

CITY COUNCIL MEETING
JUNE 5, 1985

pg 440
CC 51a
ACCEPTANCE OF
EAST SIDE WATER
WELL SITING STUDY

Council was reminded that the Eastside Water Well Siting study was authorized by the City Council in July of 1984. This study was completed the first of May and was reviewed with Council at an Informal Informational Meeting of the Council. Upon Staff's recommendation, the Council accepted the Eastside Water Well Siting study dated May 1985 and directed the Public Works Department to proceed with property appraisals on property necessary to acquire the well sites on the east side for the City's water system.



CITY OF LODI

PUBLIC WORKS DEPARTMENT

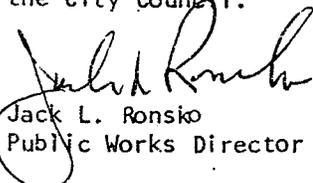
COUNCIL COMMUNICATION

TO: City Council
FROM: City Manager
DATE: May 30, 1985
SUBJECT: Eastside Water Well Siting Study

RECOMMENDED ACTION: That the City Council accept the Eastside Water Well Siting Study dated May 1985 and direct the Public Works Department to proceed with property appraisals.

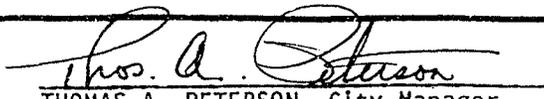
BACKGROUND INFORMATION: The Eastside Water Well Siting Study was authorized by the City Council in July of 1984. This Study was completed the first part of this month and was reviewed with the City Council at its last shirt-sleeve session of May 28. It is recommended that the Study be accepted by the City Council and that the City move expediently to acquire the necessary well sites on the east side of our water system.

The actual Study has not been included since it was previously submitted to the City Council.


Jack L. Ronsko
Public Works Director

JLR/eeh

APPROVED:


THOMAS A. PETERSON, City Manager

FILE NO.

MEMORANDUM, City of Lodi, Public Works Department

TO: City Manager
City Council

FROM: Public Works Director

DATE: May 23, 1985

SUBJECT: Eastside Water Well Siting Study

The next shirtsleeve session will be Tuesday, May 28, 1985 (day after Memorial Day) at 7:00 A.M. At this session, Dave Requa from Black & Veatch will be reviewing with the City Council the attached Well Siting Study.

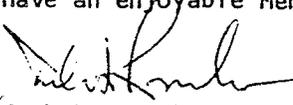
It is important that the City accept this Study as soon as possible in order that we can move ahead on the acquisition of the well sites on the east side of our system. As you are aware, both of the east side wells (Well 10 and Well 11) have been out of service for approximately two years. Money is budgeted for the replacement of these wells, however, we must first do test drilling and site acquisition.

It is recommended that prior to the shirtsleeve that you try to at least read or review the following pages:

Page 1
Page 2
Page 12
Figure 6
Page 25
Page 26

Please try to bring this report with you to the meeting of May 28.

Have an enjoyable Memorial Day weekend.


Jack L. Ronsko
Public Works Director

JLR/eeh

Attachment



WATER WELL

SITING STUDY

FOR THE

CITY OF LODI

MAY, 1985



Black & Veatch
ENGINEERS-ARCHITECTS

WATER WELL



SITING STUDY

FOR THE

CITY OF LODI



MAY, 1985



BLACK & VEATCH
ENGINEERS—ARCHITECTS

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3470 BUSKIRK AVENUE
MAILING ADDRESS: P.O. BOX NO. 4247
WALNUT CREEK, CALIFORNIA 94596

B&V Project 11733
May 6, 1985

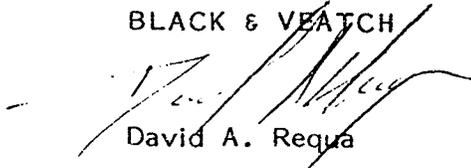
City Council
City of Lodi
221 West Pine Street
Lodi, CA 95240

We present herewith a "Water Well Siting Study" for the City of Lodi. This report contains a summary of our investigations and analysis for determining the optimum locations for new water wells on the east side of the city. Also contained in this report is our recommendation of four specific sites.

