

GROUNDWATER MANAGEMENT PLAN

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

LODI, CALIFORNIA

SEPTEMBER, 1995

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NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
GROUND WATER MANAGEMENT PLAN

I. INTRODUCTION

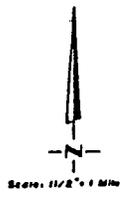
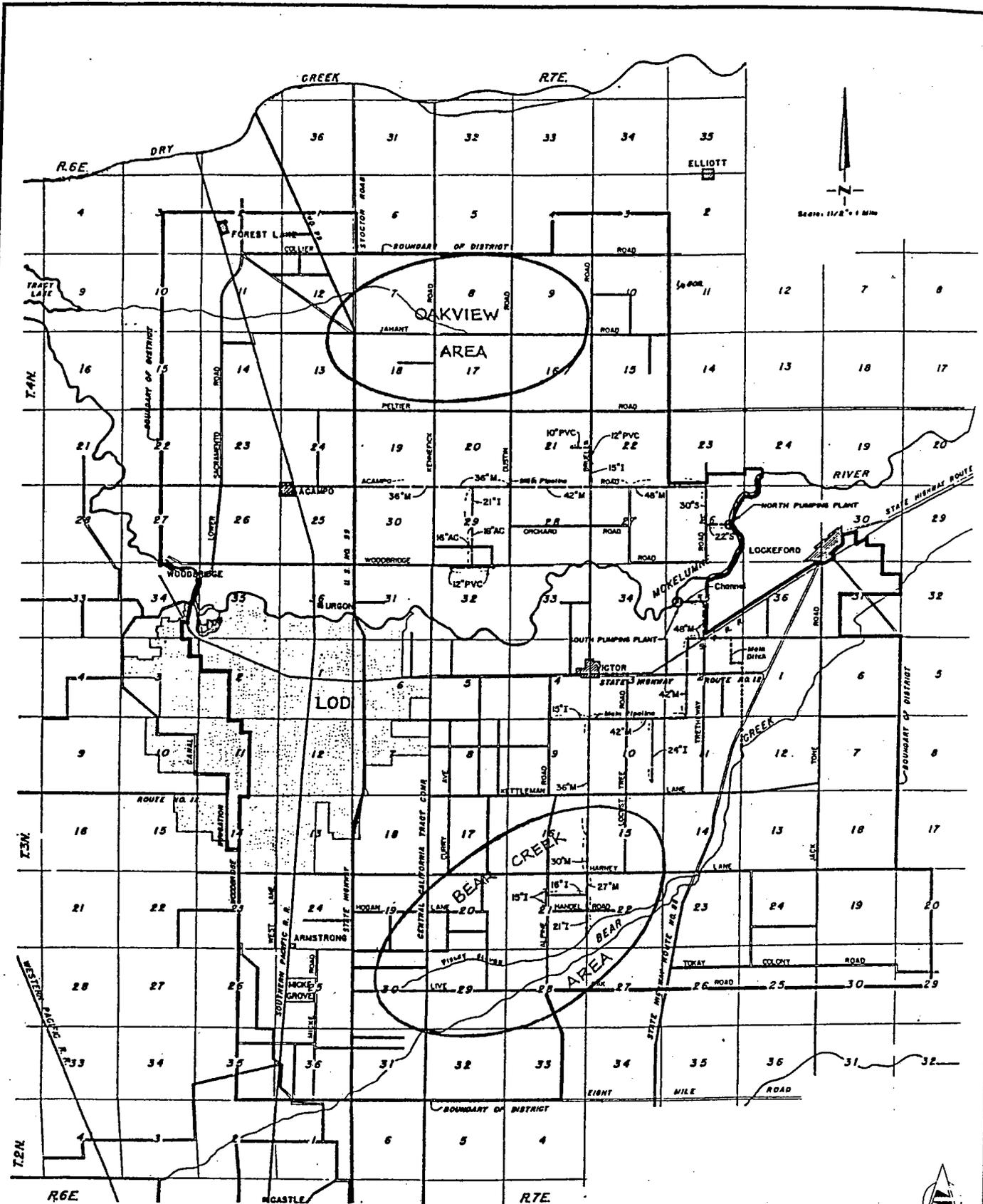
In response to California Water Code Section 10753.7 et seq. (AB 3030, 1992), North San Joaquin Water Conservation District has authorized the preparation of a ground water management plan to protect ground water supplies, encourage the balanced use of available water supplies and to protect the quality of ground water in the District area.

The authorizing legislation provides that the District, after public notice, shall conduct a public hearing as to whether a ground water management plan should be prepared. After such hearing, the District may draft a Resolution of Intention to adopt a ground water management plan and shall publish such resolution following which a draft ground water management plan is prepared. Hearing on the draft plan shall take place and unless a majority of the landowners representing more than 50 percent of the assessed valuation of the District protest, the ground water management plan may be adopted.

If fees and assessments are required in the implementation of the ground water management plan, such fees and or assessments can only be fixed and collected if such authority is approved by a majority of votes cast in a popular election.

II. STUDY AREA

North San Joaquin Water Conservation District, comprising approximately 52,700 acres of land, is situated in the northern part of the County of San Joaquin, State of California. The northern boundary of the District is generally about two miles south of Dry Creek which is the north boundary of San Joaquin



Average Irrigated Parcel Area: 20 Acres
 City of Lodi Population: 45,790

DISTRICT FACILITIES	JAMES F. SORENSEN CONSULTING ENGINEER 209 SOUTH LOCUST STREET VISALIA, CALIFORNIA 93291 209-732-7933

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
 LODI, CA.

County. The easterly boundary of the District north of the Mokelumne River is about two miles west of the northerly extension of Jack Tone Road which would run through the town of Lockeford. South of the Mokelumne River the District easterly boundary is generally along Tully Road, which is one mile east of Jack Tone Road. On the south the District boundary is partially along Liveoak Road for the easterly half and along Eight Mile Road for the westerly half of the southern portion of the District. South of Lodi the District westerly boundary is one-half mile west of West Lane through the City and the boundary north of Lodi is approximately three-fourths mile west of Lower Sacramento Road.

