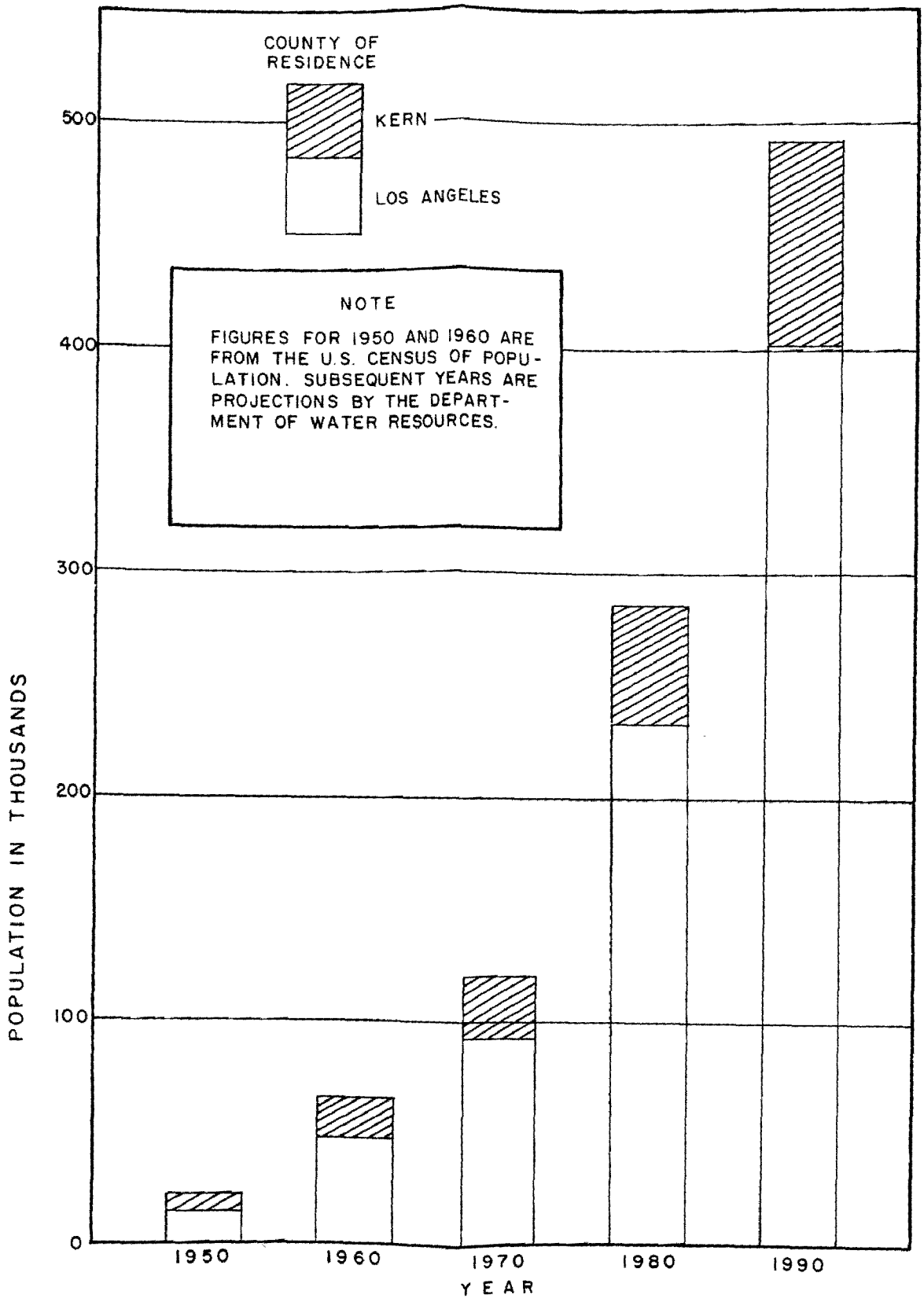
HISTORICAL AND PROJECTED ACREAGES OF IRRIGATED CROPS IN THE ANTELOPE VALLEY- EAST KERN WATER AGENCY 1945-1990

FIGURE 2



HISTORIC AND PROJECTED POPULATION IN THE ANTELOPE VALLEY — EAST KERN WATER AGENCY

FIGURE 1



HISTORIC AND PROJECTED POPULATION IN THE ANTELOPE VALLEY — EAST KERN WATER AGENCY

Urban Development

The boundaries of the Antelope Valley-East Kern Water Agency encompass no incorporated cities, but nevertheless there are several well-defined urban communities in the area, the most important of which are Lancaster and Quartz Hill in Los Angeles County, and Rosamond, Mojave and Boron in Kern County. The location of these communities is shown on Plate 4, "Present Land Use, 1960". In 1950, these five communities had a total population of 11,900. By 1960, the population of these communities had increased to 41,700. Thus, of the 44,300 increase in population between 1950 and 1960, about two-thirds occurred in the Agency's urban areas.

The community of Lancaster is the largest urban settlement in the region and has had the region's largest population increases. Three-quarters of all urban population growth within the Agency between 1950 and 1960 took place in this community. Lancaster is not only the administrative headquarters for the northern portion of Los Angeles County, but it is also the commercial, residential and transportation center of the area. Within this community there are few manufacturing activities; exclusive of employment at Air Force Plant 42, only 5 percent of employed Lancaster residents are engaged in manufacturing. However, most of the 3,300 employees at Air Force Plant 42, which is located near Palmdale but is within the water agency area, reside in Lancaster. It is expected that this community will continue to be the predominant community in the Agency during the next three decades.

Quartz Hill is a small community of about 3,300 persons, located about six miles southwest of Lancaster. In the past it was a community entirely independent of Lancaster, but recent urban expansion of the two communities has tended to merge Quartz Hill with its larger neighbor. Barring future incorporation of either of these communities, it is anticipated that their merger will be complete within the next three decades.

Boron is located in Kern County on U. S. Highway 466, just north of Edwards Air Force Base and west of the San Bernardino County line. Until the development of Edwards Air Force Base, Boron's economy was almost completely dependent upon borate mining. Today, however, its economic position has been changed by the expansion of the air base's activity. The population of Boron increased substantially from 1950 to 1960, from nearly 600 to about 3,200, primarily due to expansion programs of Edwards Air Force Base, but also due to expansion of the area's borate mining facilities.

Rosamond is in Kern County, eleven miles north of Lancaster on U. S. Highway 6. This community increased its population from nearly 500 persons in 1950 to 2,100 in 1960, primarily because of the establishment of several small manufacturing plants in the area, upon which its economy is dependent.

Mojave is located in the northerly portion of the Antelope Valley-East Kern Water Agency area and with a population of 2,600, is the largest community in that area. Mojave's population increase between the last two census enumerations was well below the average for the area and the other major communities within it. This was largely the result of the deactivation of the Marine Corps Auxiliary Air Station in 1959. Presently, the economy of Mojave is founded on railroad and freight yard activities, small mining operations, and manufacturing based upon the extraction of industrial minerals.

Table 2 shows historical and projected population estimates for present urban areas within the Antelope Valley-East Kern Water Agency, together with estimates for military and present rural areas:

TABLE 2

HISTORICAL AND PROJECTED POPULATION OF
PRESENT COMMUNITIES, MILITARY BASES, AND RURAL AREAS
1940-1990

Community	Population					
	1940	1950	1960	1970	1980	1990
Lancaster	3,100	7,500	30,500	64,000	168,000	287,000
Quartz Hill	700	1,300	3,300	6,000	22,000	45,000
Boron	150	600	3,200	5,500	6,500	10,000
Rosamond	100	500	2,100	4,000	15,000	35,000
Mojave	1,100	2,000	2,600	3,000	9,500	18,000
Subtotal	5,150	11,900	41,700	82,500	221,000	395,000
Edwards AFB	1,500	2,000	7,700	12,000	12,000	12,000
Present Rural Areas	3,150	6,800	15,600	25,500	52,000	83,000
Total	9,800	20,700	65,000	120,000	285,000	490,000

Agriculture

Agricultural production in the Antelope Valley-East Kern Water Agency area has historically been based on livestock raising and the growing of irrigated and nonirrigated field and forage crops. Poultry, cattle, and sheep have been the predominant livestock enterprises in the area, while farming has been dominated by the production of alfalfa hay, wheat and barley.

Although the region receives scant rainfall, irrigation of farmlands in the Agency has not been a universal practice; the majority of orchard and grain acreage has traditionally been dry-farmed. Most of the value of crop production, however, stems from irrigated agriculture. Over 85 percent of all irrigated crop land is in alfalfa hay, irrigated grain and irrigated grain hay, with the balance accounted for by potatoes, onions, melons, cotton, sugar beets, and milo.

Interest in other irrigated crops has arisen in the area from time to time, but the initial optimism with which these crops were met was proved to be unwarranted by the subsequent lack of success in their production.

Irrigated Agriculture

In general, it appears that the expansion of population and urbanization and the continued lowering of ground water tables have begun to affect irrigated agricultural production. Irrigated farming in the Agency increased in acreage after World War II until 1957, when a maximum of 77,000 acres was reached. Since that time, irrigated acreage has declined to the present 59,000 acres. This decline has been caused not only by the local factors of lowered ground water tables and urban encroachment, but also by the continued cost-price squeeze which has affected the agricultural industry for the past several years.

The future of irrigated agriculture in the Antelope Valley-East Kern Water Agency area is uncertain, although factors which tend to restrain irrigated farming appear to be of more force than those which tend to promote its further development. These restraining factors include climate, soil characteristics, competition from other areas, relatively high investment costs, low payment capacities for irrigation water, urban encroachment, and water supply. On the other hand, the major factors that tend to promote irrigated farming in the area are the ample supply of available land, a growing demand by the area's expanding livestock industry for locally produced animal feedstuffs, and the possibility of augmented water supplies caused by increased ground water recharge from urban use of imported water from the State Water Facilities or from urban water reclamation projects. These promotive factors do not seem to be as influential in the area's agricultural future as do those factors which tend to restrain agricultural development.

Agricultural Payment Capacities for Project Service. A prime factor in the projection of future agricultural acreages under irrigation is the amount of water available for irrigation purposes, which, in large measure, is dependent upon the cost of water service and the farmer's capacity to pay for water service for irrigation. In order to determine whether serving the area within the Antelope Valley-East Kern Water Agency with water from the State Water Facilities for irrigation purposes is economically justified, the payment capacities of the area's leading crops were determined, in order that they could be compared with the probable cost of water service. Payment capacity, determined by subtracting all production and overhead costs except water costs from gross income, was computed for the general area in which the water agency is located and was tabulated in Appendixes A and D of the department's Bulletin No. 78. Since the determination of payment capacities was made in these appendixes, the department has made modifications in its methods for computing payment capacity. These modifications have been applied to the results obtained earlier in order to reflect the department's methodology in the presentation of payment capacity in this report. The basic yield, price, and cost data for major irrigated crops in the area were left unchanged. Table 3 below indicates payment capacities for the main irrigated crops produced within the water agency's area.

TABLE 3

PAYMENT CAPACITIES OF MAJOR IRRIGATED CROPS

Crop	Payment capacity per acre-foot of applied water
Alfalfa Hay	$ 4.25
Irrigated Pasture	7.75
Milo	10.70
Wheat	19.50
Cantaloupe	21.00
Onions	34.70
Potatoes	37.40

The payment capacities shown above are lower than the estimated cost of water service from the State Water Facilities as developed in Chapter IV and shown in Table 16. Therefore, it was concluded that water from the State Water Facilities should not be imported for use by irrigated agriculture.

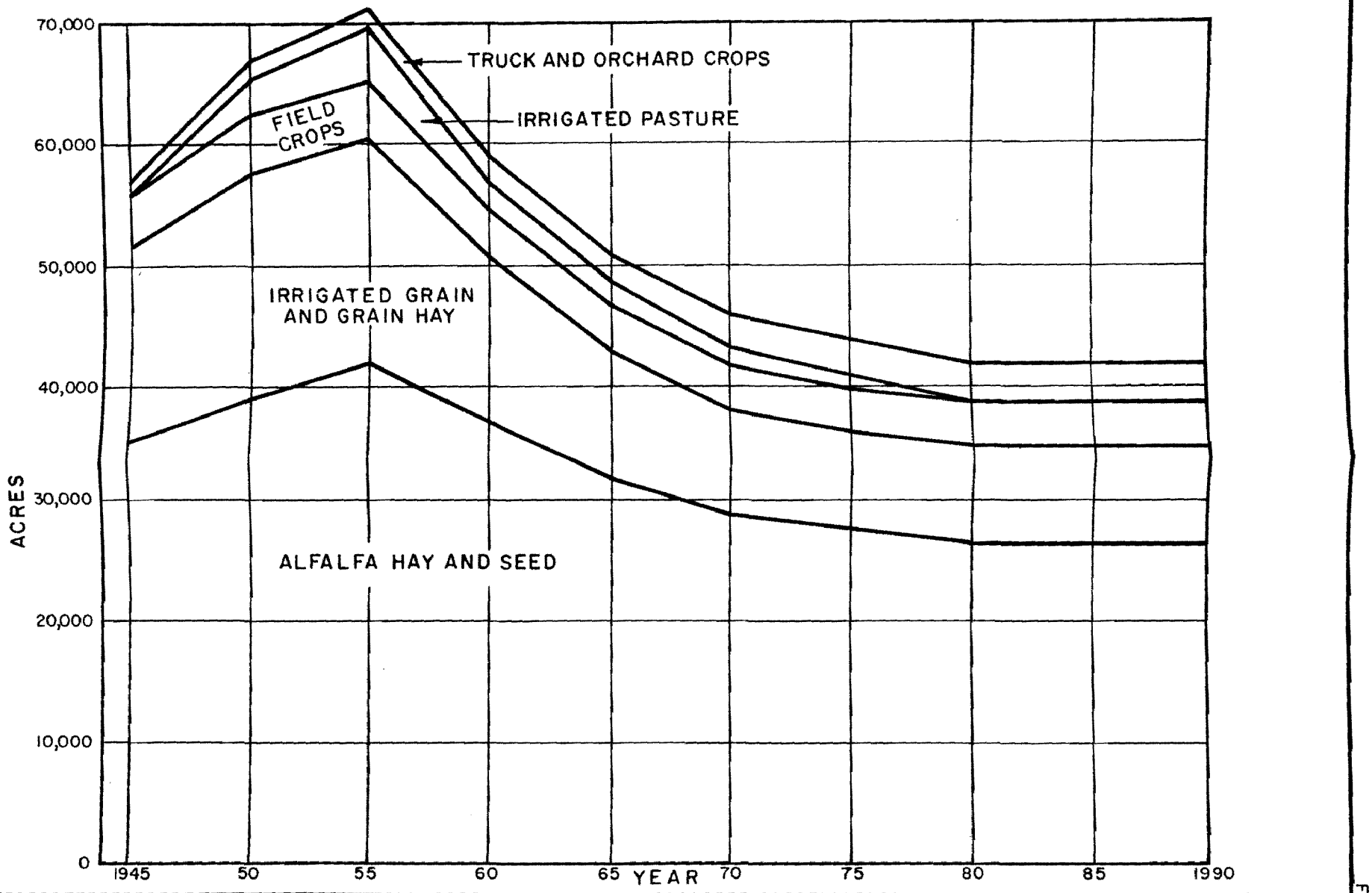
Projections of Irrigated Agricultural Acreages. In making projections of irrigated crop acreages in the water agency area, several influencing factors were given consideration, including land availability and urban encroachment, climatic conditions, crop adaptability, historical agricultural development patterns, markets for farm products, availability of local water supplies, water costs, and payment capacity for water service. Consideration of these factors led to the conclusion that irrigated farm acreages would probably decline during the next 30 years. The factors that were instrumental in making this conclusion were the conditions of water supply and the likelihood of urban encroachment on farm lands in the area. As long as overdrafting of the ground water basins persists and ground water levels continue to lower, irrigated acreage will be

forced out of production as pumping depths exceed economic limits. As water costs continue to increase because of increased pumping depths, re-location and re-development of farms displaced by urban land encroachment will be discouraged. This trend toward a decreasing irrigated acreage in the area will not be alleviated by the introduction of imported water from the State Water Facilities because the probable cost of water importation would exceed the capacity of farmers growing adaptable crops to pay for imported water service. Therefore, it was concluded that irrigated farm acreages would not receive imported water service and acreages were predicted to continue the downtrend begun in recent years. Estimates of historical and projected irrigated agricultural acreages in the Agency appear in Table 4 and Figure 2.

TABLE 4

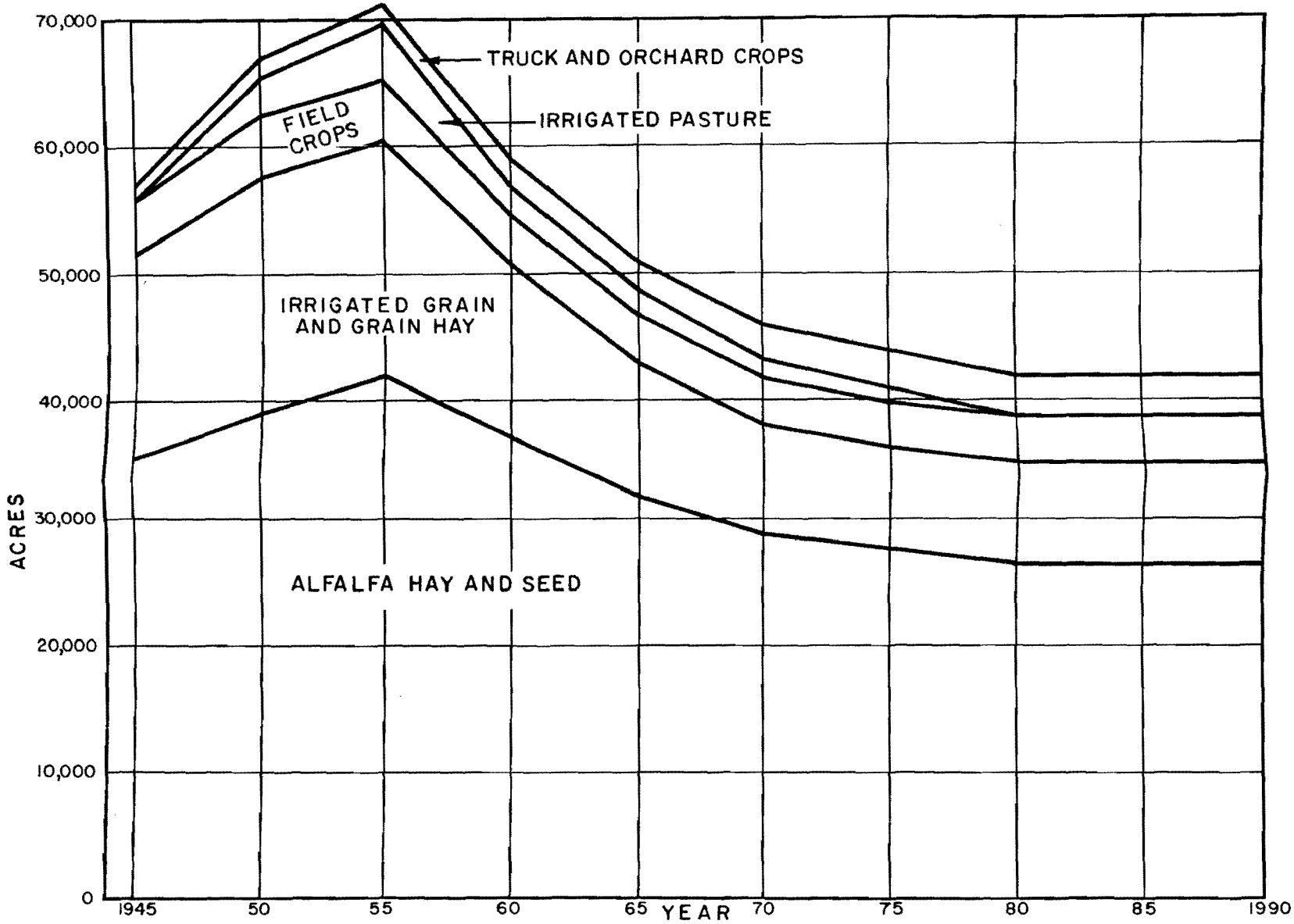
HISTORICAL AND PROJECTED ACREAGES
OF IRRIGATED CROPS
1945-1990

Year	Alfalfa	Irrigated pasture	Field crops	Grain and grain hay	Truck crops	Orchard crops	Total
				Historical			
1945	35,000	0	4,300	16,300	400	700	56,700
1950	39,000	2,900	4,900	18,700	600	1,000	67,100
1955	42,000	4,500	4,900	18,300	400	1,100	71,200
1960	37,000	2,100	3,800	14,000	1,300	800	59,000
				Projected			
1965	32,000	1,800	3,800	11,000	1,500	900	51,000
1970	29,000	1,500	3,800	9,000	1,700	1,000	46,000
1975	27,500	1,000	3,800	8,700	1,900	1,100	44,000
1980	26,500	0	3,800	8,400	2,200	1,100	42,000
1985	26,500	0	3,800	8,400	2,200	1,100	42,000
1990	26,500	0	3,800	8,400	2,200	1,100	42,000



HISTORICAL AND PROJECTED ACREAGES OF IRRIGATED CROPS IN THE ANTELOPE VALLEY- EAST KERN WATER AGENCY 1945-1990

FIGURE 2



HISTORICAL AND PROJECTED ACREAGES OF IRRIGATED CROPS IN THE ANTELOPE VALLEY- EAST KERN WATER AGENCY 1945-1990

PWS-0089-0044

Nonirrigated Agriculture

Dry farming, despite low annual rainfall, has been practiced in the region for many years, and currently accounts for a substantial proportion of the Agency's crop acreage. In 1957, there were about 45,000 acres of nonirrigated land farmed within the Antelope Valley-East Kern Water Agency, of which more than 40,000 acres were in the western end of the Los Angeles County portion of the Agency. Wheat and barley are the most important dry farmed crops.