We appreciate the opportunity to assist the city in their continuing efforts to upgrade services to the citizens of Lodi.

Very truly yours,

BLACK & VEATCH


David A. Requa

mit
Enclosure

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INTRODUCTION

Water for the City of Lodi is taken from the local ground water supply. On the east side of the city, two existing wells are no longer serviceable and require replacement to supply current users. In addition, two new wells with a combined capacity of 4,000 gallons per minute (gpm) will be required in the near future to alleviate peak summertime shortages and support planned development. The objective of this study is to identify the best water well site locations on the east side of the city.

The area being evaluated for new well locations is east of the Central California Traction Company railroad tracks; bounded by Kettleman Lane to the south and the Mokelumne River to the north. A legal restriction on the city specifies the westernmost boundary of any new well siting as the north-south section line which is coincident with the western edge of the railroad right-of-way. To verify that the new well locations will have the least possible impact on local property owners, the area extending 1,000 feet west of the tracks was also considered in the study.

Selection of the best sites for the new wells is based upon a three step approach. First, the study area is evaluated through a graphic technique using a series of overlying plates to depict the intensity of the effect of each site criteria upon proposed well locations. The variations of effect for each criterion are depicted as a color shading from light to dark, representing from little or no impact to infeasible.



The completed composite figure depicts the most feasible sites as white and the least feasible sites as a dark shade with sites of intermediate potential shaded accordingly. Second, the technical aspects of ground water hydrology and existing water distribution system conveyance capacity were evaluated to establish technical criteria for final site selection. Third, the candidate sites were inspected to evaluate access for construction and maintenance and to minimize adverse impacts to the affected parcels.



SITE CRITERIA

Five site criteria issues were identified to be used in the first step of the analysis. The issues and a summary of the evaluation impact are shown in Table 1. Figures depicting the impact of each criteria follow the report text.

EXISTING FACILITIES

Overlay No. 1, shown on Figure 1, represents the impact of existing structures and property boundaries on the selection of well sites. This figure includes the area to the west of the tracks to fully evaluate the potential impact on local residences.

Existing structures, located from aerial photographs supplied by the County's Planning Department, are shown as dark. Setbacks of 100 feet around each structure are shaded 75 percent. In addition, parcels with an area of 1.0 acre or less are shaded 75 percent. These lots are considered to be significantly impacted by placement of a well upon the property. Other improvements, such as roads, are also shaded 75 percent. The remaining areas, left white, represent available locations least impacted by the areal properties of a new well.



Table 1. SITE CRITERIA

Overlay No.	Issue	Shading	Notes
1	EXISTING FACILITIES		
	o Existing structures o Structures setback	Dark 75% Shading	No wells placed with 100 feet of structures.
	o Small parcels	75% Shading	No wells placed on parcel of 1.0 acre or less.
2	EXISTING WELLS		
	o Existing water wells o Well setback	Dark 75% Shading	No new wells placed within 250 feet of existing wells.
3	LAND USE		
	o Light manufacturing o Agricultural zoning	25% Shading White	Greater economic impact upon property zoned light manufacturing.
4	WATER LINES		
	o 0-100 ft	White	\$30-\$45 per foot pipeline cost.
	o 100-500 ft	12.5% Shading	
o Over 500 ft	25% Shading		
5	POWER LINES		
	o 0-100 ft	White	\$30-\$75 per foot power cost beyond 100 ft.
	o 100-500 ft	12.5% Shading	
o Over 500 ft	25% Shading		