The Mokelumne River runs generally east to west through the approximate middle of the District and the river bottom areas are generally 15 to 25 feet below the adjacent land surfaces to the north and south of the river.

Approximately 2,500 acres within the District lies within the corporate limits of the City of Lodi which has a population of approximately 50,000 persons.

A map showing the District area and boundaries is found on Plate 1 and Plate 2 indicates the location of the District.

III. HISTORICAL DATA

North San Joaquin Water Conservation District was organized November 8, 1948 under and pursuant to the provisions of the Water Conservation District Act of 1931, as amended, Act 9127(c), General Laws of California. The purpose of the District is to conserve the water of streams and the Mokelumne River for irrigation, domestic uses, and for municipal uses including domestic recreational and industrial purposes. Within these powers, the District is continuing

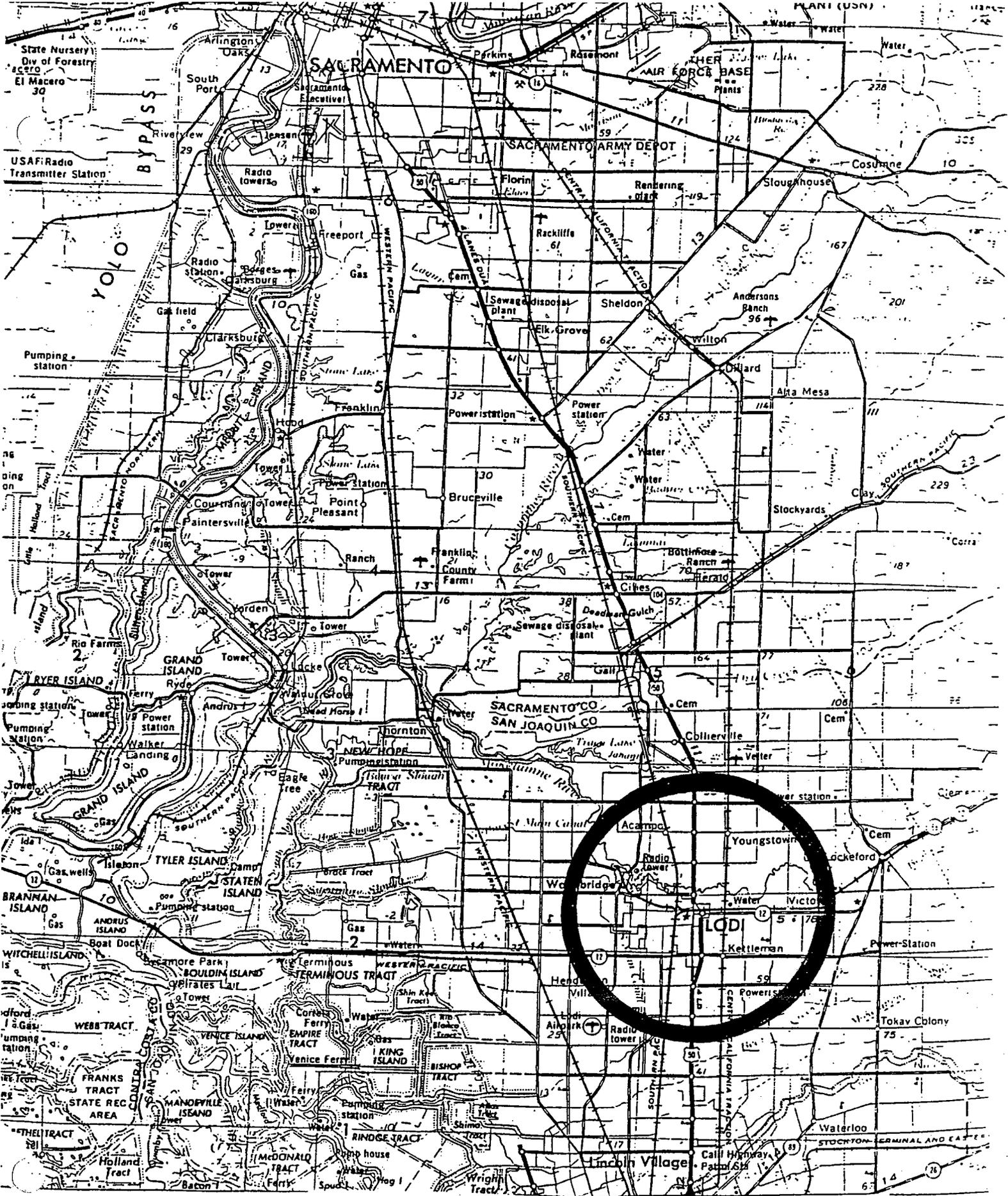


PLATE 2

efforts to obtain supplemental surface water supplies to meet current and projected deficiencies.

The District has been nearly fully irrigated for over 50 years is indicated by the solid black areas on Plate 3.