Most of the nonirrigated farm acreage in the Agency is at such a distance from present urban communities that it is not likely to be greatly affected by the development of these communities over the next three decades. It was estimated that, from 1961 to 1990, there would be a slight increase in the dry-farmed acreage in the Agency. The only factor which may have a restrictive influence on this acreage is the possibility of continually increasing real estate taxes on land currently in production of nonirrigated crops.

Livestock Production

Livestock production in the area has substantially increased in importance in the past several years, and in terms of value is more important than crop production. Over three-quarters of the value of livestock production in the Antelope Valley-East Kern Water Agency area is accounted for by the poultry industry, which is dominated by chicken and turkey meat production.

The area appears to have more potential for future growth in livestock production than in crop production, since there are more factors favorable to its development, including the ability to pay high water costs, the ability of livestock enterprises to utilize low quality land, the nearness to a major urban market, and the general lack of restrictive regulations on livestock production activities. Most livestock production within the Agency occurs in the Los Angeles County portion of the Agency.

Turkey, chicken and egg production account for a substantial majority of the value of all livestock industries in the Agency. Since the southern portion of the Agency is conveniently situated to the metropolitan Los Angeles area and is well adapted to poultry production, it is predicted that this industry will continue to expand and continue to dominate the area's livestock production.

Unit water requirements for livestock are relatively small, and water costs are generally an insignificant portion of production costs. Therefore, water requirements were not computed for livestock production in the area nor was any economic analysis made of water demands for livestock enterprises.

Manufacturing

Historically, manufacturing within the Antelope Valley-East Kern Water Agency area has been of relatively small importance to the area's economy. Until 10 years ago, virtually all manufacturing activity was oriented toward the processing of mineral ores and agricultural produce. Although these types of firms still dominate the area's industry, there has been a modest development of other, unrelated manufacturing in the past decade. Because of this present nucleus, it is predicted that manufacturing will grow at a faster rate in the future, more or less commensurate with the area's population growth. It is predicted that, in the future, processing of locally produced raw materials will show no large increase, although some expansion in these activities can be expected. Manufacturing of products from components and materials imported into the area, on the other hand, is expected to show a much more substantial growth. Furthermore, the Kern County portion of the Agency may also attract manufacturing firms which are restricted in their operations in coastal Southern California by air pollution control regulations, since Kern County presently has no such regulations.

Most manufacturing firms within the area of the Antelope Valley-East Kern Water Agency are located near Rosamond in Kern County and Lancaster in Los Angeles County, although the total number of employees is not very large. In addition, there are major manufacturing plants at Mojave and Boron, and at the Palmdale Airport between Lancaster and Palmdale.

Rosamond is the site of six small manufacturing firms, with a total employment of less than 150 persons. The community has an abundance of available land, ample transportation facilities and, being in Kern County, has no restrictive air pollution control regulations. The present group of manufacturing firms at Rosamond should provide an attraction for further industrial development.

Lancaster is another focal point of manufacturing activity within the Antelope Valley-East Kern Water Agency, with about 300 persons employed. Approximately 225 of these are engaged in the processing of agricultural products. Manufacturing of goods for local consumption will probably develop in Lancaster to a greater degree than in any other area in the Agency.

Manufacturing activity at U. S. Air Force Plant 42, between Lancaster and Palmdale, accounts for the employment of approximately 3,300 persons, 2,000 of whom live within the Agency. Production at Plant 42 is limited to specialty fabrications and final checkout of aircraft scheduled for delivery to the armed forces. The history of Plant 42 is one of comparative instability. Employment there has fluctuated considerably, resulting in economic hardship in the area from time to time. This was particularly evident in 1958, when employment at the plant was cut nearly in half. However, the planned installation at the plant of a master flight control system by the Federal Aviation Agency may have a favorable influence upon the stability of the base, and may result in additional employment there.

In 1956, the California Portland Cement Company constructed a cement plant west of Mojave that is the largest manufacturing establishment in the Mojave area. The future of the plant appears to be secure, but its facilities are not likely to provide many new jobs in coming years because production can be readily expanded with a small increase in personnel.

The U. S. Borax and Chemical Company plant, located near Boron, is another important manufacturing establishment. Over the past decade the company has extensively modernized and expanded its production facilities, but it still ships its semiprocessed chemicals to coastal areas for further refinement. Additional water supplies in the Boron area may induce the company to do more ore processing in the water agency area.

Mining

In recent years, mining activity in the water agency area has concentrated almost exclusively upon the extraction of industrial minerals. As a consequence of this, mining in the area has become a stable industry. Borates, sand and gravel, clay, limestone, and salt are the most important mine products produced in the Agency, most of which are found in Kern County. This economic activity appears likely to have a modest but steady growth in the future as producers have ample reserves, favorable operational environment, competitive unit costs and proximity to a large consumer market.

Military Installations

Edwards Air Force Base and Air Force Plant 42 are the only remaining military establishments within the Antelope Valley-East Kern Water Agency, and Edwards Air Force Base presently constitutes the most important segment of the economy of the water agency area. Edwards Air Force Base is the primary installation in the western United States for all research and development programs

of the Air Force Research Training Command, the National Aeronautics and Space Administration, and other associated federal agencies. Most of the work at the base is devoted to research and development projects rather than manufacturing.

The base employs about 10,000 military and civilian personnel, and has an annual payroll of about $61,000,000, which has been increasing steadily since 1950. Nearly 80 percent of the payroll of the base is paid to civilian employees, who make up 70 percent of the work force.

The future of Edwards Air Force Base appears to be quite secure. Ample space is available at the base for the expansion of facilities, diversification of projects, and the undertaking of new research and development assignments. It appears that the programs of the base and the natural advantages of its location will combine to keep it in operation in the area for an indefinite period, unless presently unforeseeable changes in military policy occur.

Air Force Plant 42 is owned by the federal government and is oriented toward military purposes. However, the plant's facilities are leased to private firms who test and perform work on their own products prior to acceptance for use by the Air Force.

The Effect of the 1958 Recession

Economic stability in an area depends very largely upon diversification of the area's economic base. When an area is heavily dependent upon a single industry or income-producing activity, its stability may be endangered, because the impact on the area of reverses or cutbacks in the single activity becomes magnified. A diversified economy, on the other hand, allows other industries and activities to absorb part of the shock engendered by an economic depression in any single industry.

In 1958, the economy of the area within the Antelope Valley-East Kern Water Agency was hit by a recession which was the result, to a large degree, of the area being disproportionately dependent upon military activity for its economic strength. Just prior to 1958, military employment in the area accounted for over 60 percent of the area's basic payrolls. In 1958, military employment and expenditures were sharply curtailed, particularly at Air Force Plant 42, cutting the work force by 3,400 persons and payrolls by nearly $15,000,000. In that year, military payrolls fell below 50 percent of total basic payrolls in the Agency.

The impact of the cutback in military activity resulted in economic hardship for many persons, and some found it necessary to move out of the area in search of other employment. The housing industry was also hard hit by the recession. After several years of housing construction lagging behind demand, subdividers suddenly found themselves over-built as home sales declined substantially.

The overall effects of the 1958 recession, however, were not as severe as generally believed. Economic indicators for the Antelope Valley-East Kern Water Agency area show that rather than having had an economic reversal in 1958, there was merely a slowing down of the extremely rapid growth which the area had experienced in previous years. For example, nonmilitary employment increased in 1958 to such a degree as to more than absorb the losses in military employment, and the total number of persons employed within the Agency was greater than in 1957, although total wages paid were diminished about 10 percent. This occurred despite a nearly 50 percent cutback in personnel at Air Force Plant 42 and a 6 percent cutback at Edwards Air Force Base, the two largest employers within the Agency.

Other indicators also show that the area was not severly harmed by the recession. Nonmilitary payrolls continued to increase in 1958 as did the area's assessed valuation and retail transactions. Since 1958, all phases of the area's economy have shown a continuance of their previous growth, although the rate of this growth has somewhat diminished.

From the evidence available, it appears that the Antelope Valley-East Kern Water Agency area was able to withstand the impact of reversals in defense and military activities without becoming an economically depressed area, and it has continued upon its path of economic development despite its 1958 recession experience.

Until 1957, military employment in the area accounted for over 60 percent of all basic employment, but with the cutbacks of 1958, military employment fell below 50 percent of the total. It has remained below 50 percent since 1958, despite a pick-up in military activity in the succeeding years. This indicates that the area encompassed by the water agency is tending to become less dependent on military spending, and is tending to broaden and diversify its economic base. These tendencies are expected to continue in the future, and as the area becomes more economically diversified and stabilized, future fluctuations in military spending will have a less important impact on the area's economic position.

Present and Future Land Use

An analysis of present land use within the area of the Antelope Valley-East Kern Water Agency indicates that only 154,000 acres, or less than 20 percent of the Agency's estimated 800,000 acres of usable land, excluding military land, is currently being put to beneficial use. The land use as of 1960 is shown on Plate 4 "Present Land Use, 1960", and Table 5 indicates the approximate acreages currently devoted to various land uses in the Agency. Plate 4, it should be noted, does not depict dry-farm lands.

TABLE 5

LAND USE, 1960

Type of Land Use	Acres in Use
Developed Urban Lands[1/]	6,000
Irrigated Farm Lands	59,000
Fallow Irrigated Lands	10,000
Nonirrigated Farm Lands	45,000
Fallow Nonirrigated Lands	34,000
Subtotal, Developed Lands[1/]	154,000
Undeveloped Irrigable or Habitable Lands[1/]	646,000
Subtotal, Usable Lands	800,000
Lands Unsuitable for Development[1/]	303,000
Edwards Air Force Base	257,000
Total Land Area	1,360,000

[1/] Excludes Edwards Air Force Base

Urban Land Requirements

The future requirements for urban usage were computed from projections of population and population densities. The experience in most urban areas has been that, as population increases, urban densities also increase up to certain levels. It was assumed that this pattern would also occur in the water agency area; accordingly, projections of increased population densities were made, using 1957 data as a base for estimated 1960 population densities. Table 6 indicates urban, commercial and industrial land use, except for Edwards Air Force Base, as projected to be in the Antelope Valley-East Kern Water Agency.

TABLE 6

URBAN LAND REQUIREMENTS
1960-1990

Year	Los Angeles County Area			Kern County Area			Total land requirement
	Population	Density, persons/ acre	Land Requirement acres	Population 1/	Density, persons/ acre	Land Requirement acres	
1960	46,900	9.2	5,100	10,400	8.5	1,200	6,300
1970	92,000	9.4	9,800	15,500	8.6	1,800	11,600
1980	232,000	9.6	24,200	40,000	8.7	4,600	28,800
1990	401,000	9.8	40,900	76,000	8.8	8,600	49,500

1/ Excludes residents of Edwards Air Force Base

Agricultural Land Requirements

Land requirements for agricultural purposes within the Antelope Valley-East Kern Water Agency area are made up of actual crop land requirements for both irrigated and nonirrigated farming, fallow land requirements, and an allowance for farm lanes, borders, fences, windbreaks and other necessary but nonproductive farm land. The acreage in irrigated farms was projected to 1990 by making use of historical trends, crop payment capacity data, estimates of urban encroachment on farm lands, and other physical and economic criteria. Acreage in nonirrigated farming was projected to exhibit a small increase during the next thirty years, and fallow land requirements were determined from consideration of the various kinds of farming practiced in the area. The various farm land requirements were then added together to find a total farm land acreage, which was increased by approximately five percent to provide for lands given up to necessary but non-productive farm acreage.

The sum of fallow land requirements, projected crop acres, and farm lane, fence and border area allowances represents the total land requirement

for agriculture in the Agency. This land requirement, projected through 1990, is shown in Table 7.

TABLE 7

FARM LAND REQUIREMENTS
1960-1990

Type of Land Requirement	Acres			
	1960	1970	1980	1990
Irrigated farm land	59,000	46,000	42,000	42,000
Nonirrigated farm land	45,000	50,000	50,000	50,000
Fallow land	37,000	39,000	38,000	38,000
Subtotal	141,000	135,000	130,000	130,000
Farm lanes, fences, borders, etc.	7,000	7,000	6,000	6,000
Total	148,000	142,000	136,000	136,000

Total Land Use

Total land use as of 1960 and as projected through 1990 was determined from the above computations of urban and agricultural land requirements. This is summarized in Table 8 below. It will be noted from the table that even with a nearly eight-fold increase in population between 1960 and 1990, the percentage of developable land actually put into use will increase only slightly, from 19 to 23 percent. Thus, it appears that land availability will have no restrictive effect upon economic development and population growth in the Antelope Valley-East Kern Water Agency within the next three decades.

TABLE 8

PRESENT AND PROJECTED LAND USE
1960-1990

Type of Land Use	Acres			
	1960	1970	1980	1990
Urban land	6,000	12,000	29,000	50,000
Agricultural land	148,000	142,000	136,000	136,000
Subtotal	154,000	154,000	165,000	186,000
Unused developable land	646,000	646,000	635,000	614,000
Total irrigable[1/] or habitable land	800,000	800,000	800,000	800,000
Percentage of potential development	19%	19%	21%	23%

1/ Excludes Edwards Air Force Base

CHAPTER III. DEMAND FOR PROJECT WATER

The pattern of water use within the Antelope Valley-East Kern Water Agency has changed considerably during the past twenty years. The use of agricultural water, while fluctuating from year to year, has shown very little net change in the past two decades, but urban use has expanded substantially during this time. Increased urban water use has resulted not only from the rapidly growing population of the area, but also from the development of industry and increased military activity.

Water use over the next 30 years is predicted to exhibit even more substantial changes than in the last 20 years. The demand for agricultural water will diminish as irrigated lands are encroached upon by urban developments and thus go out of production. During this time, however, increased water use by urban users and increased industrial water use will result in an urban water demand great enough to more than make up for decreases in agricultural use. By 1990, urban water use is expected to comprise over one-half of all water use, whereas today it comprises only about ten percent.

Present and Future Unit Water Use

Unit Values of Urban Water Use

Unit values of urban water use were estimated for the Antelope Valley-East Kern Water Agency area based upon studies made by the department for its Bulletin No. 78, "Investigation of Alternative Aqueduct Systems to Serve Southern California". The values appearing in Bulletin No. 78 were modified for the present study, however, to reflect the exclusion of areas other than that of the Agency and to adjust for changes in water use values in the area since the publication of Bulletin No. 78.

The estimated present and future urban water use in the Agency is shown in Table 9.

TABLE 9

ESTIMATED ANNUAL UNIT VALUES OF URBAN WATER USE

Year	Gallons per capita per day	Acre-feet per capita per year
1960	200	0.224
1970	220	.246
1980	235	.263
1990	245	.274

Unit Values of Agricultural Water Use

For many years the department and its predecessor agencies have studied unit values of water use for irrigated agriculture in different areas of the State, including the area in which the Agency is located. Values of use for this area have been printed in several reports published by the department and its forerunners. The unit values for irrigation water used in this study have been taken from the department's Bulletin No. 78, Appendix D. These unit values for irrigated crops are shown in Table 10 below.

TABLE 10

ESTIMATED ANNUAL UNIT VALUES OF AGRICULTURAL WATER USE, IN FEET OF DEPTH

Crop	Applied water	Consumptive use of applied water
Alfalfa	6.0	3.0
Irrigated pasture	5.6	2.8
Deciduous fruits and nuts	4.4	2.2
Truck crops	2.8	1.4
Field crops	4.0	2.0
Grain and grain hay	1.6	0.8

Present and Future Water Utilization

Municipal and Industrial Use

The present and future use of water for municipal and industrial purposes was determined by applying the appropriate estimates of per capita water use to the projections of population for each decade. Table 11 indicates the total municipal and industrial water requirements for the water agency area.

TABLE 11

PRESENT AND PROJECTED TOTAL URBAN WATER REQUIREMENTS
1960-1990

Year	Population	Unit values of urban water use in acre-feet per capita per year	Total urban water requirements in acre-feet per year
1960	65,000	0.224	14,500
1970	120,000	.246	29,500
1980	285,000	.263	75,000
1990	490,000	.274	134,000

Irrigated Agricultural Use

Present and future use of water for irrigation was determined by applying the appropriate units of water use to previously made projections of the acreages of various crops and crop types in the area. Based on these factors of crop acreage and water requirements per acre, the present and future use of water by irrigated agriculture in the Agency was determined, as shown in Table 12.

TABLE 12

PRESENT AND PROJECTED AGRICULTURAL WATER REQUIREMENTS
1960-1990

Year	Applied water, acre-feet	Consumptive use of applied water, acre-feet
1960	279,000	139,000
1970	221,000	111,000
1980	199,000	99,000
1990	199,000	99,000

Water Supply

The area encompassed by the boundaries of the Antelope Valley-East Kern Water Agency contains a major portion of the Antelope Valley Hydrologic Unit and the Fremont Valley Hydrologic Unit in the southwestern part of the Mojave Desert. Within the Agency's area, the major features of the land surface of these hydrologic units are the Antelope Valley Basin in the south and the Fremont Valley Basin in the north, as is indicated on Plate 5,"Ground Water Basins". The San Gabriel Mountains and the Sierra Pelona Range border the Antelope Valley Basin on the south, while the Tehachapi Mountains and the southernmost Sierra Nevadas form a portion of the western and northern boundaries of both the Antelope Valley and Fremont Valley Basins. The basins are bounded on the east by a low discontinuous chain of buttes just east of the Los Angeles-San Bernardino County line.

The water supply for these basins is wholly dependent on precipitation and runoff. The average annual precipitation for the area varies from approximately 8 inches per year on the valley floor (at elevation 2,300 feet) to over 35 inches per year on the peaks of the San Gabriel Mountains (at elevation 9,000 feet). About 75 percent of annual precipitation falls between December and March, with frequent snows in the mountains during this time.