Figure
STRUCTURES AND PRO

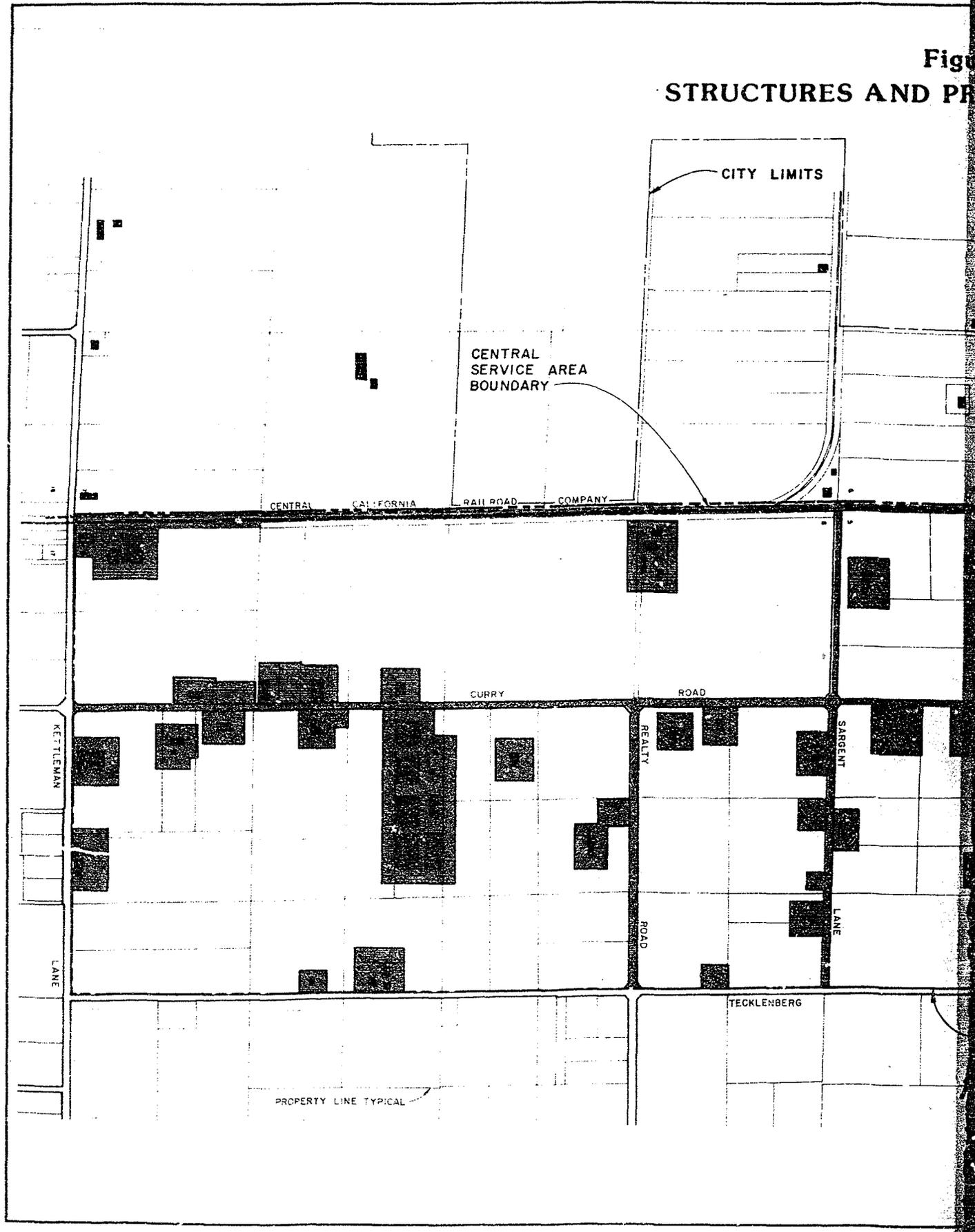