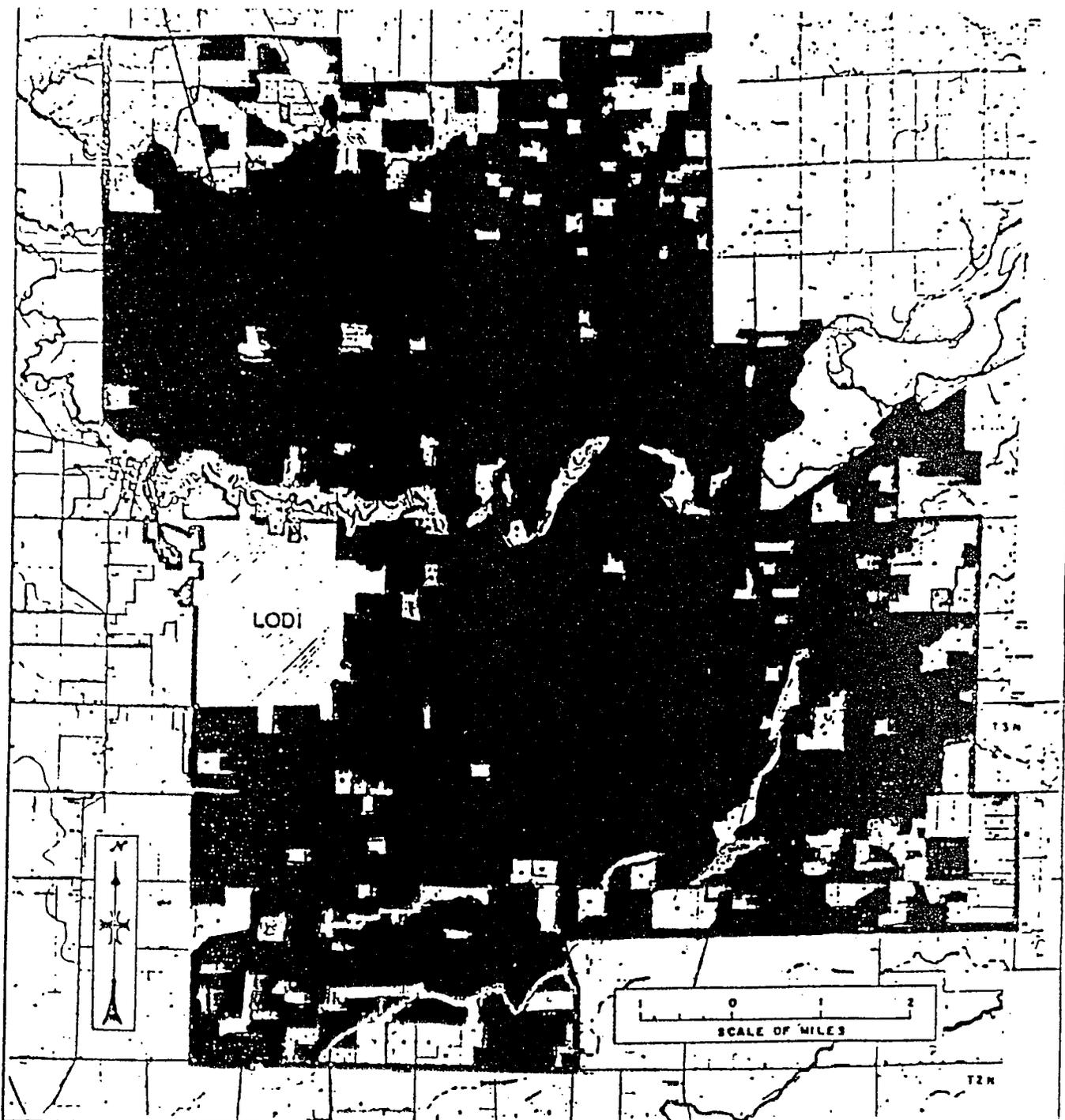
IV. WATER SUPPLIES

A. Surface Waters

The District has sought since its formation to obtain water for diversion to District lands to offset the overdrafts and deficiencies brought about by the sole dependence on ground water sources.

Many years ago the District filed an application to divert water from the Mokelumne River through facilities to be constructed near Clements. At the same time that a hearing was held on that application by the State Engineer (predecessor of the State Water Resources Control Board), action was taken on applications of the East Bay Municipal Utility District for the diversion of the Mokelumne River supplies to the East Bay area. The State Engineer with his Decision 853 gave priority to East Bay Municipal Utility District for the export of Mokelumne River water. In that Decision, North San Joaquin Water Conservation District was given the right to take waters up to July 31st of each year which were surplus to the needs of East Bay Municipal Utility District which thereby was given priority. In that decision, the District was advised to seek water from the Folsom-South Canal and the District then filed an application for American River water to be diverted near Nimbus and taken into the then proposed Folsom-South Canal.

The District desired to commence the diversion of the water even though it was termed "surplus" and undertook construction of a pump station and



- EXPLANATION**
- IRRIGATED**
- Pasture (A) and alfalfa (B)
 - Rice (C)
 - Sugarbeets (D), beans (E), tomatoes (G), truck crops (H), and misc. field crops (J)
 - Deciduous orchard (I), and nut crops (K-L)
 - Grasses (L)
- NONIRRIGATED**
- Grain and hay (M), grapes, nuts, orchard (N), cotton (O), land being leased (P)
- NONCULTIVATED**
- Native pasture (R), nonagricultural (S)
 - North San Joaquin W. C. D.

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 CENTRAL VALLEY PROJECT
 AMERICAN RIVER DIV. - AUBURN-FOLSOM SOUTH UNIT - CALIF
 NORTH SAN JOAQUIN
 WATER CONSERVATION DISTRICT
 LAND USE - 1955

JULY 1966

859-208-316

GPO 973-158

PLATE 3

diversion channel with pipelines and open ditches. With the knowledge that the water supply would be undependable, the District entered into negotiations with East Bay Municipal Utility District for the use of its unused storage and thereafter entered into a contract by which North San Joaquin Water Conservation District could, under certain conditions, store water in East Bay Municipal Utility District's storage facilities. The contract provides that the arrangements will be in effect until Folsom-South Canal is completed into the North San Joaquin Water Conservation District.

In a hearing on that American River application and applications of the United States Bureau of Reclamation, the District's application was denied and the District was advised to contact the United States Bureau of Reclamation for a water service contract from the federal Folsom-South Canal.