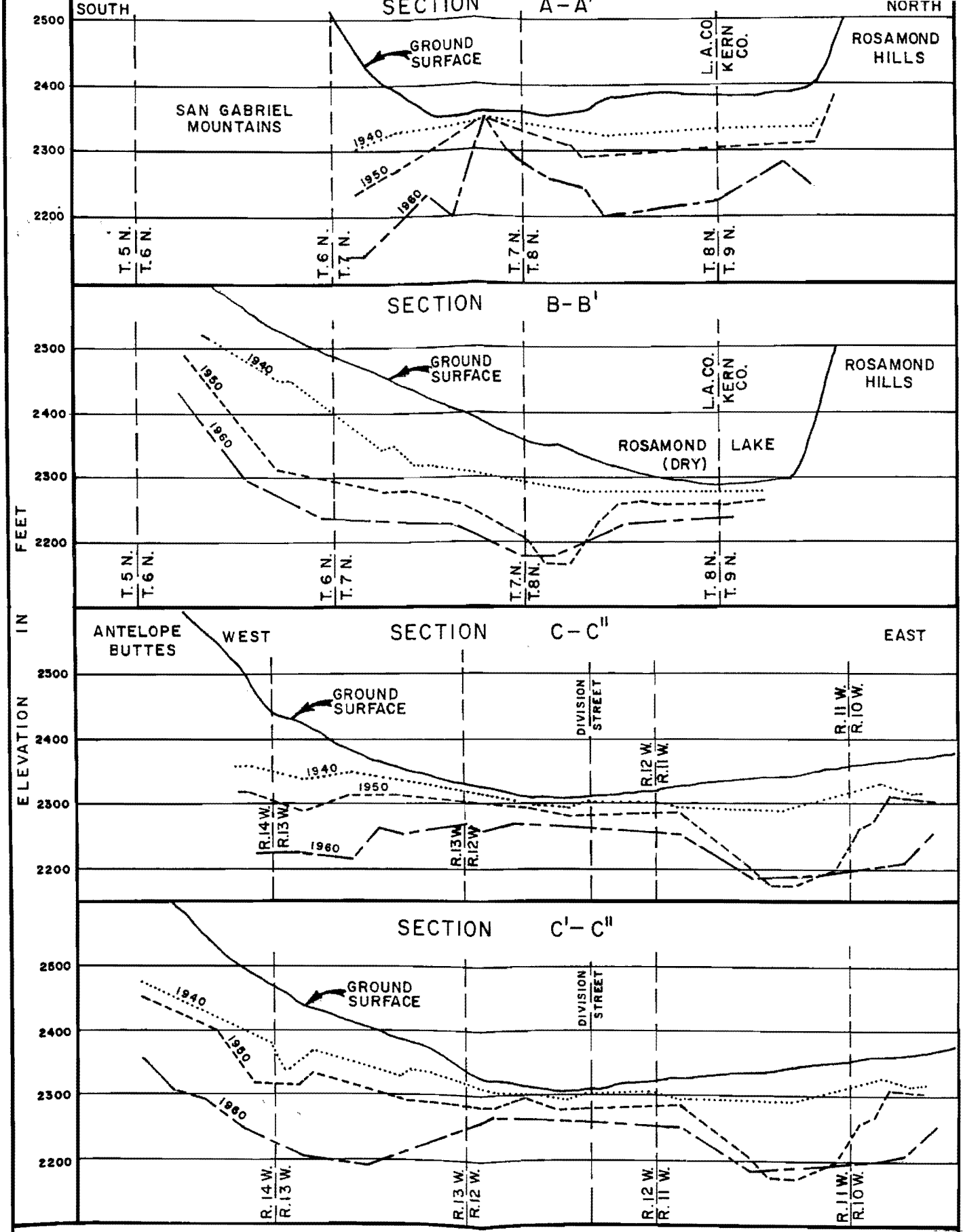
Antelope Valley Hydrologic Unit

The Antelope Valley Basin of the Antelope Valley Hydrologic Unit has an area of about 600 square miles and lies south of Fremont Valley and the Tehachapi Mountains and north of the San Gabriel Mountains. The basin is located between the Garlock and San Andreas faults, two of the major geological features of Southern California. Surface elevation of the basin varies from 2,300 feet to 3,500 feet.

Surface water for the replenishment of this basin is supplied by runoff from the mountains which surround the Antelope Valley. Over one-third of the runoff is delivered by Big Rock and Little Rock Creeks from the San Gabriel Mountains, southeast of Palmdale. The remainder is supplied by other intermittent streams. Current estimates of the mean seasonal runoff reaching the valley floor, based on stream-flow measurements, is 66,000 acre-feet, of which 12,000 acre-feet comes from Big Rock Creek and 14,000 acre-feet from Little Rock Creek.

Flows from mountain streams percolate into the alluvium of the valley as these streams emerge from their canyons. Only after major storms do the streams flow any distance toward the lower portion of the valley. Most of the rainfall on the valley floor itself is immediately lost either through transpiration or evaporation.

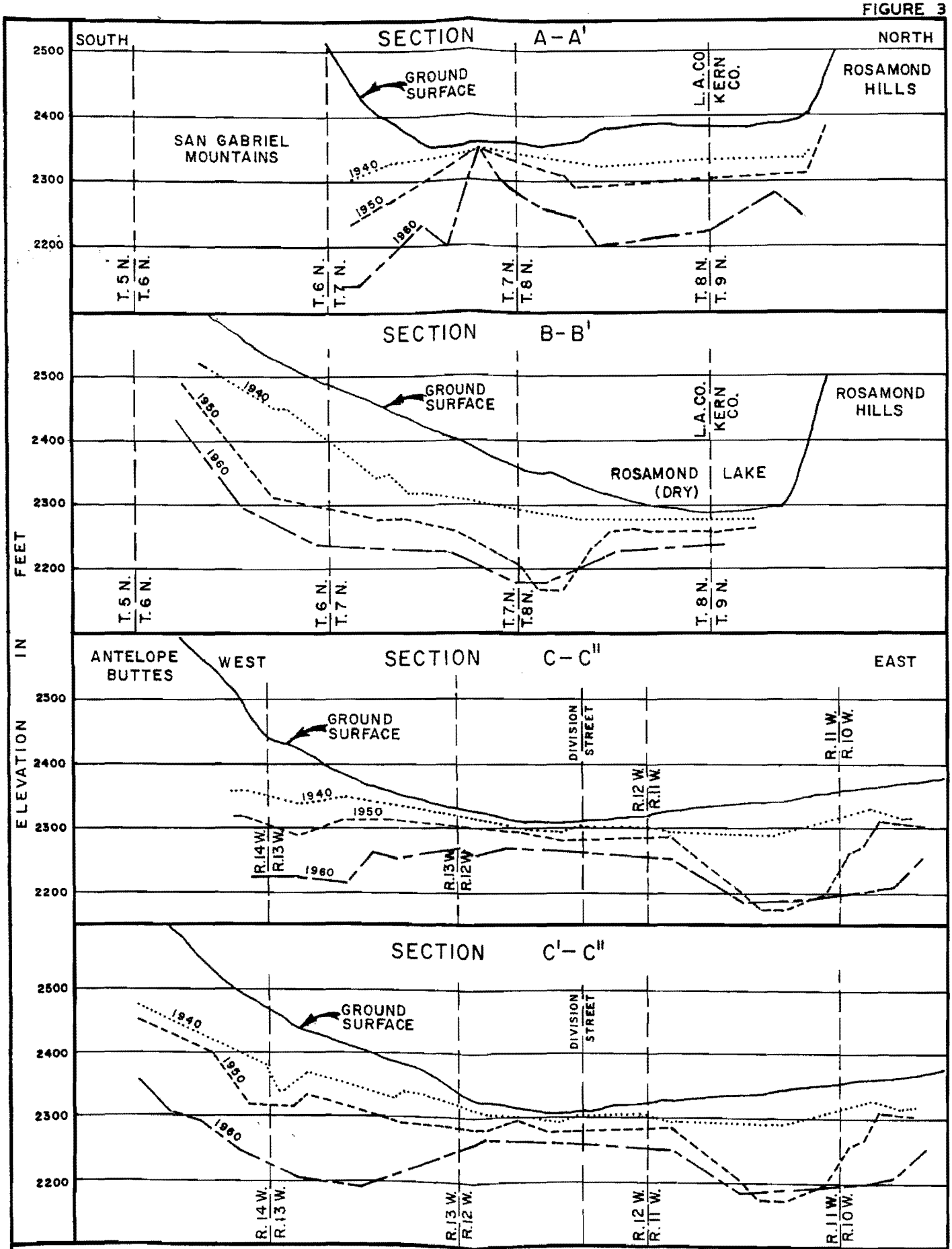
Periodic measurements of monitored wells indicate that there has been a constant decrease in ground water levels throughout the Antelope Basin over the past 30 years. This is shown graphically on Figure 3, "Antelope Valley Basin, Ground Water Profiles, 1940, 1950, and 1960". Ground water profile sections are delineated in Plate 5, "Ground Water Basins". Most of the decrease is attributable to the development of agriculture in the valley, although the



ANTELOPE VALLEY BASIN
GROUND WATER PROFILES, 1940, 1950, AND 1960

NOTE: SECTIONS DELINEATED ON PLATE 5

FIGURE 3



ANTELOPE VALLEY BASIN

PWS-0089-0062

GROUND WATER PROFILES, 1940, 1950, AND 1960

considerable residential development which has occurred in the Lancaster and Palmdale areas in the last decade has also contributed to lowered ground water levels.

The principal water-bearing formation in the Antelope Valley Basin is the alluvial fill that underlies most of Antelope Valley. These alluvial deposits are porous and permeable, and yield large amounts of water. Results of a study made by the department in 1947 show that the specific yield of the alluvium in the basin varies between 4 and 10, with an average of 6. It is estimated that there are 2,000,000 acre-feet of ground water storage capacity per 100 feet of sediment, or an estimated 10,000,000 acre-feet in the entire basin to a depth of 500 feet.

The principal water-bearing zone in the basin extends to depths of 600 feet and, easterly from about the location of Section A-A', as shown in Plate 5, is separated from a deeper zone by a south dipping clay bed which is several hundred feet in thickness. The deep zone is apparently recharged from the west directly by percolation of runoff from the mountains bordering the basin.

Fremont Valley Hydrologic Unit

The Fremont Valley Basin, in the Fremont Valley Hydrologic Unit, consists of an area of about 320 square miles, extending northeast from a drainage divide located about 5 miles northeast of Mojave to the edge of the alluvial fill located about 20 miles northeast of Koehn Dry Lake. The basin is bounded on the west by the Sierra Nevada Range, on the east by numerous buttes and the Rand Mountains, and on the north by the El Paso Mountains. Surface elevation of the valley floor varies from 2,900 feet to 3,000 feet.

Runoff to the Fremont Valley Basin is meager. It is derived from the mountains surrounding the valley, but occurs only after the infrequent periods of heavy precipitation. There are no perennial streams in the valley and much

of the runoff reaching the valley from flood flows evaporates before percolating into the alluvium. There is some subsurface inflow to the Fremont Valley Basin from the Antelope Valley Basin, through the ground water slot which parallels the trace of the Muroc fault, but quantitative estimates of this recharge have not been made. Within the basin, ground water moves in a northeasterly direction, discharging to Koehn Dry Lake, where it is consumed by evaporation or transpiration by salt grasses.

Ground water occurs in the extensive alluvial deposits which extend to depths of over 1,200 feet in the center of the basin. The department has estimated that the capacity of the alluvial deposits to store ground water between depths of 20 and 220 feet below land surface is about 4,800,000 acre-feet.

Agricultural developments in the area have caused the water levels to drop, due to overdrafting, as much as 50 feet in some areas over the past 40 years. This is shown in Figure 4, "Fremont Valley Basin Ground Water Profiles, 1953 and 1960". Ground water profile sections are delineated in Plate 5, "Ground Water Basins". At the present time, it is estimated that the total consumptive use in the area is about 25,000 acre-feet annually, resulting in a continuous overdraft on the basin. In the past few years, agricultural development has tended to increase, but adjustments in cropping patterns have somewhat lessened this increase in terms of water use.

Ground water quality in the Fremont Valley Basin is generally satisfactory for most uses, but high boron concentrations, from one to four parts per million, are found along the east side of the basin, probably as a result of the influence of ground water movement from the Boron area. In the immediate vicinity of Koehn Dry Lake, waters contain a very high concentration of dissolved solids, the highest of which, about 28,000 parts per million, occurs in shallow wells near the lake.

Local Water Supplies and Ground Water Overdraft

Water utilized in the Antelope and Fremont Valleys is derived largely from ground water basins. The Antelope Valley-East Kern Water Agency area, which overlies the major portion of both basins, relies exclusively on ground water extractions for its needs. However, safe yields of local water supplies for the Agency's area have never been determined and cannot be determined accurately without an extensive investigation of the water resources of the entire basin. Furthermore, the apportionment of safe yield between various areas or entities cannot be made without an adjudication of water rights. The calculations of supplemental water requirements for the Antelope-Mojave Service Area, reported in Bulletin No. 78, were based upon an estimated annual local water supply of 70,000 acre-feet for the Los Angeles and Kern Counties portion of that service area. As this area is larger than that of the Antelope Valley-East Kern Water Agency, the estimated local water supply must be reduced in estimating the local waters available to the Agency's area. For purposes of this report it has been assumed that the safe yield of the region's ground water basins applicable to the Agency's area is about 60,000 acre-feet.

The area encompassed by the Antelope Valley-East Kern Water Agency is the largest water user in both of the two ground water basins; consequently, it is the major contributor to the overdraft condition which exists in both basins. Total extractions for 1960 in the Antelope Valley-East Kern Water Agency are estimated to be 307,000 acre-feet. Consumptive use may be roughly estimated at about 50 percent of extractions, or about 153,500 acre-feet.

The continuous overdraft on the Antelope Valley and Fremont Valley ground water basins has caused the water tables to drop as much as 120 feet during the past twenty years in the Antelope Valley Basin and about 50 feet in portions of the Fremont Valley Basin.

Water Reclamation and Ground Water Recharge

Effluent waters from urban sewer systems have the potential of supplying good quality water, through reclamation, for reuse by irrigated agriculture and for other purposes. Therefore, as water importations by the Antelope Valley-East Kern Water Agency take place in the future to supply ever-increasing urban demands, considerations of water reclamation will become increasingly significant to the economy of the area. It has been estimated by the County Engineer's office of Los Angeles County that at least 30 percent of all water used for urban purposes within the Antelope Valley-East Kern Water Agency area could be reclaimed for application to agricultural lands. The method of providing such waters for irrigation use is contemplated to be by transportation of reclaimed sewage from the Lancaster area through a pipeline directly to the point of use about 10 miles either to the west or to the east of Lancaster, where the greatest concentrations of irrigated farming are found.

Consideration was given to recharging the ground water basin with reclaimed sewage from the Lancaster area as an alternative to piping reclaimed waters to the point of use. However, this alternative would require transporting reclaimed sewage some 30 miles to a suitable recharge site near Pearblossom. This plan would not only require the same kind of pipeline facilities as direct delivery, but would also require pumping the reclaimed water from an elevation of 2,500 feet to about 3,100 feet. On the other hand, direct delivery of reclaimed water would require very little pumping and would require a pipeline to the point of use of only about 10 miles. Thus, recharging the ground water basin with reclaimed sewage appears to be less economical than direct surface transportation to the point of use.

The use of sewage effluent for the irrigation of farm land is governed and regulated by the California Administrative Code, Sections 7897 through 7901.

The Code prohibits the use of raw sewage for use on irrigated land, and limits the use of settled but undisinfected sewage effluent to certain field and forage crops. Those crops which may be irrigated with such effluent include nursery stock, cotton, hay, grain, rice, alfalfa, sugar beets, field corn, and vegetables for seed. Dairy cattle are prohibited from pasturing on land still moist from irrigation with sewage effluent or from having access to irrigation or drainage ditches carrying such effluent. The final provision of the Administrative Code on this subject prohibits cross connection of sewage effluent pipelines with domestic water service lines. In addition to the Administrative Code requirements, sewage reclamation programs are also subject to the approval of the State Department of Public Health.

It appears that within the Antelope Valley-East Kern Water Agency area there is the potential of making available for irrigated agriculture as much as 30% of the area's total annual urban water use, in the form of reclaimed sewage. With a projected urban water use of 134,000 acre-feet by 1990, about 40,000 acre-feet could be reclaimed for this purpose. Inasmuch as local sanitation districts have to fully treat sewage waters for disposal purposes, the only additional cost that would be incurred in order to use the effluent for irrigation would be the cost of transportation to the point of use, a maximum distance of about 10 miles.

Demand for Project Water

Local water supplies within the Antelope Valley-East Kern Water Agency area are more than fully developed at the present time. There are no surface streams within the boundaries of the Agency that can be developed, and the ground water resources of the area are already overdrawn. Therefore, future water supply development in the area is limited to water importation and water

reclamation. At the present time, the importation of water is proposed to be accomplished from the State Water Facilities.

Based on the studies made for this report, it has been concluded that the demand for water from the State Water Facilities in the area of the Antelope Valley-East Kern Water Agency would depend entirely on urban water demands. This is because the importation of water for use by irrigated agriculture appears to be economically infeasible. Payment capacities for water for the production of those crops that comprise the vast majority of the area's irrigated agriculture are below $20 per acre-foot, whereas water costs from the State Water Facilities, as developed in Chapter IV, are considerably higher. Therefore, it appears that irrigated agriculture could not benefit directly from water importations by the Agency from the State Water Facilities, nor can irrigated farming development estimates be based directly on proposed water importation. It is possible, however, that urban sewage water reclamation may be practiced so as to allow for some re-use of imported water by irrigators. It is estimated that a maximum of 40,000 acre-feet of such water could be developed annually.

Because urban water needs only will be supplied to the area from the State Water Facilities, consideration of agricultural water requirements or local safe yields were not of overriding importance, and the validity of the department's assumptions regarding safe yield and irrigation water requirements were not critical in arriving at the future demand for imported water from the State Water Facilities. Nevertheless, the data developed in this report was assembled so as to show the relationships that are predicted to exist in the future between total water demands and local water supplies.

Supplemental Water Requirements

Having developed estimates of total water requirements through 1990 and estimates of safe yield and yield from water reclamation projects, it was possible to determine the approximate supplemental water requirements for the area of the Antelope Valley-East Kern Water Agency. These requirements indicate that even with reclamation of urban sewage waters, a large amount of overdraft on the ground water basins of the area will exist during the next 30 years unless a source of imported water is obtained by the Agency. After 1980, the rapid growth of urban water demands will not be offset to any significant degree by reduction in agricultural water demands, resulting in a sharply increased supplemental water requirement in 1990. Table 13, below, indicates the total and supplemental water requirements in the Agency to 1990.

TABLE 13

TOTAL AND SUPPLEMENTAL WATER REQUIREMENTS

Year	Water Requirements			Local Water Supplies			Supplemental Water Requirement 3/
	Urban	Agric.	Total	Safe yield 1/	Reclaimed water 2/	Total	
1960	14,500	139,000	153,500	60,000	0	60,000	93,500
1970	29,500	111,000	140,500	60,000	9,000	69,000	71,500
1971	34,000	110,000	144,000	60,000	10,000	70,000	74,000
1980	75,000	99,000	174,000	60,000	23,000	83,000	91,000
1990	134,000	99,000	233,000	60,000	40,000	100,000	133,000

1/ Estimated
2/ 30% of total urban water use
3/ To be made up by overdraft and/or water importations

Build-up of Demand for Project Water

Total water requirements in the Agency were computed from estimates of population and per capita water use and from projected irrigated crop acreages and unit values of agricultural water use for each decade of the study. These total requirements were then compared with local water supplies available, in the form of safe yield of ground water and reclamation of urban sewage waters, in order to determine the supplemental water requirements of the area and demand for project water. These supplemental water requirements were discussed in the previous section.