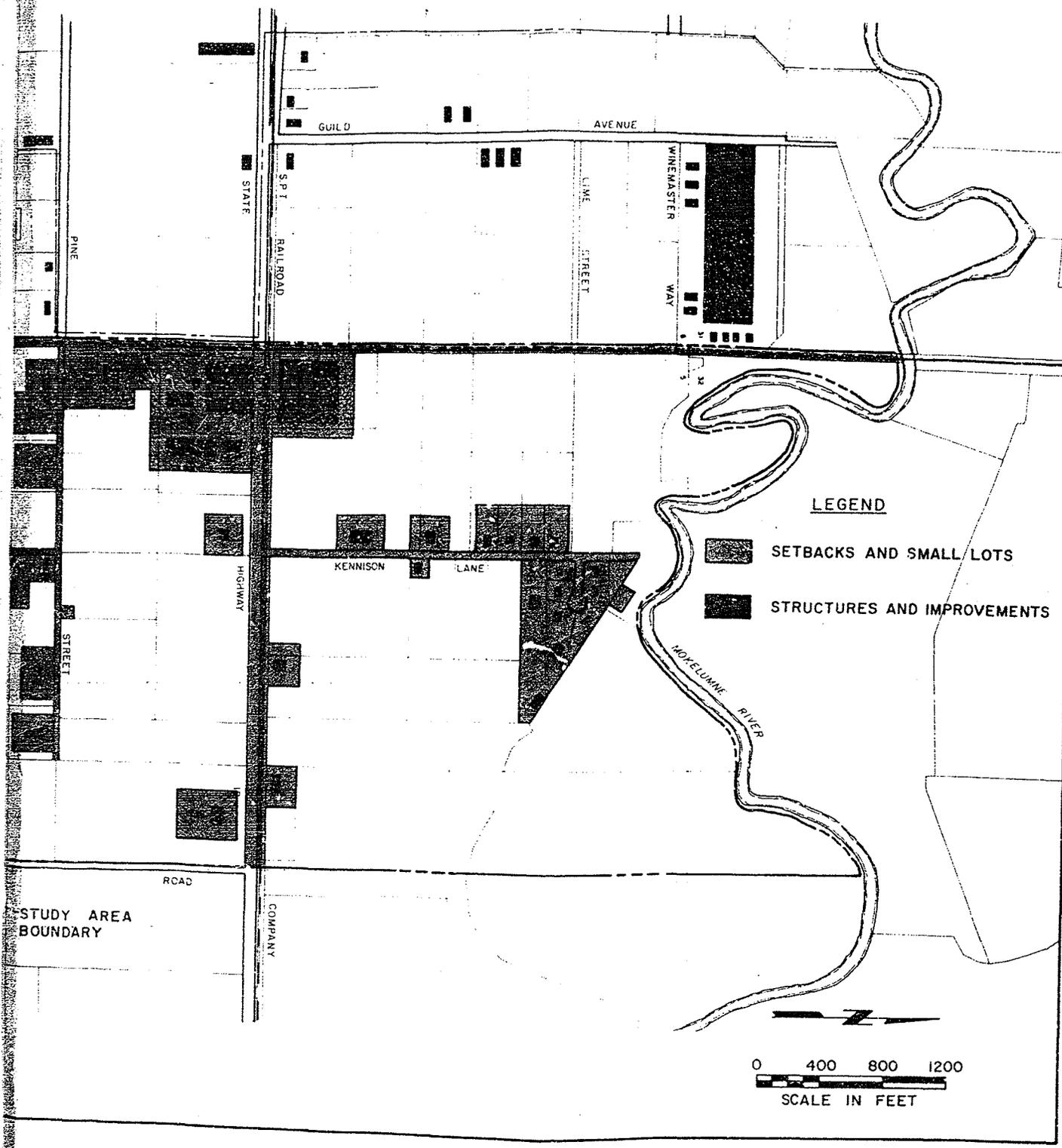