The District negotiated with the U.S. Bureau of Reclamation from 1965 and 12 drafts of contracts submitted by the U.S. Bureau of Reclamation were approved by the District. The U.S. Bureau of Reclamation has not executed any of these contracts which they submitted to the District. The U.S. Bureau of Reclamation will not enter into a contract with the District for water from the American River.

The District's original application for Mokelumne River sought 50,000 acre-feet of water for annual delivery into District facilities and in late 1992 and early 1993, the District sought 50,000 acre-feet of Mokelumne River water in a hearing before the State Water Resources Control Board. There has been no decision on that hearing.

East Bay Municipal Utility District is reducing the surplus waters available to North San Joaquin Water Conservation District as its needs increase. The nature of the surplus water and its lack of dependability, has

made it virtually impossible to maintain surface water deliveries into the District areas since most farmers and water users operate on multiple-year contracts with Pacific Gas & Electric Company and have had in addition to drill new wells or purchase new pumps.

Diversions of Mokelumne River water into North San Joaquin Water Conservation District commenced in 1959 and have continued to the present when water is available as surplus to the needs of East Bay Municipal Utility District.

Table 1 shows the diversions from the Mokelumne River into North San Joaquin Water Conservation District.

As previously indicated, surplus water availability from the Mokelumne River for District use is extremely erratic.

B. Ground Water

The District lands are underlain by aquifers of varying capabilities for pumping or recharge. Some of the lands east of Lodi have better sands and gravels than do areas north of the Mokelumne River and along the eastern portion of the District.

Ground water observation charts indicate continued general dropping of the water table in most areas of the District, particularly in areas north of the Mokelumne River. Diversions of water, such as have been possible, made on a temporary basis from the Mokelumne River have served to reverse the downward trend of ground water levels in the Victor area south of the Mokelumne River, but it is obvious that the situation is not satisfactory. With further reductions of the surplus Mokelumne River surface supplies available to the District, the ground water level lowering is expected to continue.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

MONTHLY DIVERSIONS FROM MOKELUMNE RIVER

Acre-Feet

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1958	0	0	0	0	0	0	0	0	23	0	0	1	24
1959	0	0	15	2	26	0	0	0	0	0	0	0	43
1960	0	0	0	0	106	185	1	148	160	0	0	0	600
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	139	275	319	443	386	272	56	0	0	1,890
1963	0	0	0	0	42	202	342	318	250	65	6	0	1,225
1964	0	0	0	0	0	268	307	307	119	0	0	0	1,001
1965	0	0	0	0	520	954	1,142	901	740	298	0	0	4,555
1966	0	0	24	624	729	1,185	1,364	1,109	451	89	0	0	5,575
1967	0	0	2	8	721	1,226	1,726	1,765	974	350	0	0	6,772
1968	0	30	41	827	1,644	1,725	1,851	1,513	742	147	0	0	8,520
1969	0	0	24	444	1,620	1,442	1,771	1,667	731	126	0	0	7,825
1970	0	0	84	1,233	1,609	1,582	1,845	1,699	847	230	0	0	9,129
1971	0	0	238	1,272	1,311	1,507	1,540	1,288	772	196	0	0	8,124
1972	0	0	735	1,481	1,594	1,590	1,748	1,592	717	0	0	0	9,457
1973	0	0	0	797	1,878	1,974	2,198	1,883	728	29	0	0	9,487
1974	0	0	33	55	1,416	1,785	1,933	1,891	993	268	0	0	8,374
1975	0	0	2	344	1,805	1,832	2,204	1,786	800	177	0	0	8,950
1976	0	0	0	0	0	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	19	1,015	1,599	1,788	1,082	780	431	94	0	6,808
1979	0	0	3	382	1,315	1,660	1,609	1,277	617	688	96	0	7,647
1980	0	1	0	292	944	1,514	1,594	1,223	539	832	612	1	7,552
1981	0	0	0	294	1,083	1,564	1,826	1,083	664	101	0	0	6,615
1982	0	0	0	0	721	1,430	1,590	1,104	465	26	0	0	5,336
1983	0	0	0	0	267	1,243	2,130	1,034	595	473	0	0	5,742
1984	0	0	0	544	1,158	1,551	1,637	968	822	394	25	0	7,099
1985	0	0	0	130	1,056	1,377	1,547	1,039	457	125	0	0	5,731
1986	0	0	0	91	1,022	1,400	1,660	872	683	313	0	0	6,041
1987	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0
1992*	0	0	0	5	9	3	7	8	0	10	0	0	42
1993	0	0	0	0	321	768	873	587	479	129	0	0	3,157
1994*	0	0	0	5	5	4	7	3	4	4	0	0	32
1995	0	0	0	0	46	540	688	772	413	184	0	0	2,643

* Local Riparian Only

The District also diverts water into several creeks, including Bear Creek and Pixley Creek and water users are able to divert water from those creek channels to irrigate lands near those channels.

Ground water observations have been taken for many years in North San Joaquin Water Conservation District by several agencies with those made by East Bay Municipal Utility District being of the longest duration of years.

Ground water elevations are shown on Plate 4 which show contours of equal elevation. Contours showing equal depths to ground water are shown on Plate 5.

Examination of Plate 4 indicates the varied ground water conditions in the Lodi area. Along the south side of the Mokelumne River north of the Town of Victor, the ground water level is as much as 10 feet above sea level while about three miles south of the Town of Lockeford, ground water levels are indicated at 50 feet below sea level. Generally, the slope of the ground water is from north to south toward the ground water depression in the city of Stockton where ground water elevation is about 60 feet below sea level, indicating a widespread draining of ground water toward that depression.

In the District, ground water elevations north of the Mokelumne River range from sea level to 30 feet below sea level. In the areas south of the Mokelumne River, ground water levels range from sea level to 40 feet below sea level.

Reference to Plate 5 showing lines of equal depth to ground water, depths range from 130 feet on the eastern edge to about 50 feet on the westerly portions of the District.