In its request for a water service contract, the Agency stated that it would prefer to take 90 percent of the area's total urban water requirements from the State Water Facilities. This demand was based on criteria suggested by the chief engineer of the water agency and by the work of the Department of County Engineer, County of Los Angeles, for its "Report on Contract Negotiations with the State and Other Wholesale Water Agencies on Supplemental Water as It Affects Los Angeles County Waterworks Districts", dated October 19, 1960. The chief engineer of the Antelope Valley-East Kern Water Agency has stated that the Agency would probably take at least 90 percent of its area's future urban water requirements directly from the State Water Facilities aqueduct, because of the high cost of constructing and maintaining water wells, their short life, and the high cost of treating ground water to remove sediments. For example, data from the office of County Engineer of Los Angeles County indicates that the cost of water production in the recent past for urban use in the community of Lancaster has been about $50 per acre-foot. This cost includes amortized capital costs, pumping, storage, treatment, regulation, power, repairs and operation and maintenance costs. In bench areas not directly overlying ground water basins, the cost of water production has been about $65 per acre-foot.

These costs do not reflect present or contemplated future water development costs, which are due to be higher not only because of inflationary trends but also because of increased well depths and higher standards and requirements for water well construction. Under this assumption, only ten percent of the area's urban water requirements would be pumped from the local ground water basins.

Demand for project water, although taking into consideration the preference of the water agency with respect to the extent of water deliveries, was primarily based on 2 criteria - that imported water deliveries would be solely for urban usage and that such deliveries would eventually completely displace ground water overdraft as a source of supplemental water. An additional factor to consider was the existence of water production facilities now in the area. It is unlikely that communities within the Agency would be willing to abandon the considerable investment in their existing production facilities except those with comparatively high production costs. Instead, it is probable that water wells would be retired and not replaced at the end of their useful lives, and the water demands formerly satisfied by these wells would henceforth be met by importations from the State Water Facilities. Under conditions of water importation, many of the presently existing urban water wells in the area would be maintained to provide for peaking requirements of water demand, as an alternative to providing increased aqueduct capacity or terminal storage facilities in order to accomplish this end.

The build-up of demand for project water postulated for the Antelope Valley-East Kern Water Agency area considered all the factors mentioned above, including the water agency's preferences, local water production facilities, overdraft conditions, and urban water demands. It was postulated that by 1990 the area's urban water demands would be supplied to the extent of 90 percent from the State Water Facilities, although the percentage would be somewhat less

in earlier years. The effect of the demand build-up selected for the area is to gradually reduce overdraft of the ground water basins in the area so that by 1990 overdraft would be only 13,000 acre-feet. Table 14 below presents the projected build-up in demand for water from the State Water Facilities in the area through 1990.

TABLE 14

DEMAND FOR IMPORTED WATER, 1960-1990

Year	Total Water Demand[1]	Local Water Supplies[1]	Supplemental Water Requirements		
			Total[1]	Overdraft	Imported water deliveries
1960	153,500	60,000	93,500	93,500	0
1971	144,000	70,000	74,000	54,000	20,000
1980	174,000	83,000	91,000	26,000	65,000
1990	233,000	100,000	133,000	13,000	120,000

[1] Source: Table 13

Location of Lands To Be Served

As stated above, it was assumed that only urban areas will be served with water from the State Water Facilities. Those urban areas presently in existence have an advantage over other areas in regard to attracting future population, and they will be the ones most likely to receive imported water in the future. It is expected that the communities of Lancaster and Quartz Hill will receive the largest quantities of water, as they are predicted to have the largest urban populations in the future. Mojave, Rosamond and Boron, all in Kern County, would also receive water from the State Water Facilities.

CHAPTER IV. COST OF WATER SERVICE FROM THE STATE WATER FACILITIES

The cost of water service from the State Water Facilities to the Antelope Valley-East Kern Water Agency is dependent upon the Agency's allocated portion of construction, operation and maintenance costs of the California Aqueduct, the cost accruing from the Delta Water Charge, and the cost of local conveyance systems. Local conveyance systems will be constructed and paid for by the Agency itself. Construction of the State Water Facilities, on the other hand, will be done by the State and will be financed with monies from the California Water Fund and from the sale by the State of general obligation bonds authorized under the Water Resources Development Bond Act of 1960.

Under the standard contract for water service from the State Water Facilities, each contracting agency undertakes an obligation to repay the State for its share of costs associated with water deliveries from the State Water Facilities. These costs include a share of the costs incurred for the construction of transportation facilities, a proportionate share of the operation and maintenance cost of these facilities, and the Delta Water Charge. The allocation of costs to the agency is made on the proportionate use of facilities concept, based on the relative size of maximum entitlement and peaking capacity of the agency and the distance from the Delta to the reach of aqueduct wherein the agency's turnout structures are located. As regulation of the water deliveries is provided to enable the delivery of 11% of annual deliveries during peak months of demand, the aqueduct design and cost estimates include sufficient aqueduct capacity between the agency turnouts and Cedar Springs Reservoir, and a portion of the reservoir itself, allocated to the agency.

State Water Facilities

The cost of the State Water Facilities to the Antelope Valley-East Kern Water Agency can only be tentatively estimated at the present time, since neither aqueduct capacities, nor the maximum annual entitlement for the agency, nor the design of aqueduct facilities are as yet firmly established. However, based on information now known and on assumed levels of participation in the aqueduct facilities by all probable contractors, cost allocations were made for the Agency for a maximum entitlement of 120,000 acre-feet.

Construction Features of State Water Facilities

The Antelope Valley-East Kern Water Agency is ideally situated with respect to the California Aqueduct, as the aqueduct parallels the entire length of the southern boundary of the Agency. Furthermore, the elevation of the aqueduct below Cottonwood Power Development is higher than all but a small portion of the Antelope Valley, and the reach of the aqueduct above Cottonwood Power Development is at a higher elevation than most of the Fremont Valley. These conditions allow water distribution by gravity or with a minimum of pumping.

The major State facilities to be built within and along the boundaries of the Antelope Valley-East Kern Water Agency include the Cottonwood Power Development, the Fairmont Pumping Plant, the Pearblossom Pumping Plant, and 77 miles of canal and siphon.

The Cottonwood Power Development is located near the south portal of the Tehachapi Tunnels, which cut through the mountains from Pastoria Creek in the San Joaquin Valley into the Antelope Valley. The power plant at the development will operate under an effective head of about 136 feet, producing power that will reduce the direct cost of pumping project water to the Agency's area. Fairmont Pumping Plant is part of the West Branch Aqueduct that will deliver

water into Castaic Reservoir for use in coastal Los Angeles and Ventura Counties. Pearblossom Pumping Plant will be located about two miles south of the community of Pearblossom. The pumps there will provide a lift of about 540 feet to an elevation that will allow the water to flow by gravity into Cedar Springs Reservoir in the San Bernardino Mountains. The California Aqueduct will mostly be canal in the Antelope Valley, with pipe sections crossing difficult areas. The hydraulic grade line of the aqueduct will be at an average elevation of about 2,950 feet.

Cost of Facilities

The total allocated construction costs of the State Water Facilities to the Agency are estimated to be about $32,600,000 for a maximum annual entitlement of 120,000 acre-feet. This would require a maximum annual repayment of principal and interest costs by the Agency of $1,520,000. The annual capital repayment would be less than the above figure in years prior to 1990 and after 2010. Operation and maintenance costs would be assessed to the Agency in two ways. A minimum charge would be assessed for operation and maintenance of the facilities represented by an annual charge regardless of water deliveries to the Agency, and a variable charge would be levied depending on water actually received by the Agency. The maximum amount of these charges would be about $1,140,000 and $1,510,000 per year, respectively, in 1990. The final component of the Agency's annual cost to the State for water deliveries from the State Water Facilities would be the Delta Water Charge, based on the schedule of estimated annual water deliveries in the Agency's water service contract. As of the time of this study, the Delta Water Rate was estimated to range from $4.68 per acre-foot in the early years of water service and increase to an estimated $6.30 per acre-foot as a maximum in 1982. This would result in a maximum annual charge to the Agency of nearly $760,000.

Table 15 indicates the estimated annual component costs of water service from the State Water Facilities to the Antelope Valley-East Kern Water Agency for specific years during the period of build-up in water demand to 1990, the year of maximum demand.

TABLE 15

ANNUAL COMPONENT COSTS OF WATER SERVICE
FROM THE STATE WATER FACILITIES

Year	Estimated annual water delivery in acre-feet	Annual capital payment	Minimum[1] annual operation and maintenance	Annual[2] variable operation and maintenance	Annual delta water charge	Total annual payment to State
1963	----	$ 49,500	$ 500	$ ----	$ ----	$ 50,000
1971	20,000	1,010,000	466,000	251,000	94,000	1,821,000
1980	65,000	1,350,000	922,000	816,000	304,000	3,392,000
1990	120,000	1,520,000	1,139,000	1,506,000	756,000	4,921,000

1/ Minimum operation and maintenance charges are those necessary to maintain the system even though there are no water deliveries to the Agency.

2/ Variable operation and maintenance charges are those associated with moving water to the contracting agency.

Local Conveyance Facilities

In order to distribute imported water, the Antelope Valley-East Kern Water Agency will be required to build an extensive feeder system throughout the water agency's territory. This is true even though it is contemplated that water importation will be for urban purposes only, because the communities which will ultimately use imported water are rather widely dispersed throughout the area. It is expected that each urban area will provide its own local system to provide consumers with water service, and these local systems will connect through the Agency's feeder line to the California Aqueduct.

Since the Agency encompasses such a broad area and since main feeder lines must be constructed to such widely separated communities as Mojave, Boron, and Lancaster, an extensive engineering study will be required to determine the most economical design of such a system. While this study has not been completed, the Agency has made preliminary studies of possible distribution systems and the system described in the following paragraphs is one that appears to be economical and feasible.

Construction Features of Local Conveyance Facilities

The main features of the local conveyance facilities, as shown on Plate 3, are eleven main north-south trunk lines fed directly from the East Branch of the California Aqueduct at intervals of about five miles. These lines are then connected by laterals at intervals of about three miles. Also, there is a line through the Leona Valley that takes off from the West Branch Aqueduct in the vicinity of Lake Hughes.

The best distribution system for this area is one that can be economically and systematically expanded as the water demands for presently undeveloped areas increase. The system delineated on Plate 3 shows the staging only for the time of initial delivery and for the years 1980 and 1990.

Sections of pipeline and other facilities would be added to the system as needed throughout the years. The local distribution facilities as developed on Plate 3 would provide the network for a primary distribution system capable of conveying water to any part of the agency by 1990. The initial stage would serve the largest population centers of Lancaster, Rosamond, Quartz Hill, Mojave, and Pearblossom; and should be completed to coincide with the first delivery of water through the California Aqueduct.

Cost of Facilities

An estimate of construction costs for the local conveyance system, previously described and shown on Plate 3, has been prepared by the Antelope Valley-East Kern Water Agency. This cost estimate was utilized in this report, as submitted by the Agency, for the financial analysis of the Agency.

The costs, as shown below, do not reflect the costs associated with turnout structures and local storage facilities. The number and location of turnouts and the amount of terminal storage for regulation and emergency use are subject to changes with changes in design criteria. While the tabulated costs are high, the system is elaborate and provides large areas of land with a water supply. If the lands are not sufficiently developed by 1990 to utilize the system depicted, the costs would be reduced accordingly.

The local conveyance system has been staged, with construction planned to meet expected dispersal of urban development. The costs have been estimated for the years of initial operation of each stage, which are 1971, 1980, and 1990. These costs are shown in Table 16.

TABLE 16

ESTIMATED CONSTRUCTION COSTS
OF LOCAL CONVEYANCE FACILITIES

Facilities	Year placed in operation	Cost
First Stage	1971	$ 7,740,000
Second Stage	1980	8,615,000
Third Stage	1990	7,165,000
Total Construction Costs		$23,530,000

The costs of water service shown above have been translated into per acre-foot costs for purposes of comparison with local unit water costs, payment capacities of crops, etc. These costs do not represent the actual average water cost from the State Water Facilities and local conveyance system in any given year, but instead are equivalent unit rates -- those charges that, when applied to each acre-foot of entitlement during the repayment period will return all costs to the State with interest, at the project interest rate.

Table 17, below, shows the equivalent unit costs of various components of service from the State Water Facilities, including the costs associated with local conveyance facilities. Since no deliveries of imported water are contemplated to be made for irrigation purposes, no consideration was given to possible surcharges on excess farm land holdings. Likewise, it is not contemplated that there will be water deliveries to industrial plants with excess land holdings. No determination of excess lands within the Agency was made, since it is predicted that there will be no deliveries of imported water to excess lands in the area so as to make any surcharges necessary. Therefore, surcharges on excess lands are not a factor in imported water costs to the Agency or its water users.

TABLE 17

UNIT COSTS OF STATE WATER FACILITIES
AND LOCAL CONVEYANCE FACILITIES

Components of Cost	Equivalent Unit Rate, $/acre-foot
State Water Facilities	
Operation and Maintenance Expense	$ 24.27
Delta Water Charge	6.30 1/
Subtotal for System Operation	$ 30.57
Capital Cost of Transportation Expenses	17.10
Total, All Cost Components for State Water Facilities	$ 47.67
Local Conveyance Facilities	
Estimated Operation, Maintenance and Replacement Expense	$ 1.68
Estimated Capital Cost Expense	12.06
Total, All Cost Components for Local Conveyance Facilities	$ 13.76
Total All Cost Components	$ 61.43

1/ Maximum rate. Lower rates exist prior to 1982.

CHAPTER V. ECONOMIC JUSTIFICATION AND FINANCIAL CAPABILITY

The most important and basic elements to consider relative to the execution of a water service contract between the State and the Antelope Valley-East Kern Water Agency are the economic justification and financial capability of the performance of the contract. Economic justification proves the worth of the proposed water service, while financial capability indicates an ability on the part of the agency to repay the costs of water importation.

Economic Justification

Economic justification is a showing that the uses to which imported water supplies would be put would incur economic benefits in excess of the cost of water service. For irrigated agriculture, imported water costs are measured against the irrigator's capacity to pay for water after paying all other farming expenses and after reserving for himself a reasonable return to his enterprise. In analyzing the economic justification of water importation for urban purposes, less definite criteria must be used. Often, economic justification is shown by demonstrating that other, alternative water sources would be more costly. Where no alternatives are available, economic justification may be concluded if there is a showing that the cost of water importation is not unreasonably high, the area's economic development would be restricted without additional water supplies, and the repayment of the necessary expenditures for the water supply is financially feasible.

Comparison of Benefits from Municipal and Industrial Service with Project Charges

Since service from the State Water Facilities to the area of the Antelope Valley-East Kern Water Agency is not contemplated for irrigation purposes, a comparison of agricultural payment capacities and project charges

is not necessary. However, because water service from the State's facilities is contemplated for urban use, it is necessary to compare benefits from municipal and industrial use with project charges in order to justify such water service on an economic basis.

It is extremely difficult, if indeed it is possible, to measure the benefits of water importation for municipal and industrial purposes in monetary terms. One method of measuring benefits is to assume them to be equal to the next cheapest alternative source of water supply. In the present instance, however, there is no alternative source of water. Nevertheless, it seems fair to assume that if imported water from the State Water Facilities can be delivered at costs not unreasonably above present water costs, and if the future of economic development in the area is dependent on water importations and would occur if imported water were available, then the benefits of such importation will probably exceed the costs associated with it.

In the present case, the Antelope Valley-East Kern Water Agency contemplates supplying 90 percent of the urban water needs of its area with imported water supplies, even though its urban areas have ground water supplies available. The present cost of ground water production in the area ranges from about $50 to $65 per acre-foot, whereas water cost under the proposed system of importation from the State Water Facilities is estimated to be about $61 per acre-foot. The economy and population of the area have grown substantially during the past 15 years under current water cost conditions, indicating that benefits accruing from water supply have exceeded the cost of water. Since the cost of imported water supplies are estimated to be within the range of current water costs, it is probable that benefits accruing to the area from water importations in the future will exceed water costs, and that therefore urban water importation would be economically justified.

Financial Capability

Financial capability is a showing that the public credit of the water agency contracting with the State will be strong enough to reasonably support and repay the long-term debt which it must necessarily undertake to finance water facilities under the contract. Since the cost of facilities to the Antelope Valley-East Kern Water Agency will be relatively high, it must be shown that the Agency's area will not be unduly burdened by its overall debt during the project repayment period. Furthermore, it must be shown that the methods of obtaining funds for debt repayment (usually by taxation) are practical and reasonable.

Present and Projected Assessed Valuations

The present assessed valuation of property within the Antelope Valley-East Kern Water Agency, for fiscal year 1960-61, is over $140,000,000. This valuation represents an estimated market value of well over a half billion dollars, most of which is in the Los Angeles County portion of the Agency. Table 18 shows the assessed valuation in the water agency and its estimated market value.

TABLE 18

CURRENT ASSESSED VALUATION AND ESTIMATED MARKET VALUE, 1960-61

County	Assessed Valuation in Water Agency Area	Percent of Market Value 1/	Estimated Market Value
Kern	$ 33,656,000	21.2%	$158,755,000
Los Angeles	107,292,000	23.3%	460,480,000
Total	$140,948,000		$619,235,000

1/ Source: California State Board of Equalization Annual Report 1959-60, pp.8-9.

As a result of increased population and economic activity, and also because of inflationary trends, the assessed valuation of the area encompassed by the water agency has increased nearly five times in the past ten years. Table 19 shows the growth of assessed valuation in the area in question from 1951 to the present, as estimated by the department.

TABLE 19

HISTORICAL ASSESSED VALUATIONS

Year	Los Angeles Co. Area	Kern Co. Area	Total Water Agency Area	Increase over previous year
1951-52	$ 18,654,000	$10,416,000	$ 29,070,000	- -
1952-53	22,265,000	12,423,000	34,688,000	19.3%
1953-54	27,506,000	13,303,000	40,809,000	17.6
1954-55	33,540,000	15,149,000	48,689,000	19.3
1955-56	45,443,000	16,473,000	61,916,000	27.2
1956-57	58,651,000	18,232,000	76,883,000	24.2
1957-58	84,241,000	21,650,000	105,891,000	37.7
1958-59	98,622,000	26,680,000	125,302,000	18.3
1959-60	101,182,000	30,951,000	132,133,000	5.4
1960-61	107,292,000	33,656,000	140,948,000	6.7

The above tabulation indicates the effect on the water agency area of the curtailment of military activity and the accompanying economic recession of 1958. Since 1958, the assessed valuation of the area has continued to rise, but at a slower rate than in the several years preceding 1958. It should be noted, however, that in the Palmdale School District, outside the Agency's area, assessed valuation fell abruptly from the 1958-59 valuation of $8,147,000 to $5,680,000 in 1959-60, after having had substantial increases in valuation in prior years. This area apparently felt the impact of the recession much more than did the water agency area.

Assessed valuation of property in the Antelope Valley-East Kern Water Agency will undoubtedly continue to increase in the next thirty years, as it has in the past fifteen, as population and economic development continue to expand

in the area. In the past ten years, assessed valuation has risen at a significantly higher rate than population growth, increasing from $1,132 to $1,710 per capita in the Kern County portion of the Agency and from $933 to $2,160 in the Los Angeles County portion since the 1951-52 fiscal year. Much of this increase stems from inflationary tendencies of the past decade, but a significant amount of the advance has arisen because of continued economic development.

For purposes of analyzing the financial capability of the area to pay for service from the State Water Facilities, it was necessary to make projections of future assessed valuations of property within the Agency. These projections were conservatively made, based on the assumption that assessed valuation per capita would remain at its present level during the next thirty years. The projected assessed valuations are shown in Table 20 below.

TABLE 20

PRESENT AND PROJECTED ASSESSED VALUATIONS

Fiscal year	Los Angeles County area: Population	Los Angeles County area: Assessed value per capita	Los Angeles County area: Assessed valuation	Kern County area: Population	Kern County area: Assessed value per capita	Kern County area: Assessed valuation	Total Assessed Valuation in Water Agency Area
1959-60	46,900	$2,160	$101,182,000	18,100	$1,710	$ 30,951,000	$ 132,133,000
1969-70	92,000	2,160	198,700,000	28,000	1,710	47,900,000	246,600,000
1979-80	232,000	2,160	501,100,000	53,000	1,710	90,600,000	591,700,000
1989-90	401,000	2,160	866,200,000	89,000	1,710	152,200,000	1,018,400,000

Present and Projected Bonded Indebtedness

The Antelope Valley-East Kern Water Agency, as a political entity, has no bonded indebtedness at the present time. However, the area encompassed by the agency has a current bonded indebtedness of $20,329,000, which is about

15 percent of the area's assessed valuation. School bonds account for over 70 percent of the total indebtedness. Table 21 below indicates the present bonded indebtedness for which property owners in the Antelope Valley-East Kern Water Agency area are responsible.