Review of Plates 4 and 5 indicate that the Mokelumne River is of considerable influence in replenishing ground water both north and south of the

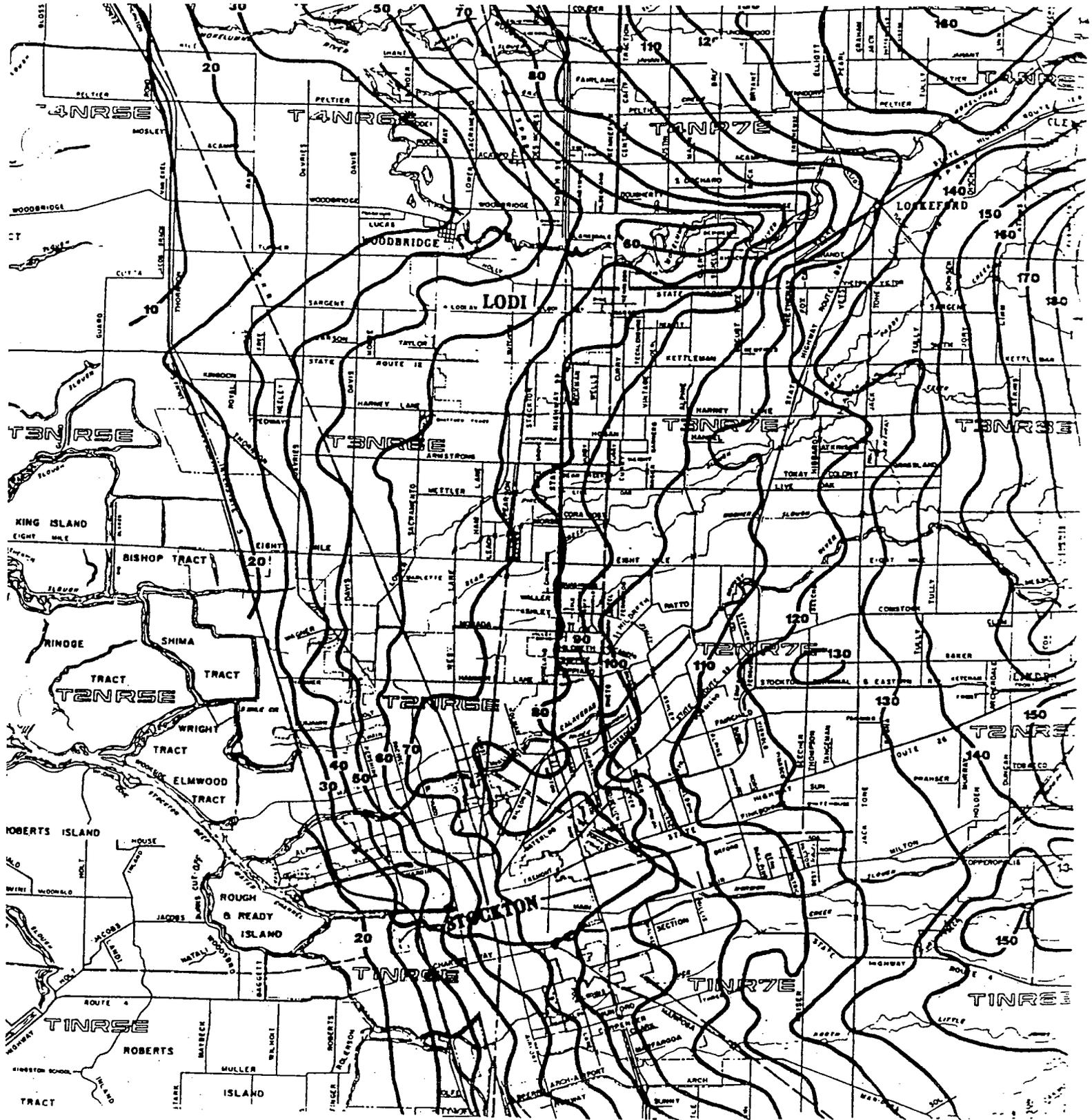


LINES OF EQUAL ELEVATION
OF GROUNDWATER

FALL 1994

SAN JOAQUIN COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

PLATE 4



LINES OF EQUAL DEPTH

TO GROUNDWATER

FALL 1994

SAN JOAQUIN COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

PLATE 5

Mokelumne River. Any reduction of flows in the Mokelumne River will lead to lesser amounts of ground water recharge.

In an effort to determine whether there was a difference in the ground water levels in areas in which North San Joaquin Water Conservation District has been able to deliver surface water and areas without surface water, two areas have been designated. These two areas are shown on Plate 1. On the north side of the river observation wells have been used in the Oak Tree Area as an area which has not received any supplemental surface water. Similarly on the south side of the river the Victor Area observation wells have been used to indicate results in an area where the District had delivered supplemental surface water. For comparative purposes, Charts 3 shows the ground water levels for both the Oak Tree Area and the Victor Area.