TABLE 21

PRESENT BONDED INDEBTEDNESS, BY TYPE OF DISTRICT

Type of District	Bonded indebtedness in the Antelope Valley-East Kern Water Agency Area 1/		
	Los Angeles Co.	Kern Co.	Total
Schools	$12,310,000	$1,740,000	$14,050,000
Sanitation	2,681,000	-	2,681,000
Water & Waterworks	1,532,000	1,103,000	2,635,000
General County Bonds	694,000	-	694,000
Hospital	352,000	-	352,000
Flood Control	52,000	-	52,000
Other	- -	342,000	342,000
TOTALS	$17,621,000	$3,185,000	$20,806,000

1/ As of June 30, 1961

Although assessed valuation within the Antelope Valley-East Kern Water Agency area has increased substantially in the past decade, bonded indebtedness in the area has been increasing more rapidly. Thus, bonded indebtedness as a percentage of assessed valuation has increased from about 7 percent in 1951 to 15 percent in 1960. Table 22 shows the rise in bonded indebtedness in the area in the past ten years in comparison with assessed valuation, as estimated by the Department of Water Resources.

TABLE 22

HISTORICAL BONDED INDEBTEDNESS

Year 1/	Bonded indebtedness in the Antelope Valley-East Kern Water Agency			Assessed Valuation in the Water Agency Area	Debt as % of valuation
	Los Angeles Co.	Kern Co.	Total		
1951	$ 1,344,000	$ 726,000	$ 2,070,000	$ 29,070,000	7.1
1952	2,184,000	647,000	2,831,000	34,689,000	8.2
1953	2,465,000	1,382,000	3,847,000	40,809,000	9.4
1954	3,477,000	1,371,000	4,748,000	48,689,000	9.8
1955	4,967,000	1,314,000	6,281,000	61,916,000	10.1
1956	8,420,000	1,200,000	9,620,000	76,883,000	12.5
1957	10,788,000	1,511,000	12,299,000	105,891,000	11.6
1958	14,018,000	2,066,000	16,085,000	125,310,000	12.8
1959	17,324,000	2,482,000	19,806,000	132,133,000	15.0
1960	17,621,000	3,185,000	20,806,000	140,948,000	14.8

1/ As of December 31.

Current bonded indebtedness for water facilities within the Antelope Valley-East Kern Water Agency area totals about $1,800,000, comprising the debt of three waterworks districts and one county water district in Los Angeles County and two community services districts in Kern County. This amounts to about 9 percent of the total bonded debt in the Agency's area and about 1.3 percent of the assessed valuation in the Agency.

Although it is difficult to estimate to what extent the area encompassed by the Agency will incur bonded indebtedness in the future, nevertheless it was assumed for this study that such bonded debt would remain in its present relationship to assessed valuations. At the present time, bonded indebtedness in the Los Angeles County area of the water agency is about 17 percent of its assessed valuation, compared with about 9 percent in the Kern County area. These percentages were applied to each area's projected assessed valuations in order to estimate future bonded debt. Table 23 below shows the present and projected bonded indebtedness existing within the water agency to 1990.

TABLE 23

PRESENT AND PROJECTED BONDED INDEBTEDNESS

Year	Bonded Indebtedness in Water Agency Area			Percent of Total Assessed Valuation
	Los Angeles Co.	Kern Co.	Total	
1960	$ 17,621,000	$ 3,185,000	$ 20,806,000	15%
1970	33,800,000	4,300,000	38,100,000	15
1980	85,200,000	8,200,000	93,400,000	16
1990	147,300,000	13,700,000	161,000,000	16

Analysis for Financing Future Obligations

The feasibility of serving imported water from the State Water Facilities is, from a general point of view, dependent not only upon the economic benefits to be derived from water service to a particular agency or upon the fact that benefits may outweigh the costs associated with water importation, but also upon the financial capabilities of the contracting agency to repay the costs of water service. Therefore, an analysis of financial capability, i.e., a determination of the financial impact on the area in question caused by the water importation program, is necessary. The determination of financial capability requires an analysis of several factors and their interrelationships, including the amount of money required to pay for the agency's allocated share of costs, the probable repayment schedule necessary, the present and future assessed valuation of the agency, its current and future debt for other public works, the tax rates prevalent in the area, and the additional tax rates necessarily incurred by undertaking a water importation project.

For the Antelope Valley-East Kern Water Agency, an investigation was made of many facets of its present financial condition. The data gathered in this investigation is presented in detail in Appendix A of this report,

entitled, "Credit Analysis of the Antelope Valley-East Kern Water Agency". The data in this appendix is for historical and current conditions, and does not attempt to measure the impact on the Agency of proposed costs of imported water service.

Comparison with Assessed Valuations. The present bonded indebtedness in the area of the Antelope Valley-East Kern Water Agency is approximately 15 percent of its assessed valuation. This compares with a ratio of about 25 percent in the City of Los Angeles. It should be noted that this latter figure does not include the amount of indebtedness atrributable to the contract between the State and The Metropolitan Water District. The area's present bonded indebtedness is estimated to increase in the future more or less commensurately with increases in assessed valuation, but will be even further increased by the debt which the Agency will incur for service from the State Water Facilities.

From the schedules of estimated allocated construction costs, costs of local conveyance facilities, and assessed valuations, the total debt outstanding in any year due on the transportation portion of State Water Facilities and the local conveyance facilities was determined as a percentage of assessed valuation. These percentages are shown in Table 24 below.

TABLE 24

SUMMARY OF CAPITAL REPAYMENT OBLIGATIONS
RESULTING FROM WATER SERVICE

Year	Assessed Valuation	Outstanding Debt					
		Local conveyance facilities		Transportation portion of State Water Facilities		Total attributable to water service	
	(000's)	Amount (000's)	Percent of assessed valuation	Amount (000's)	Percent of assessed valuation	Amount (000's)	Percent of assessed valuation
1960	$ 132,133	$ --	--	$ --	--	$ --	--
1971	281,100	7,538	2.7%	21,119	7.5%	28,657	10.2%
1980	597,100	15,189	2.6	26,539	4.5	41,728	7.1
1990	1,018,400	19,795	1.9	26,342	2.6	46,137	4.5

In the year of the highest debt ratio, occurring in about 1971, the total obligation for water service and other public debt would be about 25 percent of the area's assessed valuation. This is about equal to the current debt ratio of the City of Los Angeles, excluding the effect of the Metropolitan Water District's water service contract with the State. Thus, even at a maximum, the area's ratio of debt to valuation would appear to be reasonable. The debt ratio in the area would continually decline throughout the project repayment period after 1971.

Levels of Ad Valorem Taxation. Property tax rates in the Antelope Valley-East Kern Water Agency area vary widely from place to place. Considering the total assessed valuation of the area and its total tax levies, however, the weighted average tax rate at the present time is about $7.20 per $100 assessed valuation.

Tax rates in the area have tended to increase in the past several years, just as in most areas of Southern California. Table 25 indicates the

weighted average tax rates and their component parts in the water agency area for the past several years.

TABLE 25

AD VALOREM TAX RATE COMPONENTS

Year	Tax Rate (per $100 assessed value)					
	General County Tax	School Districts	Townships	Special Districts	AV-EK WA	Total rate
1956-57	$2.11	$3.64	$ .82	$ .13	$ -	$6.70
1957-58	2.15	3.45	.82	.10	-	6.52
1958-59	2.21	3.83	.78	.11	-	6.93
1959-60	2.32	4.33	1.00	.22	-	7.87
1960-61	2.34	3.81	.83	.20	.06	7.24

Tax collections in the area encompassed by the water agency have increased substantially in the past several years as both assessed valuations and tax rates have increased. Table 26 indicates tax collections made in the Antelope Valley-East Kern Water Agency area during the past six years.

TABLE 26

PROPERTY TAX COLLECTIONS

Year	Tax Collections in Water Agency Area		
	Los Angeles Co. area	Kern Co. area	Total
1955-56	$2,879,000	$1,138,000	$4,017,000
1956-57	3,839,000	1,205,000	5,044,000
1957-58	5,232,000	1,428,000	6,660,000
1958-59	6,251,000	2,069,000	8,320,000
1959-60	7,090,000	2,852,000	9,942,000

Water taxes in the Antelope Valley-East Kern Water Agency area are collected for several water districts serving various communities. Tax levies for water service in 1960-61 amounted to about 3 percent of the total tax levies in the water agency's area during the fiscal year. By way of comparison, water tax levies averaged 2.2 percent in the entire area of Kern and Los Angeles counties for the 1960-61 fiscal year. Tax rates and levies for 1960-61 in the water service districts within the Agency are shown in Table 27 below.

TABLE 27

PRESENT TAX LEVIES FOR WATER SERVICE

District	Community served	Tax rate for water service[1]	Assessed valuation	Tax levies
Boron Community Service	Boron	$2.0000	$ 1,217,100	$ 24,340
Desert Lake Community Serv.	Desert Lake	1.1000	441,500	4,857
California City Community Service	California City	1.0000	3,003,000	30,030
Waterworks District #4	Lancaster	0.1850[2]	50,964,700	94,297
Waterworks District #23	Lancaster	0.2046[2]	4,391,400	8,984
Waterworks District #24	Pearblossom	5.0351	178,700	8,995
Waterworks District #27	Littlerock	0.0591	891,200	526
Quartz Hill County Water District	Quartz Hill	1.4198[2]	3,044,500	43,224
Average and Totals		$0.3356	$ 64,132,000	$215,253
Antelope Valley-East Kern Water Agency		.0649	133,530,060[3]	86,661
Total Tax Levy for Water Services		$0.4005		$301,914

1/ In dollars per $100 assessed valuation

2/ Effective rate

3/ Tax levied only on secured valuation in Los Angeles County portion of the agency. Total valuation is $140,948,000.

Water taxes in the Antelope Valley-East Kern Water Agency area on a weighted average based on the entire water agency, were about $0.21 per $100 assessed valuation in 1960-61. For comparison purposes, water taxes in all of Kern and Los Angeles counties, on the same basis, were about $0.18 per $100 valuation.

Under a repayment schedule similar to that in the State's contract with The Metropolitan Water District, for repayment of its share of the capital costs of the transportation facilities, the Antelope Valley-East Kern Water Agency would make a payment in 1963 of about $50,000. The amount paid would increase each year until 1990, when the annual payment would be $1,518,000. Payments would remain constant from 1990 to 2010, after which time they would decrease until full repayment of the capital costs would have been accomplished in 2038. In many districts these payments are collected through ad valorem taxation.

Data concerning the local conveyance system for the area, supplied by the Agency, indicate that construction of the system will be in at least three stages between the present time and 1990, and will be financed through the sale of bonds by the Agency. Repayment is contemplated by the Agency to be accomplished through ad valorem taxation. Although the Agency has not presented any definite plans regarding the schedule of repayment of local conveyance facilities costs, a tentative repayment schedule was constructed from the data available. This tentative schedule provided a basis for estimating the necessary tax rates needed for repayment of the cost of the local facilities.

The annual repayment requirements, as estimated for both the transportation portion of the State Water Facilities and the local conveyance facilities, were compared with projections of valuations in the area, and the tax rates necessary for capital repayment were determined. This was done in

order to see if the necessary rate of taxation, should all capital repayment obligations be collected through ad valorem taxation, would place an unreasonable burden on the taxpayers of the area. The tax rates computed as necessary for capital repayment are shown in Table 28. The tax rate maximum, not shown in the table, would be in 1969, when it would amount to $0.59 per $100 assessed valuation.

TABLE 28

TAX RATE NECESSARY FOR CAPITAL REPAYMENT
OF LOCAL CONVEYANCE FACILITIES AND
STATE WATER FACILITIES

Year	Assessed Valuation (000's)	Capital Repayment: Local conveyance facilities Amount (000's)	Local conveyance facilities Tax Rate 1/	State Water Facilities Amount (000's)	State Water Facilities Tax Rate 1/	Total Amount (000's)	Total Tax Rate 1/
1960	$ 132,133	--	--	--	--	--	--
1971	281,100	$ 451	$0.16	$1,012	$0.36	$1,463	$0.52
1980	591,700	953	0.16	1,355	0.23	2,308	0.39
1990	1,018,400	1,371	0.13	1,518	0.15	2,889	0.28

1/ Dollars per $100 assessed valuation.

For purposes of this analysis, it was assumed that capital repayment of both State and local water facilities would be accomplished through ad valorem taxation, but that other ad valorem property taxes would remain at substantially current levels in the future. Consideration was given these projected levels of tax rates that would prevail in the area in the future and to the ratio of bonded debt and water service contract debt to future assessed valuations under conditions of water importation. Comparisons of these were made against similar conditions in other areas. From these considerations and comparisons a conclusion was drawn that the Antelope Valley-East Kern Water

Agency would have the financial capability of successful performance of its obligations under a water service contract with the State, to the extent of 120,000 acre-feet of annual water delivery as a maximum entitlement.

Need for and Possibility of Application of Option Provisions of Article 45 of the Contract

Article 45 of the water service contracts between the State and The Metropolitan Water District of Southern California and the San Bernardino Valley Municipal Water District provide that additional contracts shall conform substantially to these earlier contracts. In regard to the capital cost component of the transportation charge, the article provides basically that all contractors shall completely pay their total allocated capital costs and interest thereon, computed at the project interest rate and compounded annually, within the project repayment period. Within this limitation, the State is allowed to grant three options that allow variations in the timing of payments of this capital cost component.

One option is that principal and interest payments may be made by the contractor in installments which vary in magnitude during the project repayment period. Another option provision of Article 45 allows for deferment of principal and interest payments until the year of initial water deliveries. However, this second option is exercisable only by agencies that will use more than 25 percent of their maximum annual entitlement for agricultural purposes. Thus, the Antelope Valley-East Kern Water Agency will not qualify for this option. A third option provides for the deferment of principal payments for a period up to 9 years following the year in which construction costs are incurred by the State if the State determines that such deferment in principal repayment is necessary to prevent unreasonable financial hardship on the contractor.

With respect to the Antelope Valley-East Kern Water Agency, an analysis was made of the effects of deferment of principal payments under the latter option. If the Agency should exercise this option, it would repay only the interest component of capital costs until 1971, after which repayment would be the same as under a full repayment schedule, at least until 1990. The deferred payments, of course, would have to be made up at a later time. Between 1963 and 1972, the Agency would defer about $600,000, should it exercise this option.

The effects of the deferment under subparagraph (1)' of Article 45 of the contract would be to reduce the area's necessary tax rate in 1971 to repay principal and interest charges due on the transportation system of the State Water Facilities, should the Agency use ad valorem taxation for this purpose, from $0.36 per $100 assessed valuation to about $0.31. A similar reduction in tax rate would also be effected for some years prior to 1971. However, the deferment of principal payment would also cause the Agency's water service debt to increase from 7.5 percent to 7.7 percent of the area's assessed valuation.

It would appear from the analysis that the deferments in principal payment would not substantially better the Agency's financial capacity to repay project costs. Furthermore, as it appears that the Agency has the financial feasibility to repay construction costs without making subparagraph (1) of Article 45 operative, it is believed that this option would have no practical application to the Antelope Valley-East Kern Water Agency.

CHAPTER VI. CONCLUSIONS

Analysis of the data gathered and presented in this report has led to the following conclusions:

1. The ground water basins within the area encompassed by the boundaries of the Antelope Valley-East Kern Water Agency appear to have been subjected to a substantial amount of overdrafting for a considerable number of years, and are currently being overdrawn at the rate of nearly 94,000 acre-feet per year.
2. The area within the water agency has the potential for substantial population and economic growth, and exterior pressures indicate a high probability for large increases in population and employment to occur if sufficient water supplies are available in the future.
3. The local water supplies available in the area are not sufficient to satisfy its future requirements, and, therefore, the area's future growth will be seriously restricted unless a supply of supplemental water is made available.
4. The Antelope Valley-East Kern Water Agency is empowered by its enabling legislation to enter into contracts with the State for the importation of water supplies.
5. The water agency area will have an economic demand for water from the State Water Facilities of about 120,000 acre-feet per year by the year 1990.
6. The financial position of the Antelope Valley-East Kern Water Agency area is such that the increased debt and taxation requirement necessitated by the execution and performance of a water service contract with the State would not impose an unreasonable financial burden upon the Agency.

7. Financing the construction of necessary local conveyance facilities, in addition to the debt required for a contract with the State, would not increase the area's total ratio of debt obligations to assessed valuation beyond acceptable limits.

8. The Antelope Valley-East Kern Water Agency and the area it encompasses has the ability, the necessity, the economic justification, and the financial capability required to enter into a contract with the State of California for the service of water from State Water Facilities.

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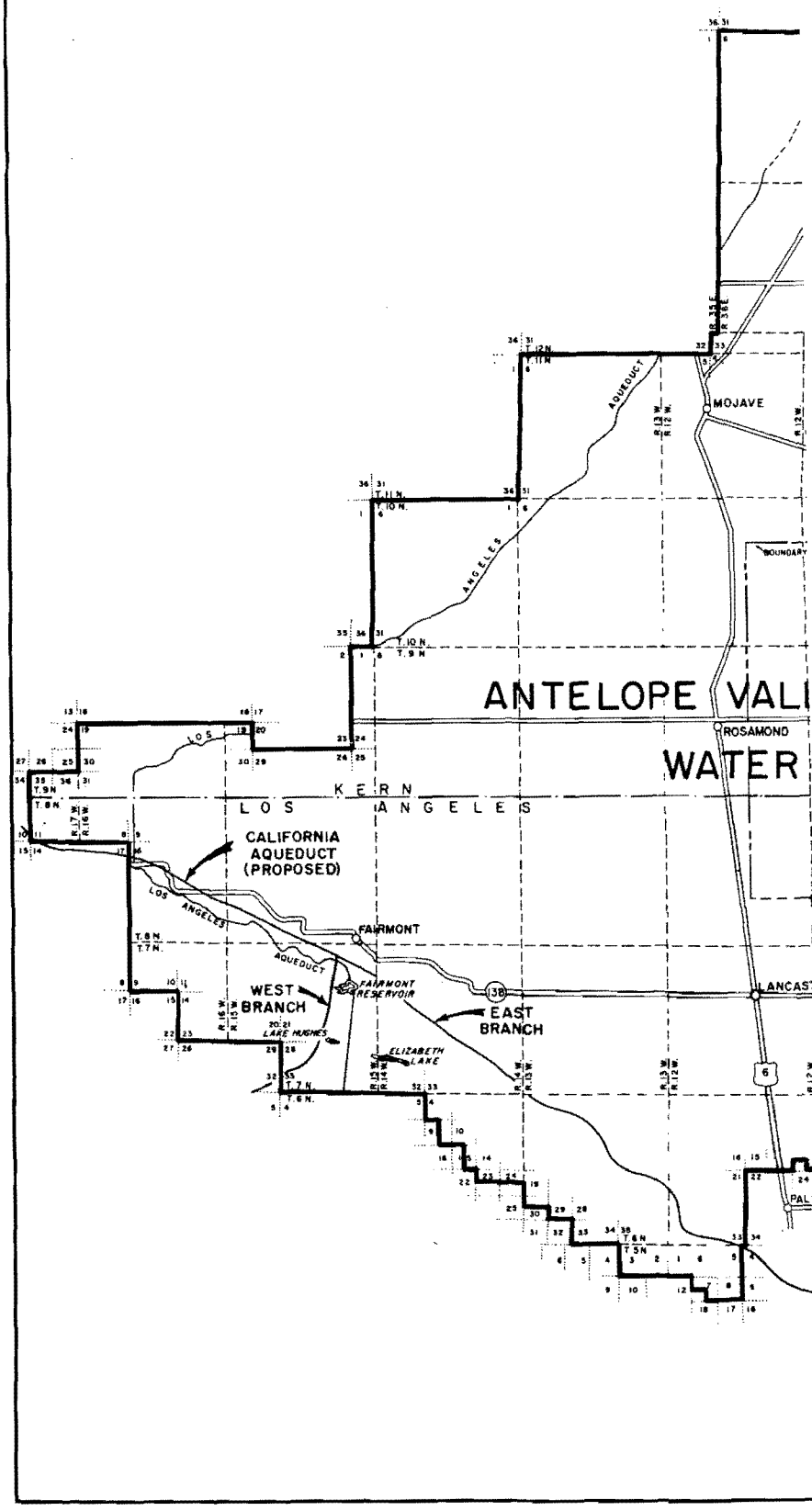

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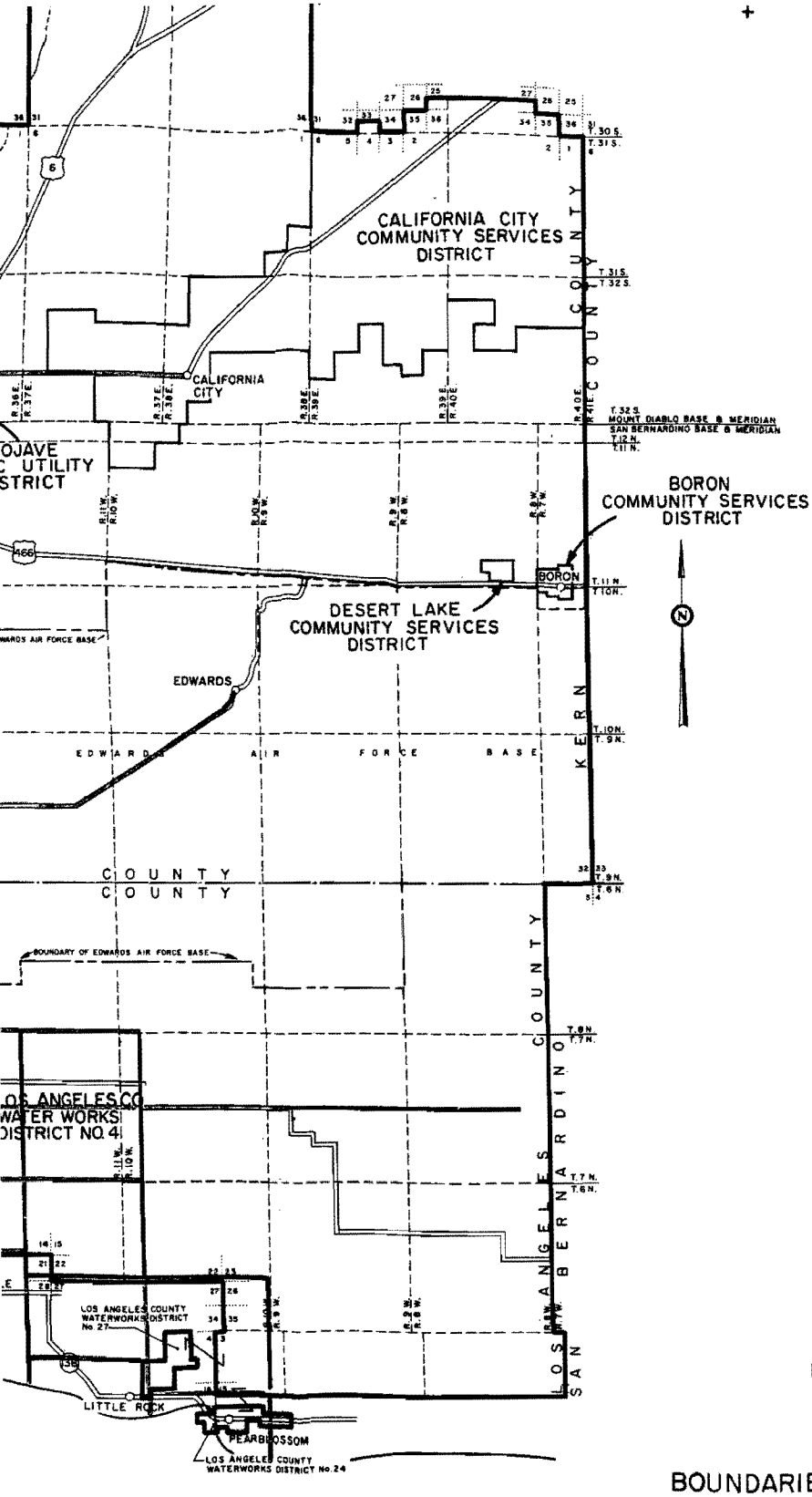


LEGEND

LOCAL DISTRIBUTION FACILITIES

1971 ——

1980 ——

1990

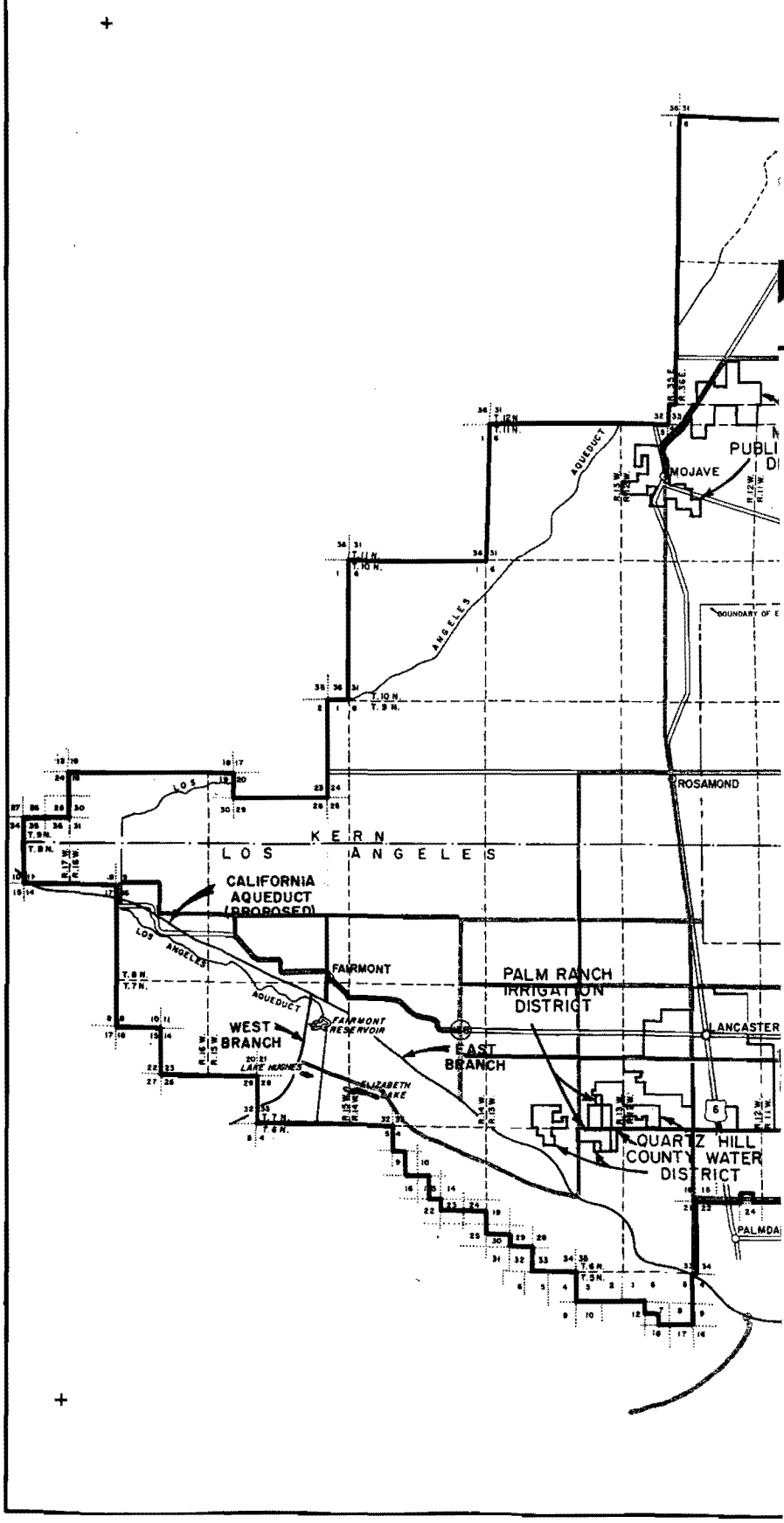
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

FEASIBILITY STUDY ON SERVING THE ANTELOPE VALLEY–EAST KERN WATER AGENCY FROM THE STATE WATER FACILITIES

BOUNDARIES OF EXISTING WATER AGENCIES AND PROPOSED LOCAL DISTRIBUTION FACILITIES

SCALE OF MILES

PWS-0089-0101



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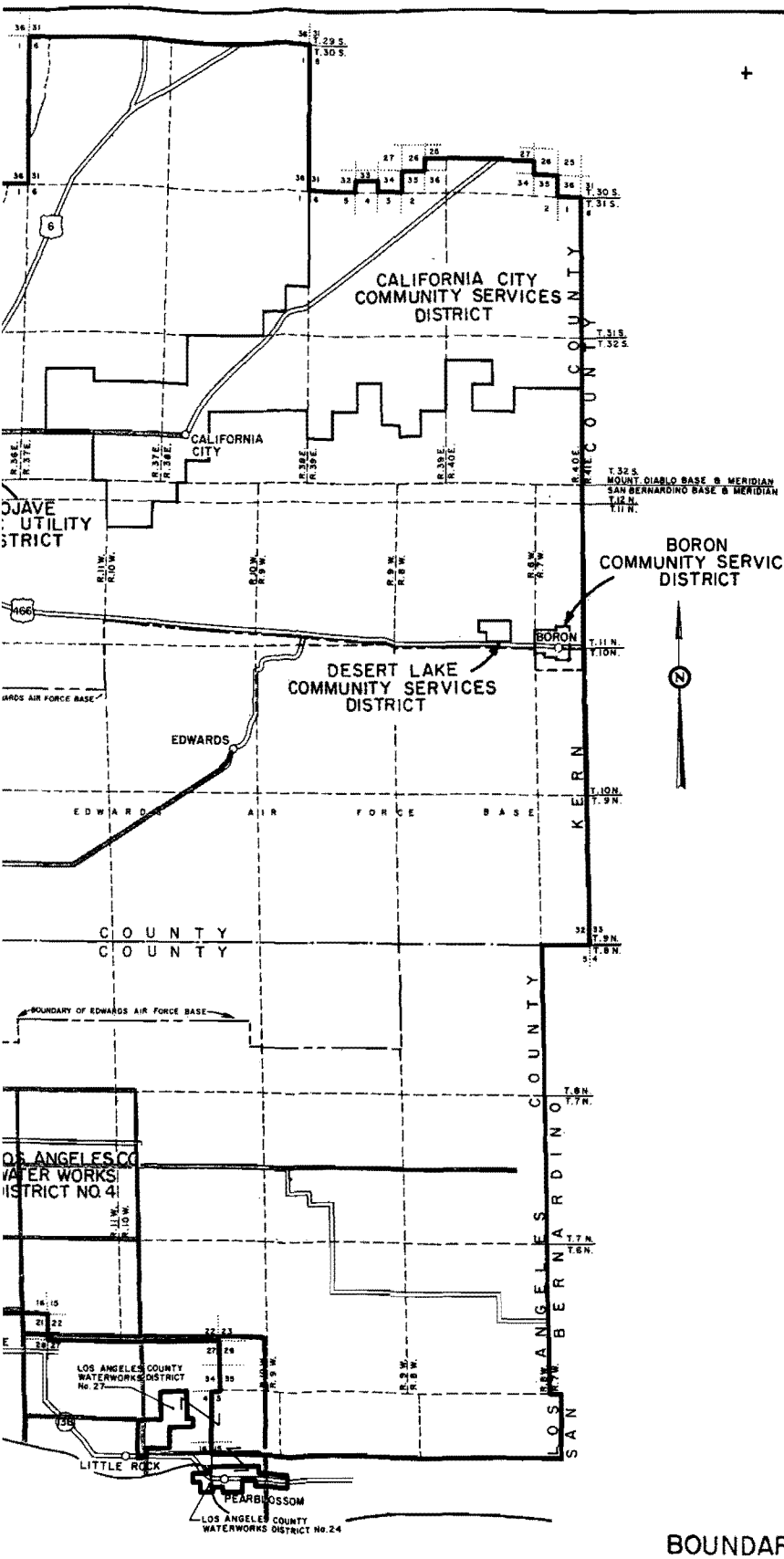


LEGEND

LOCAL DISTRIBUTION FACILITIES

1971 ——

1980 ——

1990

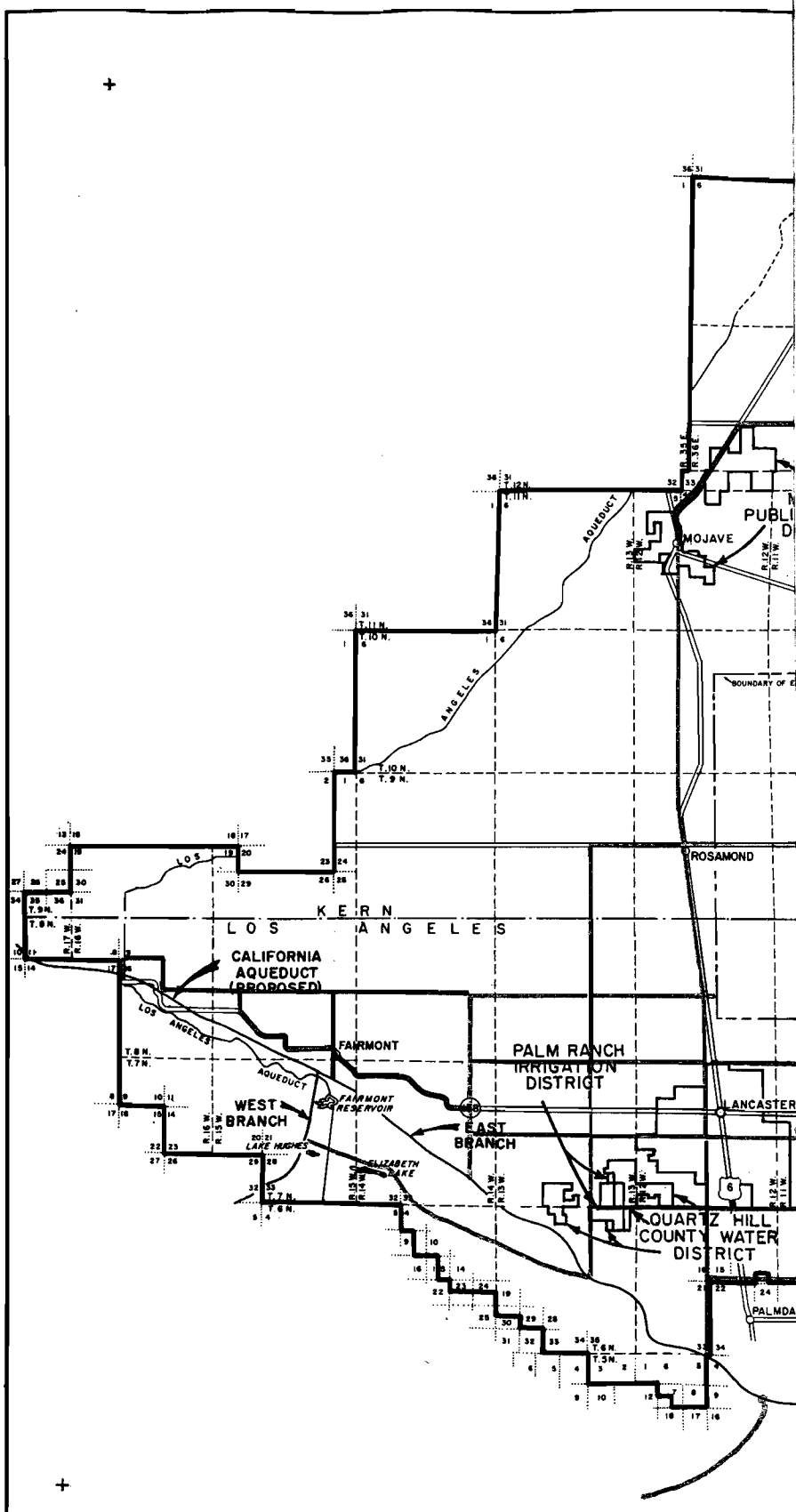
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

FEASIBILITY STUDY ON SERVING THE ANTELOPE VALLEY–EAST KERN WATER AGENCY FROM THE STATE WATER FACILITIES

BOUNDARIES OF EXISTING WATER AGENCIES AND PROPOSED LOCAL DISTRIBUTION FACILITIES

SCALE OF MILES

PWS-0089-0103



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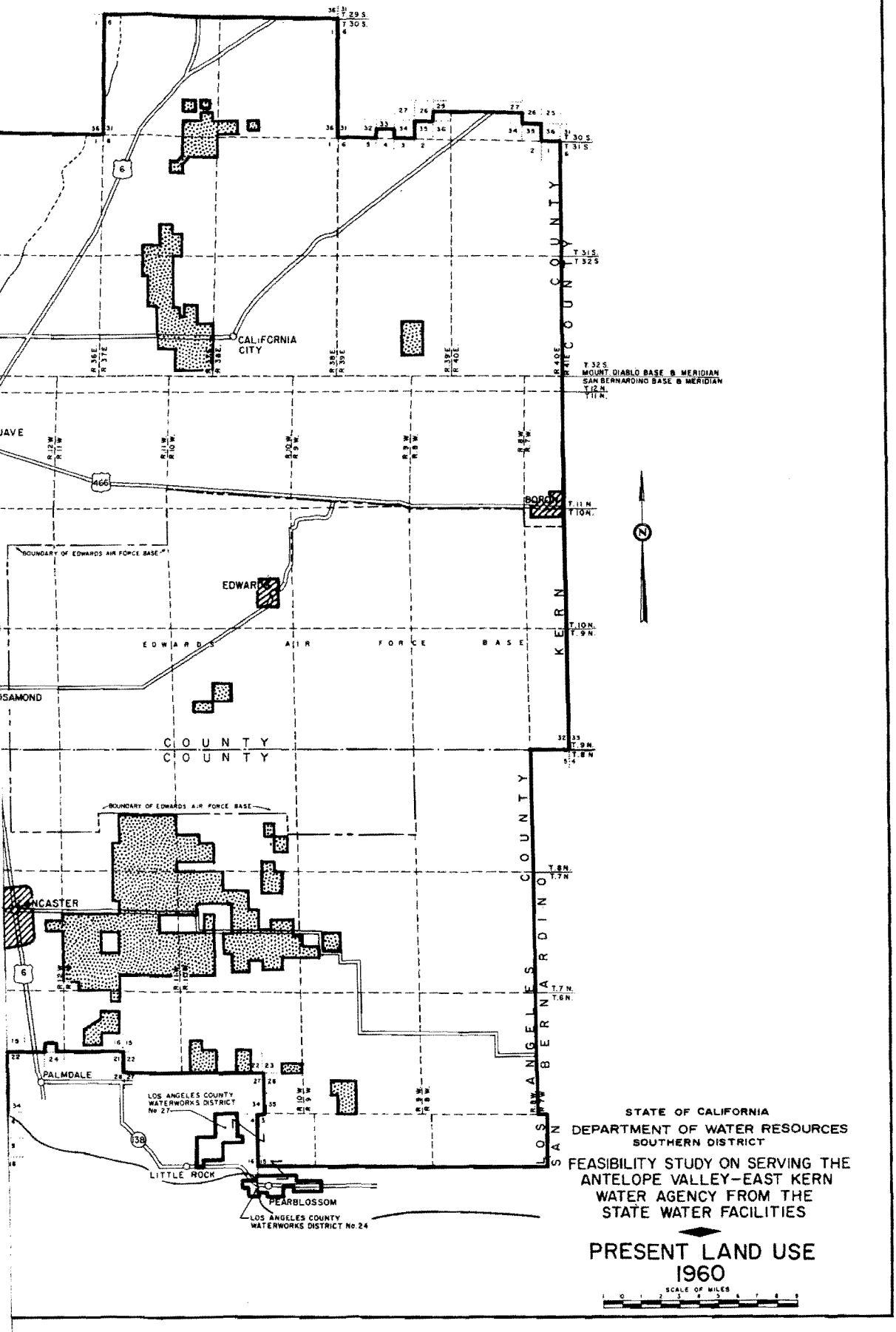


STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

FEASIBILITY STUDY ON SERVING THE ANTELOPE VALLEY–EAST KERN WATER AGENCY FROM THE STATE WATER FACILITIES

PRESENT LAND USE 1960

SCALE OF MILES

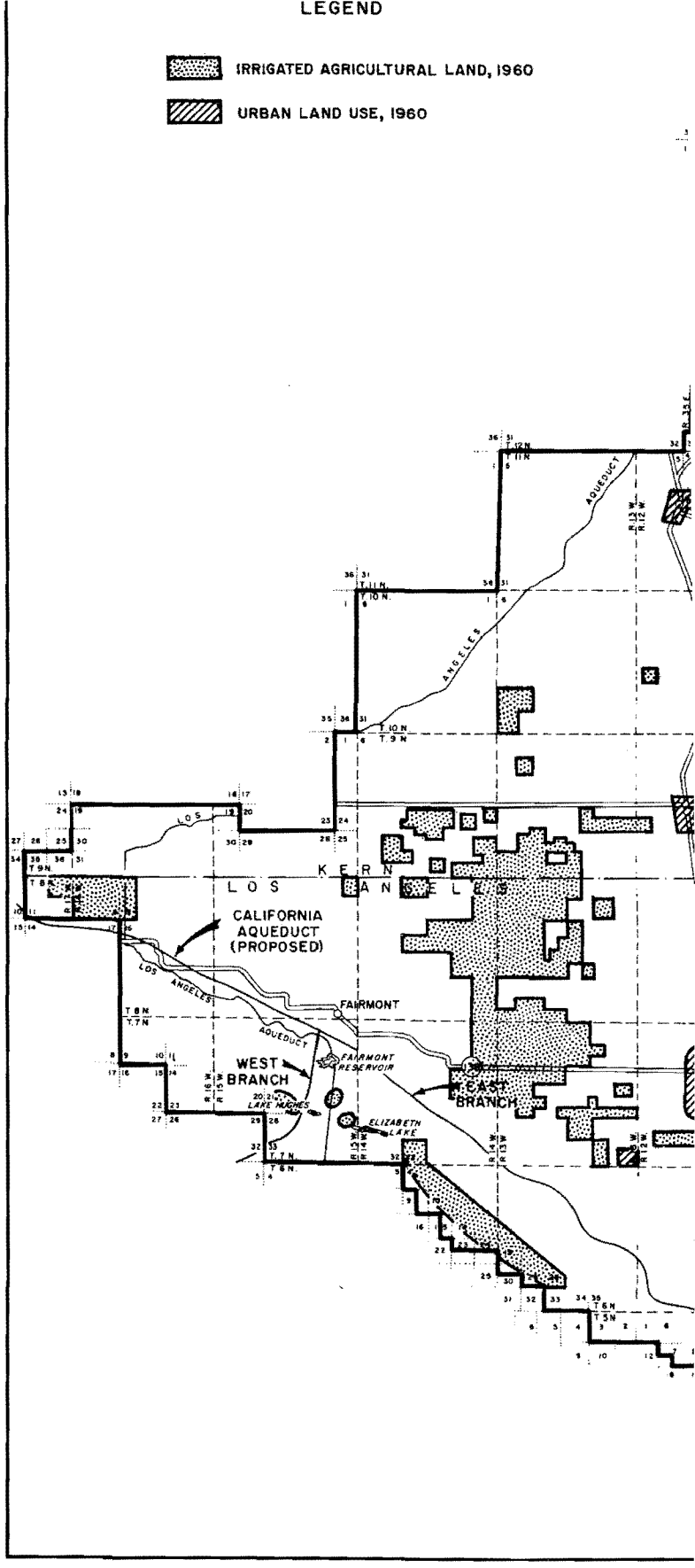
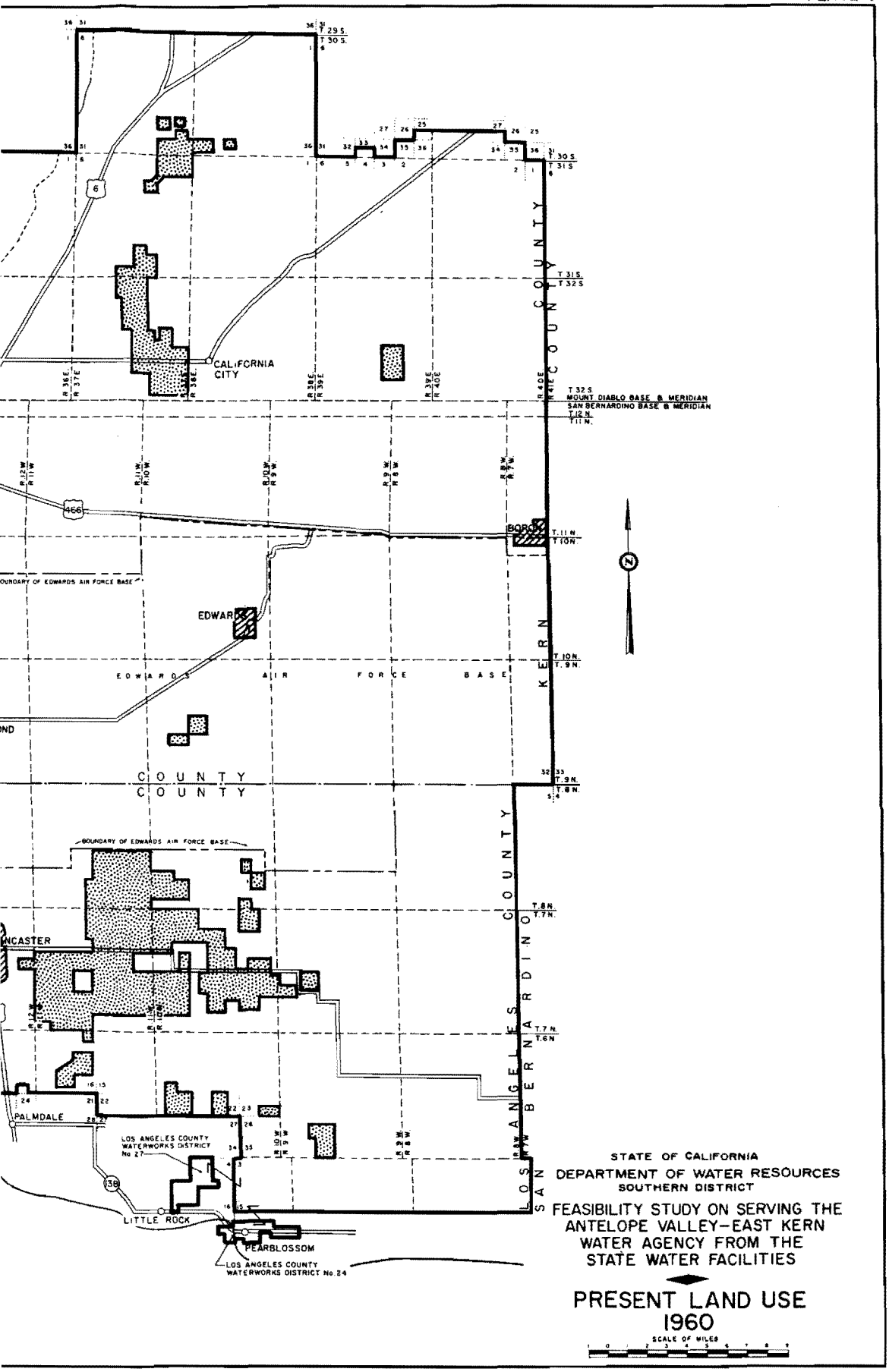

LEGEND
IRRIGATED AGRICULTURAL LAND, 1960
URBAN LAND USE, 1960
AQUEDUCT
ANGELES
LOS
KERN
LOS ANGELES
CALIFORNIA
AQUEDUCT
(PROPOSED)
LOS ANGELES
AQUEDUCT
FAIRMONT
FAIRMONT RESERVOIR
WEST
BRANCH
EAST
BRANCH
LAKE HUGHES
ELIZABETH LAKE

PLATE 4



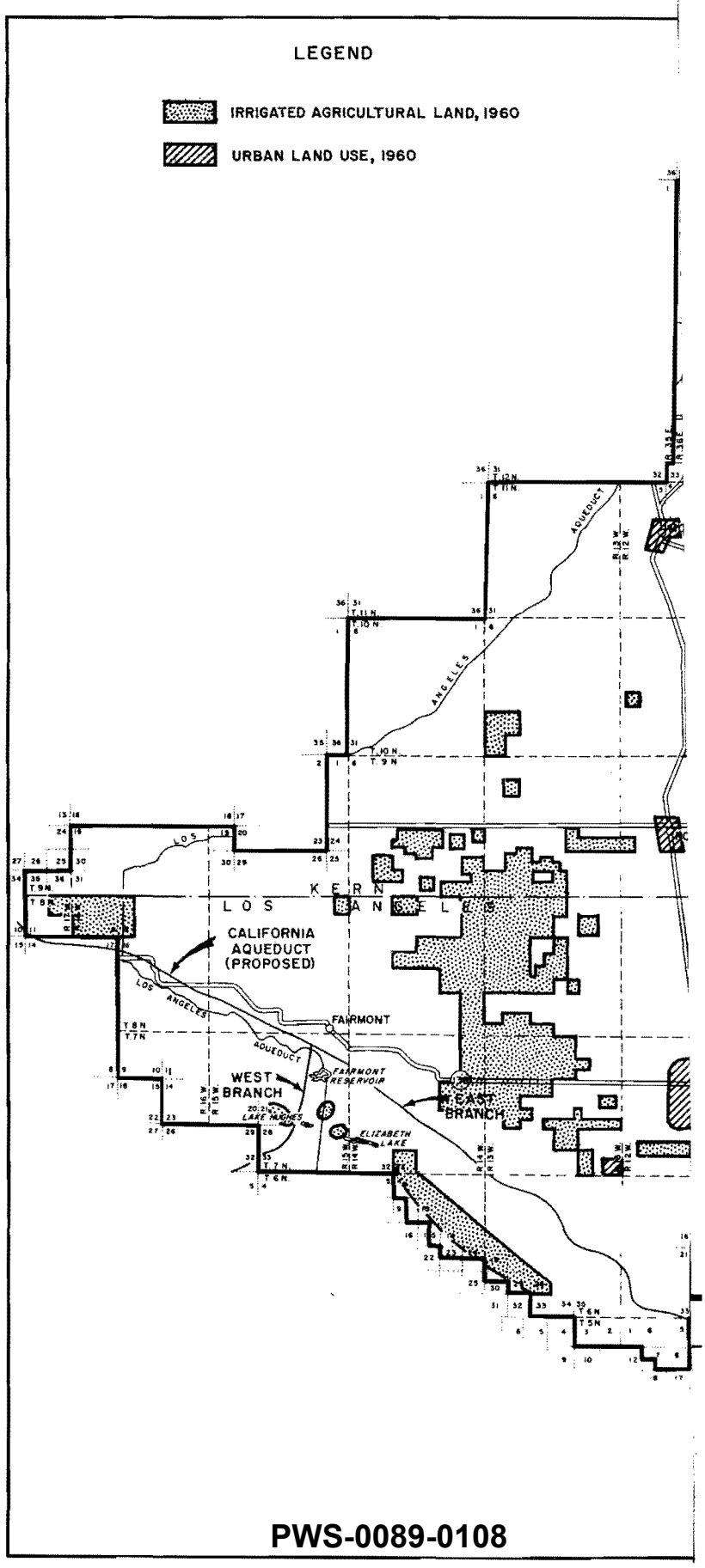
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

FEASIBILITY STUDY ON SERVING THE ANTELOPE VALLEY–EAST KERN WATER AGENCY FROM THE STATE WATER FACILITIES

PRESENT LAND USE
1960

SCALE OF MILES

PWS-0089-0107



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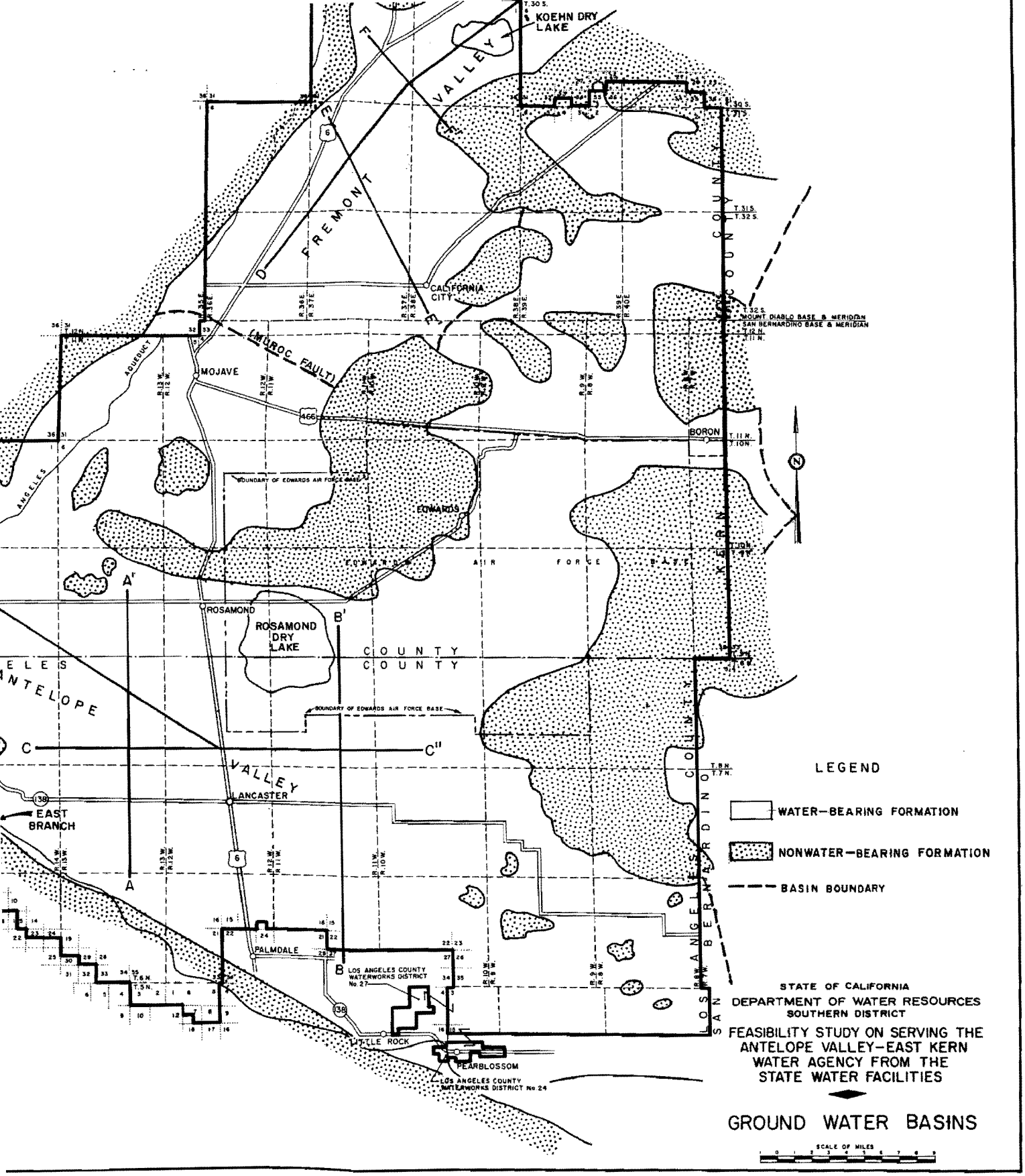

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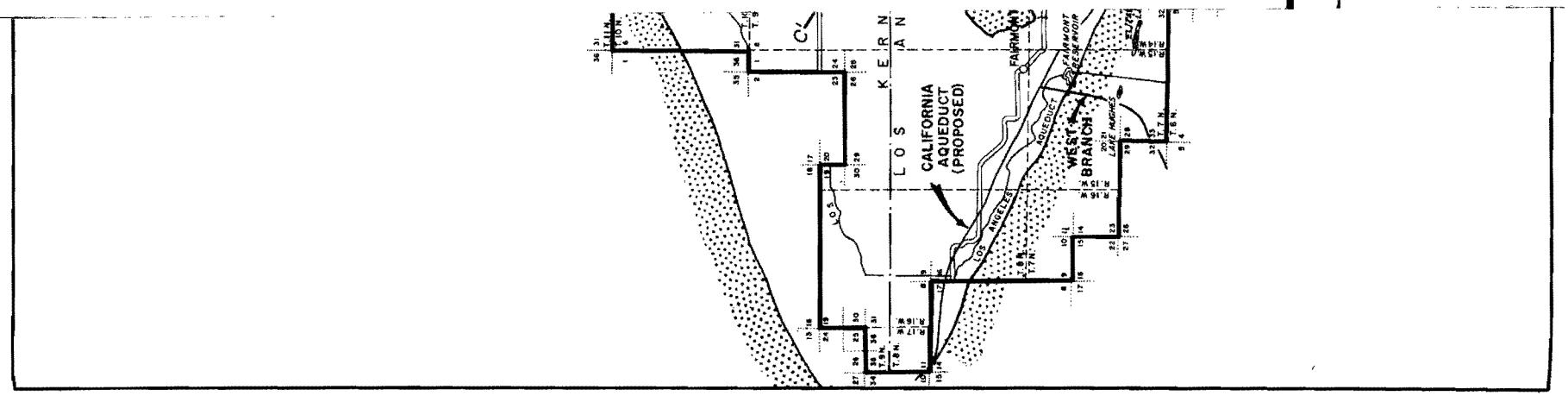
KERN
LOS
CALIFORNIA
AQUEDUCT
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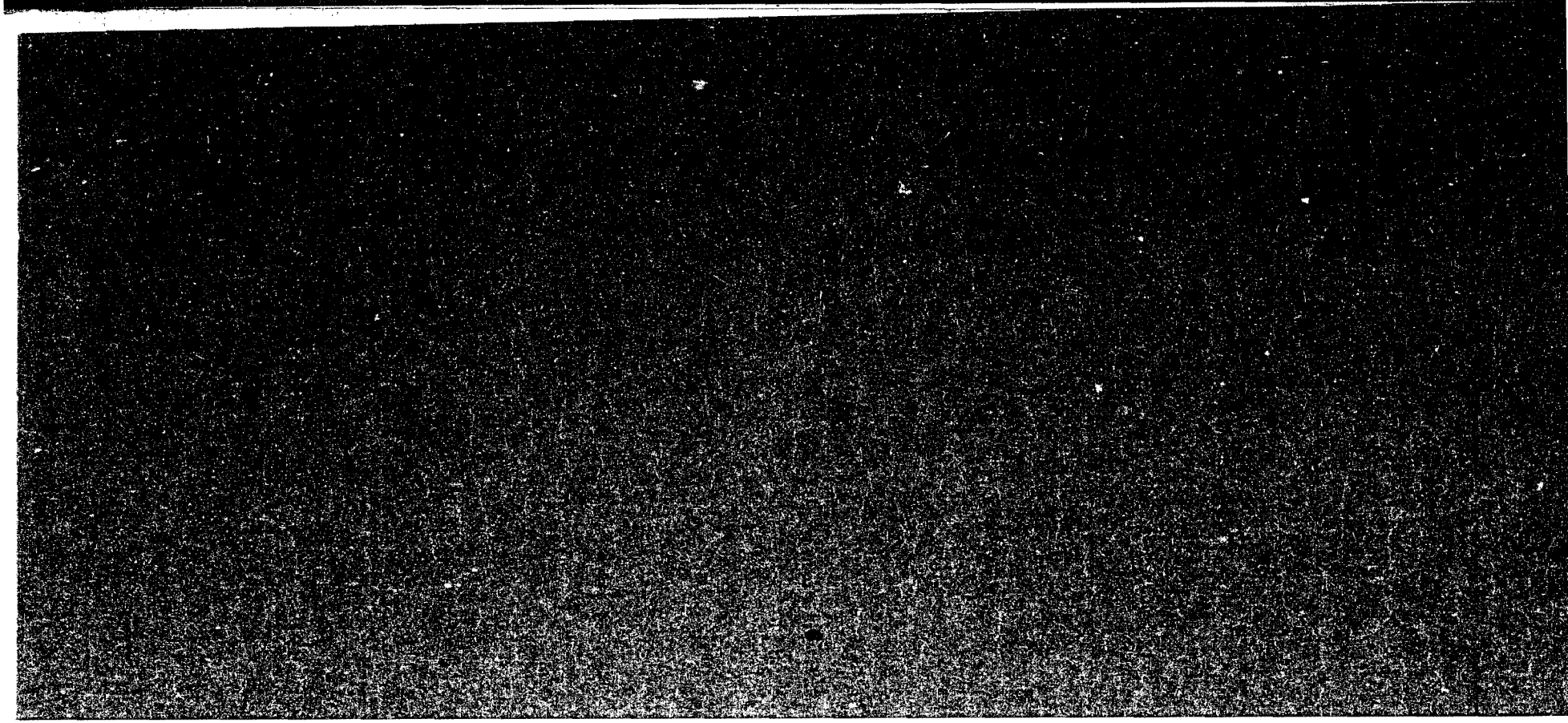
FAIRMONT
FAIRMONT RESERVOIR
LAKE HUGHES



APPENDIX A

CREDIT ANALYSIS OF THE

ANTELOPE VALLEY-EAST KERN WATER AGENCY

APPENDIX A

CREDIT ANALYSIS OF THE
ANTELOPE VALLEY-EAST KERN WATER AGENCY

A. Statement of Debt of the Antelope Valley-East Kern Water Agency

1. Net Direct Debt (full faith and credit)

   a. Bonds: none

   b. Floating debt: June 30, 1961: 0

   c. Total debt: none

2. Special Obligations (not full faith and credit): none

3. Limitation on Debt

   a. Promissory Notes: May be issued in amounts not exceeding the lesser of $500,000 or 2 percent of the assessed valuation of taxable property in the agency. The interest rate limit is 6 percent per annum. Maturity of notes shall not be greater than three years from date of issuance.

   b. Bonds: May not bear an interest rate of more than 5 percent per annum, and maturity of bonds may not exceed 40 years.

   c. Applicable Statutes: Senate Bill No. 1068, Statutes of 1959, Section 61, Subd. 8a (promissory notes), and Section 72 (bonds).