V. WATER QUALITY

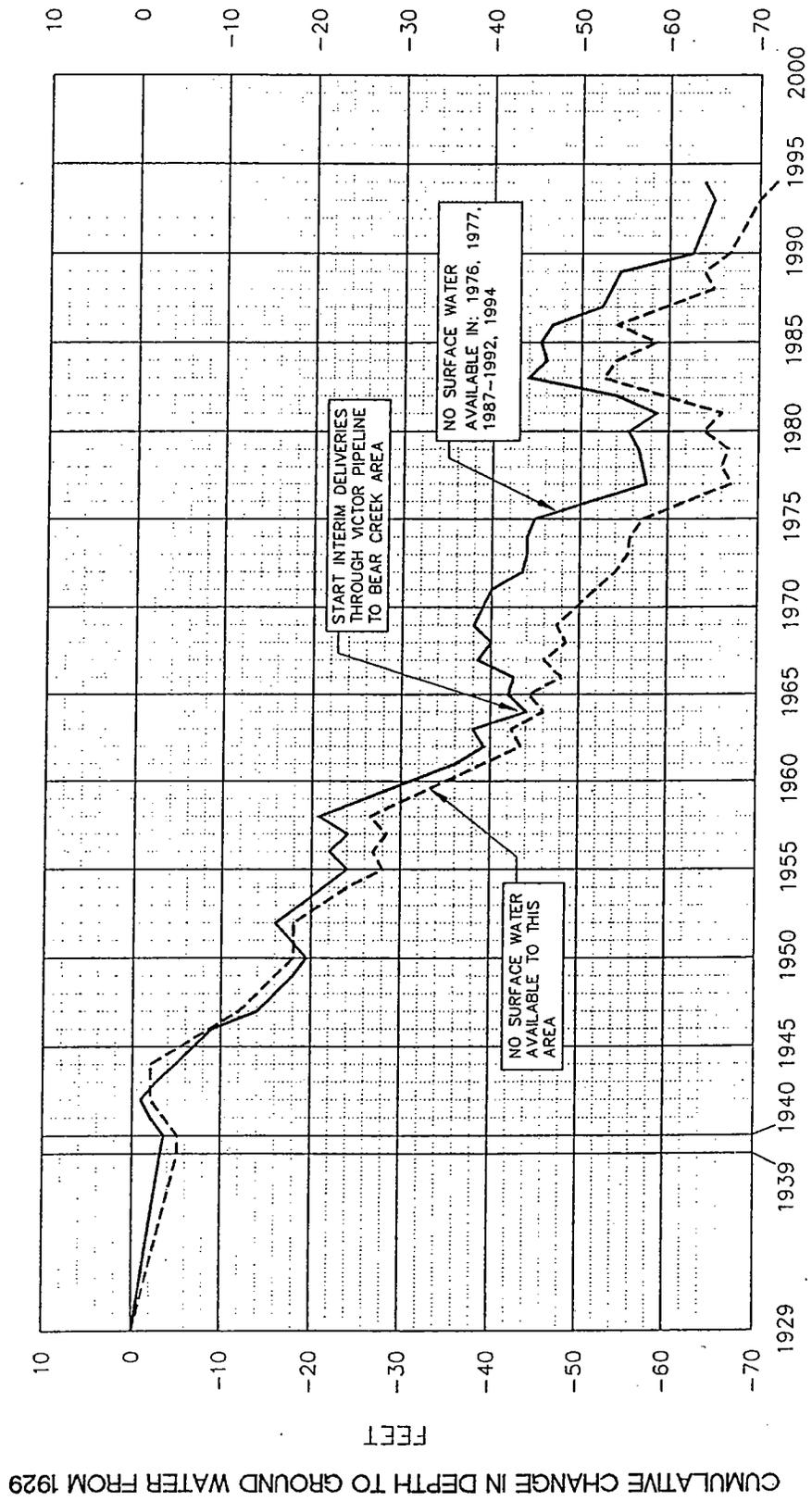
Available water quality tests indicate that ground water in the North San Joaquin Water Conservation District service area meets the various local, state and federal water quality standards except in areas within and east of the City of Lodi. In this area, some wells formerly operated by the City of Lodi in this aforementioned area have been shut down due to the presence of DBCP (dibromochloropropane). Currently, ground water use by the City of Lodi meets quality standards of all agencies and the levels of DBCP are decreasing.

VI. CLIMATIC CONDITIONS

The North San Joaquin Water Conservation District with Lockeford near its easterly boundary and the City of Lodi on the westerly boundary has a

GROUND WATER

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT
BEAR CREEK AREA ——— OAKVIEW AREA - - - - -



JAMES F. SORENSEN
CONSULTING ENGINEER

moderate climate typified by hot, dry summers and cool to cold winters. Temperature and precipitation conditions are typified by records kept in the City of Lodi.

Summer temperatures for a typical four-year period range from a maximum of 105°F to 102°F during the four months June through September with minimums during that period ranging from 46°F to 41°F.

Late fall and winter temperatures range from maximums of 67 in December and January and to the 80's and 90's in months of March through May and October through November. Minimum temperatures during this latter periods range from 21 and 23 December and January to 45°F to 46°F in July and August. Temperatures below freezing at 32°F are common in November, December, January and February with temperatures below 24°F occurring occasionally as late as mid-February and as early as mid-November.

Precipitation at Lodi ranges from below 6 to 7 inches and a maximum of more than 25 inches the average being about 17 inches as indicated on the following Table 2.

VII. TOPOGRAPHY

The lands of the District slope generally from northeast to southwest at rates of 5 feet to 10 feet per mile. There are several creeks which follow this slope. On the north Jahant Slough is the major and there are other minor channels north of the Mokelumne River.

On the south side of the Mokelumne River there are several creeks of which Bear Creek is the major channel. Other channels include Pixley Slough which branches from Bear Creek, Paddy Creek and Mosher Creek.

On both sides of the Mokelumne River there are other minor channels, most of which have been filled and graded as the adjoining lands were put into

TABLE 2
PRECIPITATION AT LODI

<u>MONTH</u>	<u>AVERAGE RAINFALL</u> (Inches)
September	.35
October	.86
November	2.42
December	2.93
January	3.34
February	2.55
March	2.61
April	1.48
May	.37
June	.13
July	.06
August	<u>.06</u>
TOTAL	17.16

agricultural production. These channels, both north and south of the Mokelumne River, have their headwaters in the foothills east of the District.

The Mokelumne River flows generally east to west through the District with the channel north and east of Lockeford flowing southwesterly and the channel west of Lodi flowing in a northwesterly direction. The Mokelumne River has cut a trench which varies from one-quarter mile to one mile in width. The wider river bottom areas have historically been subject to flooding during high flow times and it is only in more recent years that the river has been levied extensively to protect these adjacent low lying areas most of which have been developed for agriculture.

The bluffs along the Mokelumne River vary in height from about 40 feet near the eastern edge of the District to 20 feet near the western boundary.

Lands north of the river are slightly less even than those on the south of the river. The northern areas have been graded for irrigation with the most northerly portion being somewhat more uneven.

To the south of the Mokelumne River the lands slope more evenly with fewer irregularities than those found to the north of the river.

Elevations of District lands vary from about 35 feet above sea level on the west to about 100 feet above sea level on the eastern portion.

VIII. SOILS

Soils in the District are predominantly of the TOKAY-ACAMPO classification, being fairly well drained with moderately coarse soils which generally overlay a cemented hardpan base. Some of these soils, however, are quite deep. Clay lenses exist in some areas which tend to limit downward percolation of surface water.

Some of the soils in the northern portion of the District and in the southeasterly portion are of the SAN JOAQUIN-BRUELLA classification which generally are fairly well drained, are of fairly coarse texture, but tend to have clay lens layers at levels somewhat closer to the surface.

Along the Mokelumne River, particularly in the floodplain zones, the COLUMBIA-VINA-COYOTECREEK classifications predominate. Some of these soils are well drained and deep being underlain by sands and gravels, while others are not well drained because of clay layers which have been laid down by river overflow.

The following table indicates U.S. Department of Agriculture soil classifications for District soils.

TABLE 3
SOIL CLASSIFICATIONS

<u>Soil Name</u>	<u>Description</u>
Tokay	Coarse-loamy, mixed
Acampo	Coarse-loamy, mixed
San Joaquin	Fine, mixed
Bruella	Fine-loamy, mixed
Columbia	Coarse-loamy, mixed
Vina	Coarse-loamy, mixed
Coyotecreek	Fine-silty, mixed

IX. CROPS

District soils are suitable for most irrigated crops that are grown in the central valley of California. It is obvious that with rainfall of about 1.5 feet per year, that most crops will require irrigation for full production.

Water supplies to supplement natural rainfall generally come from ground water underlying the District and from surplus flows of the Mokelumne River. With the highly erratic surplus flows from the Mokelumne River, heavy reliance must be placed on ground water pumping and such use has resulted in falling ground water tables under most areas of the District.

Annual crops vary from year to year with predominate crops being tomatoes, alfalfa, grain, corn and vegetables. Permanent crops are predominately grapes, cherries and walnuts with some almond acreages. Irrigated pasture occupies substantial acreage.

For many years the Lodi area was particularly well known for its tokay grapes, but in recent years wine grape varieties have predominated. There are several large wineries in the area and there has been some increase in the planting of grapes, most of which have been of the wine varieties.

The Table 4 indicates a typical recent acreage of crops.

X. WATER DISTRIBUTION FACILITIES

The District owns a pumping plant at a point on the south bank of the Mokelumne River approximately 1½ miles upstream easterly from the town of Victor. This pumping plant was constructed to divert temporary surplus supplies from the Mokelumne River to underground pipelines.

The District entered into an agreement with Mokelumne South Irrigation Association, Inc. in 1964 to purchase a pipeline system which was then connected to the District's existing Mokelumne River pipeline system.

Additionally, the District in 1969 purchased from the Locust Tree Pipeline Joint Venture and Alpine Pipeline System Joint Venture, underground pipeline systems owned by those entities.

The District owns a pumping plant on the north bank of the Mokelumne River approximately two miles northeast of the town of Victor. The District in 1972 purchased the Acampo pipeline system from the Mokelumne North Irrigation Association, Inc. This system serves the Acampo Road area north of the Mokelumne River with temporary surplus water supplies from the Mokelumne River.

TABLE 4
CROP SURVEY

<u>CROP</u>	<u>ACRES</u>	
Grapes	27,000	
Deciduous Fruits	3,000	
Vegetables	1,500	
Alfalfa	1,000	
Corn	2,000	
Pasture	6,500	
Sugar Beets	<u>500</u>	
Sub-Total Irrigated		41,500
Grain	5,000	
Idle	1,700	
Roads Channels	1,500	
Urban	<u>3,000</u>	
Sub-Total Non-Irrigated		<u>11,200</u>
TOTAL		52,700 acres

XI. WATER APPLICATION FACILITIES

On-farm facilities receiving water through the District facilities or from individually-owned pumps include pipelines and ditches to apply water through various private irrigating systems such as drip systems, furrows, checks, flooding and high or low volume sprinklers and misters. It is anticipated that continuing improvement of water application methods will take place in the future.

XII. MUNICIPAL AND INDUSTRIAL USES

Water needs for municipal and industrial uses have come chiefly from the City of Lodi or areas immediately adjacent.

Municipal uses for the City of Lodi are typical of Central Valley cities with water use and consumption being approximately the same as those for agricultural areas. Lodi water usage has resulted in generally falling ground water tables although such levels under the city areas have not fallen much below sea level except in very dry years.

Industrial uses are not of high water consumption and it is not anticipated that this pattern will change appreciably in the future.

The City of Lodi includes Lodi Lake in its northwestern area and this body of water is maintained during the spring-summer-fall seasons by Woodbridge Dam which maintains the lake level at elevations such that water can be diverted into canals of Woodbridge Irrigation District which lies generally to the west of North San Joaquin Water Conservation District.

XIII. INSTITUTIONAL MATTERS

North San Joaquin Water Conservation District is bounded by the south by Stockton East Water District which utilizes water from the Calaveras River and from ground water supplies. Woodbridge Irrigation District which lies to the west of North San Joaquin Water Conservation District derives its surface water supply from the Mokelumne River by diverting at Woodbridge Dam.