4. Amount of Bonds Authorized but Unissued: none

5. Utilities Operated by the Agency (other than water service): none

B. Debt of Overlapping, Coterminous and Underlying Political Units

Name and Character of Unit Bearing Bonded Indebtedness	Net Debt	Net Debt Assignable to the Agency's Area		Date of Statement
		%	Amount	
1. Los Angeles County portion				
Los Angeles County - general	$ 62,457,000	1.00	$ 624,570	March 31 1961
County Flood Control District	165,535,500	.03	49,661	"
Waterworks Districts: No. 4	396,000	99.96	395,842	"
No. 23	30,000	100.00	30,000	"
No. 24	238,000	100.00	238,000	"
Sanitation Districts: No. 14	2,512,000	99.19	2,491,653	"
No. 20	1,560,000	12.05	187,980	"
Antelope Valley Hospital Dist.	470,000	72.62	341,314	"
Quartz Hill County Water Dist.	865,000	99.77	863,011	"
School Districts: Eastside Union	470,000	100.00	470,000	"
Hughes-Eliz. Lake Union	103,000	52.63	54,209	"
Keppel Union	361,300	33.63	121,505	"
Lancaster	2,115,000	100.00	2,115,000	"
Palmdale	1,468,000	17.65	262,279	"
Soledad-Aqua Dulce	101,000	2.94	2,969	"
Westside Union	679,000	97.77	663,858	"
Wilsona	85,000	100.00	85,000	"
A.V.J.U.H.S.	11,865,500	70.54	8,369,924	"
Total Debt, Los Angeles County Portion			$17,366,775	

Name and Character of Unit Bearing Bonded Indebtedness	Net Debt	Net Debt Assignable to the Agency's Area		Date of Statement
		%	Amount	
2. Kern County Portion				
Mojave Public Ut. District	$ 341,800	100.00	$ 341,800	June 30, 1961
Boron Com. Services District	47,000	100.00	47,000	"
Desert Lake Com. Services District	56,500	100.00	56,500	"
California City Com. Services District	1,000,000	100.00	1,000,000	"
School Districts: Kern Co. J.U.H.S.	9,598,000	.002	200	"
Mojave Union	535,000	96.13	514,300	"
Muroc Elem.	70,000	100.00	70,000	"
Muroc U.H.S.	1,000,500	100.00	1,000,500	"
South Kern Co. Elementary	126,400	92.85	117,400	"
Tehachapi Elementary	232,000	16.00	37,100	"
Total Debt, Kern County Portion			$3,184,800	
3. Total Debt in Water Agency Area			$20,551,555	

C. Summary of Full Faith and Credit Debt of the Water Agency and Other Political Entities

	As of June 30th				
	1957	1958	1959	1960	1961
1. Net Bonded Debt	$ 0	$ 0	$ 0	$ 0	$ 0
2. Net Floating Debt	0	0	0	20,005	0
3. Overlapping, etc. Debt					
a. Los Angeles Co.	8,420,000	10,788,000	14,019,000	17,324,000	17,621,000
b. Kern Co.	1,511,000	2,066,000	2,482,000	3,471,000	3,185,000
4. Total Debt	$9,931,000	$12,854,000	$16,501,000	$20,815,005	$20,806,000

D. Default Record. There has been no default in the payment of principal or interest during the past twenty years, either by the water agency or by any overlapping, coterminous or underlying taxing district.

E. Assessed Valuations of Property in the Antelope Valley-East Kern Water Agency

	Valuation ($000)				
	1956-57	1957-58	1958-59	1959-60	1960-61
1. Los Angeles Co. Area					
a. Real Property	$ 49,853	$ 70,560	$ 82,216	$ 88,361	$ 93,676
b. Personal Property	11,730	17,834	21,478	18,036	18,706
c. Less Exemptions	2,932	4,193	5,072	5,215	5,090
d. Total Assessed Value	$ 58,651	$ 84,241	$ 98,622	$101,182	$107,292
e. Est. Market Value	$271,718	$361,546	$423,266	$434,253	$460,476
2. Kern County Area					
a. Real Property	$ 17,120	$ 20,394	$ 25,159	$ 29,434	$ 32,041
b. Personal Property	1,695	1,970	2,428	2,600	2,793
c. Less Exemptions	583	714	907	1,083	1,178
d. Total Assessed Value	$ 18,232	$ 21,650	$ 26,680	$ 30,951	$ 33,656
e. Est. Market Value	$ 86,000	$102,123	$125,850	$145,996	$158,755
3. Total Water Agency Area					
a. Total Assessed Value	$ 76,900	$105,900	$125,300	$132,100	$140,900
b. Est. Market Value	$357,700	$463,700	$549,100	$580,200	$619,200

4. Assessment Ratio (proportion of market value)

   a. Real Property: Los Angeles Co., 23.3 percent; Kern County, 21.2 percent.

   b. Personal Property: Los Angeles Co., 23.3 percent; Kern County, 21.2 percent.

   c. Source of Estimates: State Board of Equalization, Annual Report, 1959-60, pp. 8-9.

5. Important Tax Exempt Property Within the Agency. U. S. Air Force Plant 42, between Lancaster and Palmdale in Los Angeles County, is owned by the U. S. Government and is therefore exempt from county property taxes. However, the facility is leased to private concerns, which must pay property taxes on personal property held there and upon their leasehold interests at the plant. In this manner, the taxing unit is reimbursed to a large degree for its loss in property taxes. Edwards Air Force Base, comprising nearly 200,000 acres in southeastern Kern County, is also property of the Federal Government and is exempt from property taxes. The taxing unit is reimbursed to some extent for this tax loss, however, since the base makes payments to the county for its share of the cost of maintaining schools in the area.

6. Concentrations of Valuable Property Just Outside the Area. The community of Palmdale, which has a substantial concentration of property wealth, lies immediately to the south of the water agency's boundaries. This area was excluded from the agency since it has a public water agency already in existence, the Palmdale Irrigation District.

7. Ten Largest Taxpayers in the Area. A cursory examination of property records revealed that the ten largest taxpayers within the agency probably do not contribute a significant portion of the total taxes collected in this area.

F. Property Tax Rates on Property in the Antelope Valley-East Kern Water Agency

	Weighted Average Tax Rates in Dollars per $100 assessed valuation				
	1956-57	1957-58	1958-59	1959-60	1960-61
1. Los Angeles County Area					
a. County rate	$1.96	$2.05	$2.13	$2.25	$2.23
b. Townships	.92	.91	.77	.90	.86
c. School districts	3.61	3.37	3.52	3.72	3.73
d. Waterworks districts	.07	.05	.15	.29	.11
e. Special districts	.16	.11	.12	.27	.25
f. A.V. - E.K.W.A.	.00	.00	.00	.00	.06
g. Total Rate	$6.72	$6.49	$6.69	$7.43	$7.24
2. Kern County Area					
a. County rate	$2.56	$2.54	$2.54	$2.53	$2.70
b. Townships	.26	.27	.27	.39	.37
c. Special Districts	.06	.06	.07	.03	.04
d. Schools	3.76	3.78	4.94	6.34	4.05
e. A.V. - E.K.W.A.	.00	.00	.00	.00	.06
f. Total Rate	$6.64	$6.65	$7.82	$9.29	$7.22
3. Avg. rate in Water Agency area	$6.70	$6.52	$6.93	$7.87	$7.24

4. Assessment Roll. Taxes for all districts are levied from the same assessment roll.

5. Legal Limits on Tax Rates (in dollars per $100 assessed valuation)

a. County Library	$0.30	
b. Supervisorial road districts	0.40	
c. Flood Control district	0.15	(Plus taxes for bonds and other special assessments. No limit for drainage improvement)
d. Cemetery districts	0.20	
e. Hospital districts	0.20	(Plus tax for bonds and other special assessments)
f. School districts	2.00	(Through junior college. Bonded debt subject to additional rates. Increased rates may be allowed by Calif. Education Code.)

6. Taxes by Classification of Property. With rare exceptions, tax rates apply to all classes of taxable property, whether real or personal, secured or unsecured.

7. Division of Tax Rates into Separate Levies. Most tax rates are consolidated rates for all purposes. However, many rates are broken down into maintenance rates and bond repayment rates, where applicable. Furthermore, in Los Angeles County, tax rates for some taxing districts are broken down into various components as shown below:

County Tax Rate: general fund, interest and sinking fund, exploitation and exposition

School Tax Rates: general funds, bonds, junior college tuition, county school service

County Flood Control District, Hospital Districts, and County Water Districts: maintenance funds, interest and sinking funds

Sanitation Districts: interest and sinking fund, maintenance, refuse disposal

Waterworks Districts: interest and sinking funds, general funds, and accumulative capital outlay funds.

G. Record of Tax Collections on Property in the Antelope Valley-East Kern Water Agency

	Fiscal Year	Amount Levied	Cash collections in year of levy: Amount	Cash collections in year of levy: %	Uncollected at end of fiscal year: Amount	Uncollected at end of fiscal year: %
1. Los Angeles County Area						
	1960-61	$ 7,770,000	n.a.[1]	n.a.	n.a.	n.a.
	1959-60	7,518,000	$ 7,089,500	94.3%	$ 428,500	5.7%
	1958-59	6,601,000	6,251,100	94.7	349,900	5.3
	1957-58	5,467,000	5,231,900	95.7	235,100	4.3
	1956-57	3,941,000	3,838,500	97.4	102,500	2.6
	1955-56	2,950,000	2,879,200	97.6	70,800	2.4
	1954-55	2,081,000	2,022,700	97.2	58,300	2.8
	1953-54	1,606,000	1,556,200	96.9	49,800	3.1
	1952-53	1,213,000	1,180,200	97.3	32,800	2.7
	1951-52	1,016,000	n.a.	n.a.	n.a.	n.a.
Total 1952-53 thru	1959-60	$31,377,000	$30,049,300	95.8%	$1,327,700	4.2%
2. Kern County Area						
	1960-61	$ 2,432,000	n.a.[1]	n.a.	n.a.	n.a.
	1959-60	2,876,000	$ 2,852,300	99.2%	$ 23,700	0.8%
	1958-59	2,087,000	2,068,800	99.1	18,200	.9
	1957-58	1,438,000	1,428,000	99.3	10,000	.7
	1956-57	1,211,000	1,205,400	99.5	5,600	.5
	1955-56	1,142,000	1,137,500	99.6	4,500	.4
Total 1955-56 thru	1959-60	$ 8,754,000	$ 8,692,000	99.3%	$ 62,000	0.7%

[1] n.a. = not available

3. When Taxes are Due

   a. Due date: one-half of tax levy due each on November 1st and February 1st.

   b. When delinquent: December 10th and April 10th following due date.

   c. Penalties: penalties attach as of the delinquent date, to the extent of 6% of each delinquent installment. No discounts are allowed for prompt payment. Penalties are enforced.

4. Tax Sales. Tax sales of delinquent property are regularly held by the county.

5. Estimated Tax Delinquency. Each year, the county tax collector estimates a tax payment delinquency which is used for budget purposes and for computing necessary tax levies and rates for the ensuing year. The estimate is generally 5% of the total levy.

6. Collection of Taxes. The water agency does not collect its own taxes or the taxes of other taxing districts. The county tax collector collects all taxes.

H. Receipts and Disbursements of the Antelope Valley-East Kern Water Agency

	Fiscal Year		
	1958-59	1959-60	1960-61
1. Cash, beginning of fiscal year	0	0	$ 2,061.12
2. Notes Payable		$20,005.00	15,000.00
3. Receipts			
a. Tax levies	0	0	78,762.82
b. Water sales	0	0	0
c. Other continuing revenues	0	0	0
d. Notes	0	0	0
e. Bonds	0	0	0
f. Total receipts	0	$20,005.00	$93,762.82
4. Total Cash Plus Receipts	0	$20,005.00	$95,823.94
5. Disbursements			
a. Operating expense (admin.)	0	$17,206.15	$30,644.20
b. Water purchases	0	0	0
c. Capital and emergency expenses	0	683.80	1,018.41
d. Debt service	0	500.00	
(1) Interest payments	0	168.13	856.41
(2) Principal payments	0	0	35,000.00
(3) Payroll taxes not disbursed	0	(614.20)	120.40
(4) Special Deposit Fund	0	0	20,000.00
6. Total Disbursements	0	$17,943.88	$87,639.42
7. Cash, End of Fiscal Year	0	$ 2,061.12	$ 8,184.52

I. Sinking Fund Operations. There are no sinking funds being operated by the Agency at the present time.

J. Future Debt Service Requirements. None exist for the Agency as an entity at the present time.

K. Management and Services

1. Fiscal Policies. The Agency has been in existence such a short time and has had so little money with which to operate that no valid judgment can be made of its fiscal policies.

2. General Character and Efficiency of the Management. The management has been diligent and aggressive both in its efforts toward formation of the Agency and in its negotiations with the State for a water service contract.

3. Services Performed by the Agency. Thus far, the Agency has acted only as a disseminator of information and as a negotiator for a water service contract with the State. Upon receiving imported water, it will act as a wholesaler and distributor of water to local water agencies and districts.

L. Economic Background

1. Land Area. The Agency encompasses about 1,360,000 acres of land, of which about 560,000 acres are in Los Angeles County and about 800,000 are in Kern County.

2. Population

Year	Los Angeles County Area	Kern County Area	Total Water Agency Area
1940	5,600	4,200	9,800
1950	12,800	7,900	20,700
1960	46,900	18,100	65,000

3. Employment

	Number Employed		
	1950	1960	1970 (est.)
Agriculture	2,200	2,200	2,200
Manufacturing & Commerce	2,500	12,000	20,000
Military	1,700	13,200	18,700
Total	6,400	27,400	40,900

4. Agriculture

Crop	Unit	Production of Leading Crops 1956	1957	1958	1959	1960
Alfalfa Hay	ton	242,000	248,000	268,000	264,000	279,000
Wheat	cwt.	138,000	267,000	307,000	222,000	274,000
Barley	cwt.	182,000	280,000	490,000	222,000	226,000

5. Industry

a. Principal Products

(1) Borates and other industrial chemicals

(2) Cement

(3) Industrial minerals

(4) Graphite electrodes

(5) Reclaimed metals

(6) Fresh-dressed and frozen poultry

b. Large industrial plants in the area:

(1) Edwards Air Force Base

(2) U. S. Air Force Plant 42

(3) U. S. Borax & Chemical Co.

(4) California Portland Cement Co.

(5) Great Lakes Carbon Co.

6. Trade. Wholesale trade activities are negligible within the Antelope Valley-East Kern Water Agency, because the area is not a marketing center for goods. Instead, the area depends on metropolitan Los Angeles, and to a lesser extent, Bakersfield, for wholesale trade in all types of commodities and products. Retail trade is confined to the usual activities associated with supplying goods and services to community residents and rural families. There is some retail trade based on supplying production materials to farmers. Tourist trade, except for persons passing through the area on their way elsewhere, is relatively unimportant.

7. Transportation. The area is served by the Southern Pacific and the Atchison, Topeka and Santa Fe Railroads. These facilities appear to be ample to serve the needs of agriculture and industry. Considering the state of the area's development, it is well supplied with good highways. U. S. Highways 6 and 466 traverse the area and provide more than ample facilities to meet the area's requirements. Trucking appears more important than railroads as a means of commercial transportation.

8. Natural Resources. There are no lumbering activities in the area, but considerable mining is practiced. The most important products are borates, cement, salt, clay and other nonmetallic industrial minerals. There is no metallic ore extraction of major importance. Proven reserves of the important mineral products are adequate for at least 100 years at present rates of extraction.

M. Financial Data for the Water Agency Area

1. General Data

	Los Angeles Co. Area	Kern Co. Area	Entire Water Agency Area
a. Population:			
1950	12,800	7,900	20,700
1960	46,900	18,100	65,000
b. Assessed Valuation			
(1) Amount, 1959-60	$101,182,000	$ 39,951,000	$132,133,000
(2) Basis of Assessment	23.3%	21.2%	22.8%
(3) Est. Full Valuation	$434,258,000	$145,995,000	$580,253,000
c. Bonded Debt (as of 12-31-60)	$ 17,324,000	$ 2,482,000	$ 19,806,000
d. Tax Collections, 1959-60	$ 7,089,500	$ 2,852,300	$ 9,941,800

2. Per Capita Data

a. Assessed Valuation	$ 2,157	$ 1,710	$ 2,033
b. Estimated Full Valuation	9,259	8,066	8,927
c. Bonded Debt	369	137	305
d. Tax Collections	151	158	153

3. Ratios

a. Tax supported bonded debt as % of:			
(1) Assessed valuation	17.1%	8.0%	15.0%
(2) Estimated full valuation	4.0	1.7	3.4
(3) Tax collections	244.4	87.0	199.2
b. Percentage increase (decrease)			
(1) Population, 1950 to 1960	266%	129%	214%
(2) Assessed Valuation 1951-52 to 1959-60	442	197	355
(3) Bonded Debt, 1951 to 1960	1189	242	857
(4) Tax Collections, 1955-56 to 1959-60	146	151	148

Antelope Valley 7 pdf 1

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