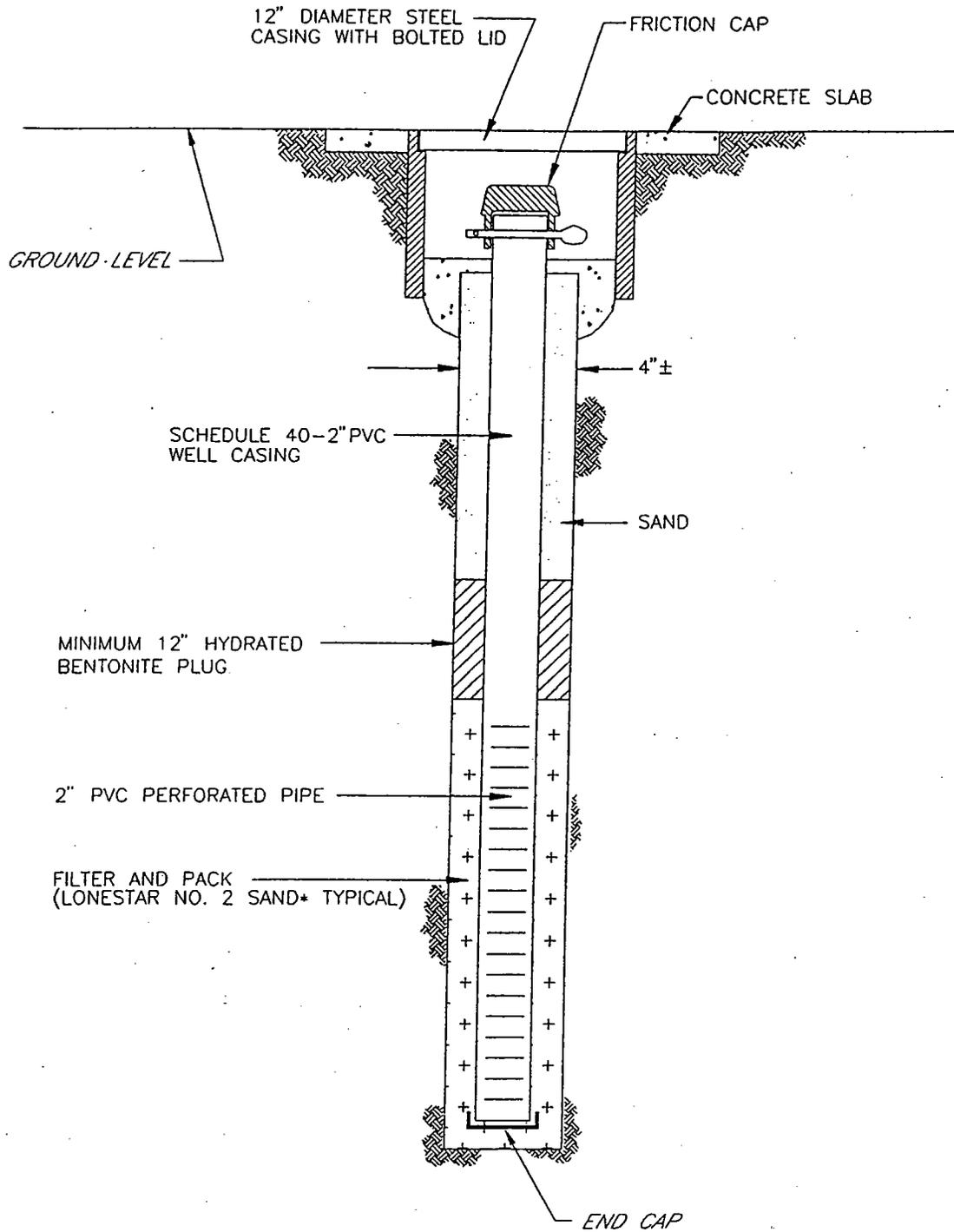
Areas north of the District are not organized into public entities. Lands east of the District are not organized into public water entities.

The District is within the boundaries of the San Joaquin County Flood Control and Water Conservation District which is governed by the San Joaquin County Board of Supervisors. The San Joaquin County Flood Control and Water Conservation District can and has designated zones. Assessments can be levied against such areas. North San Joaquin Water Conservation District lies within Zone 3.

XIV. PROPOSED GROUNDWATER MANAGEMENT PROGRAM

To balance and stabilize ground water levels, the District should continue efforts to acquire dependable surface water supplies from the Mokelumne River and/or other streams, both by local supplies or by participating other entities in developing conjunctive uses on a regional basis utilizing water supplies from the American River as well as from streams south of the District such as the Calaveras and the Stanislaus Rivers.

Currently, the District is facing uncertainties regarding future water supplies. At the federal level, the Federal Energy Regulatory Commission is considering changes to required minimum releases from Camanche Reservoir for fish.



**TYPICAL
MONITORING WELL DESIGN**

NO SCALE



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Also at this time, the California State Water Resources Control Board has not delivered a decision on requested Camanche Reservoir minimum releases which it considered in a hearing that concluded in January, 1993.

A conjunctive use project is now under study involving East San Joaquin Parties, of which North San Joaquin Water Conservation District is a party, and East Bay Municipal Utility District.

The District should encourage its landowners and water users to continue to improve water application methods to conserve the available surface and ground water supplies. In many cases, satisfactory crop yields can be obtained with decreased water application. Elimination of spill water, excess deep percolation and ponding can be of benefit to the District and its constituents.

The District should continue efforts to bring about ground water recharge through the development of injection wells, recharge ponds and use of conjunctive ground and surface water supplies wherever and whenever possible.

The District should continue reviewing ground water data obtained from East Bay Municipal Utility District, San Joaquin County, State of California and federal observations.

The District should develop financing plans which could be used in the event that additional surface water can be made available in the District for direct diversion or for ground water recharge. It is possible that regional development plans can be developed feasibly and it would be necessary that methods of financing which are not now available to the District be developed and put into place. New state legislation may be necessary to make it possible to raise additional funds.

If additional ground water observations are advisable, monitoring wells as shown on Plate 6 could be installed.