Figure 1 PROPERTY BOUNDARIES



EXISTING WELLS

Overlay No. 2, shown on Figure 2, represents the impact of existing wells on the selection of new well sites. This figure also includes the area to the west of the tracks to identify potential interference with local wells.

A well survey questionnaire, sent by the city to all property owners in the study area, provided information on well location, depth, and use (irrigation, domestic, commercial). Of the property owners who were sent questionnaires, approximately 51 percent responded. A sample questionnaire is shown in Appendix B. Existing wells are shaded dark and their usage is denoted by symbol. The area around an existing well in which the location of a new well may affect the yield of the existing well is shaded 75 percent. This zone influence is used for screening purposes to eliminate hydraulic interference considerations. This zone is not intended as an accurate study of existing well drawdowns but is an approximation for screening only.

LAND USE

Overlay No. 3, shown on Figure 3, represents planned land use in the study area.

The study area consists of light manufacturing and agricultural zoning. Placement of a well in property zoned light manufacturing is considered to be of greater financial impact than within agricultural zoning and is shaded 25 percent. All agricultural areas are considered equal under the criterion of impact upon land use and are white.



Figure
EXISTING

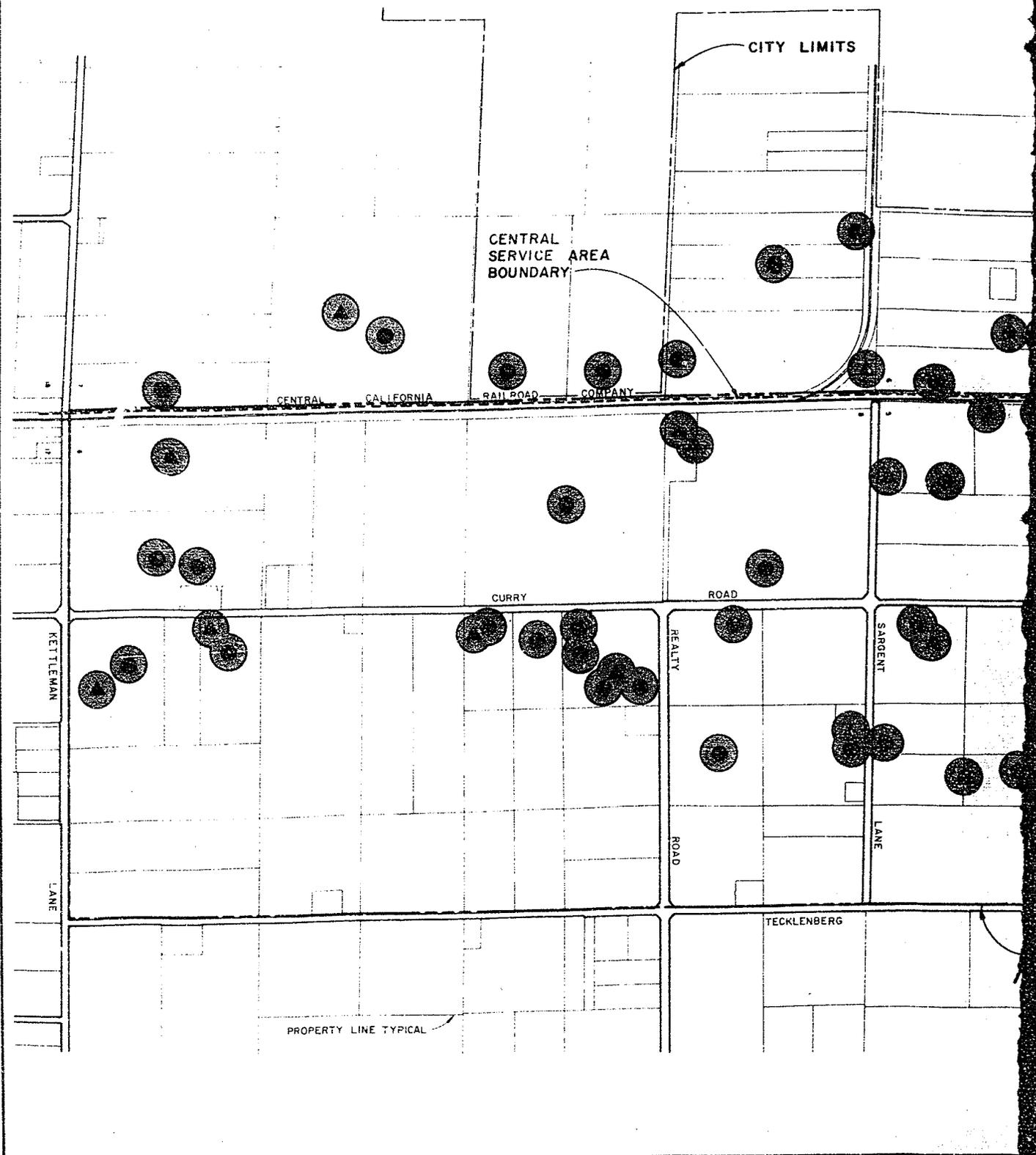


Figure 2
 NG WELLS

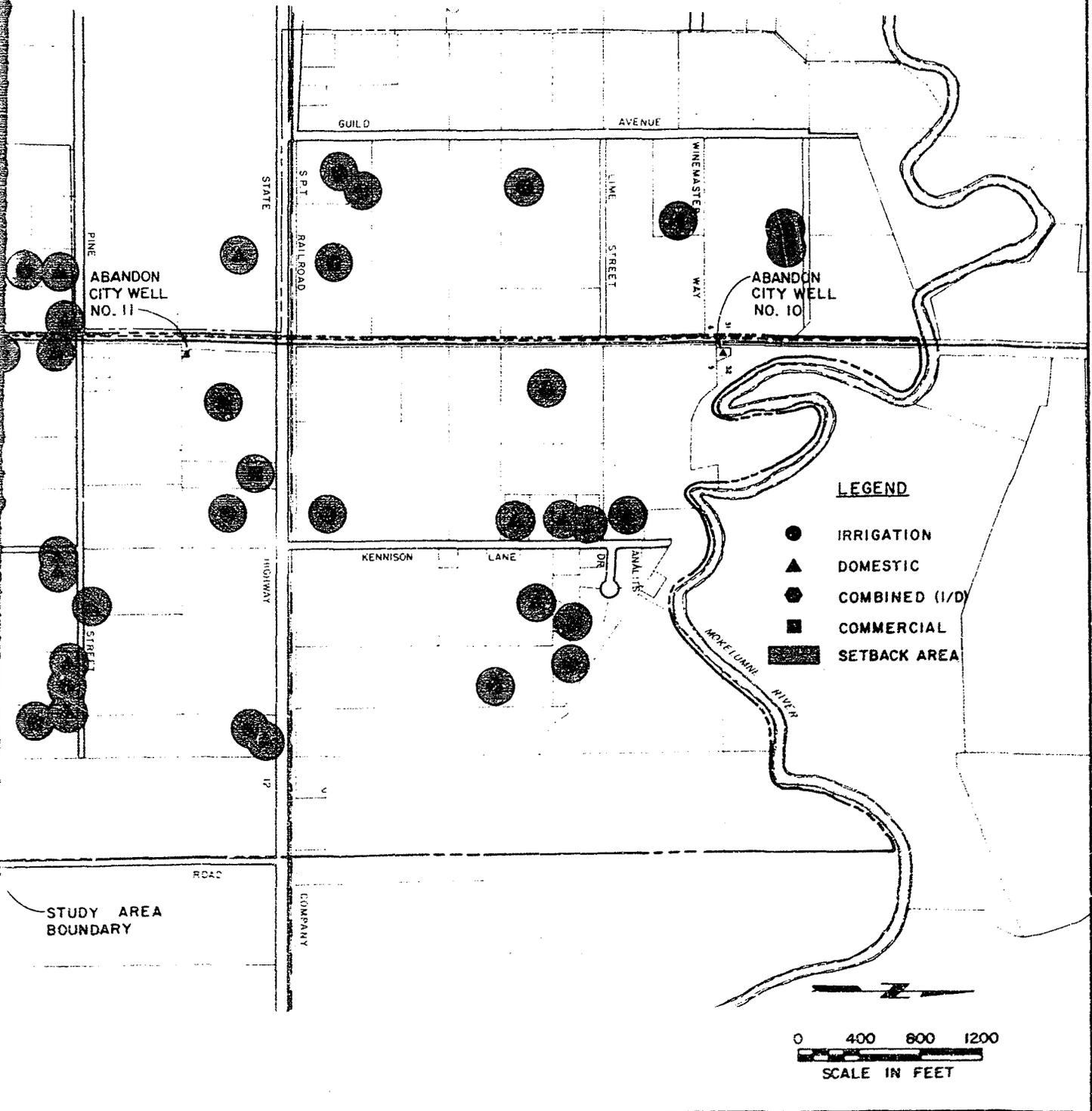


Figure
LAND

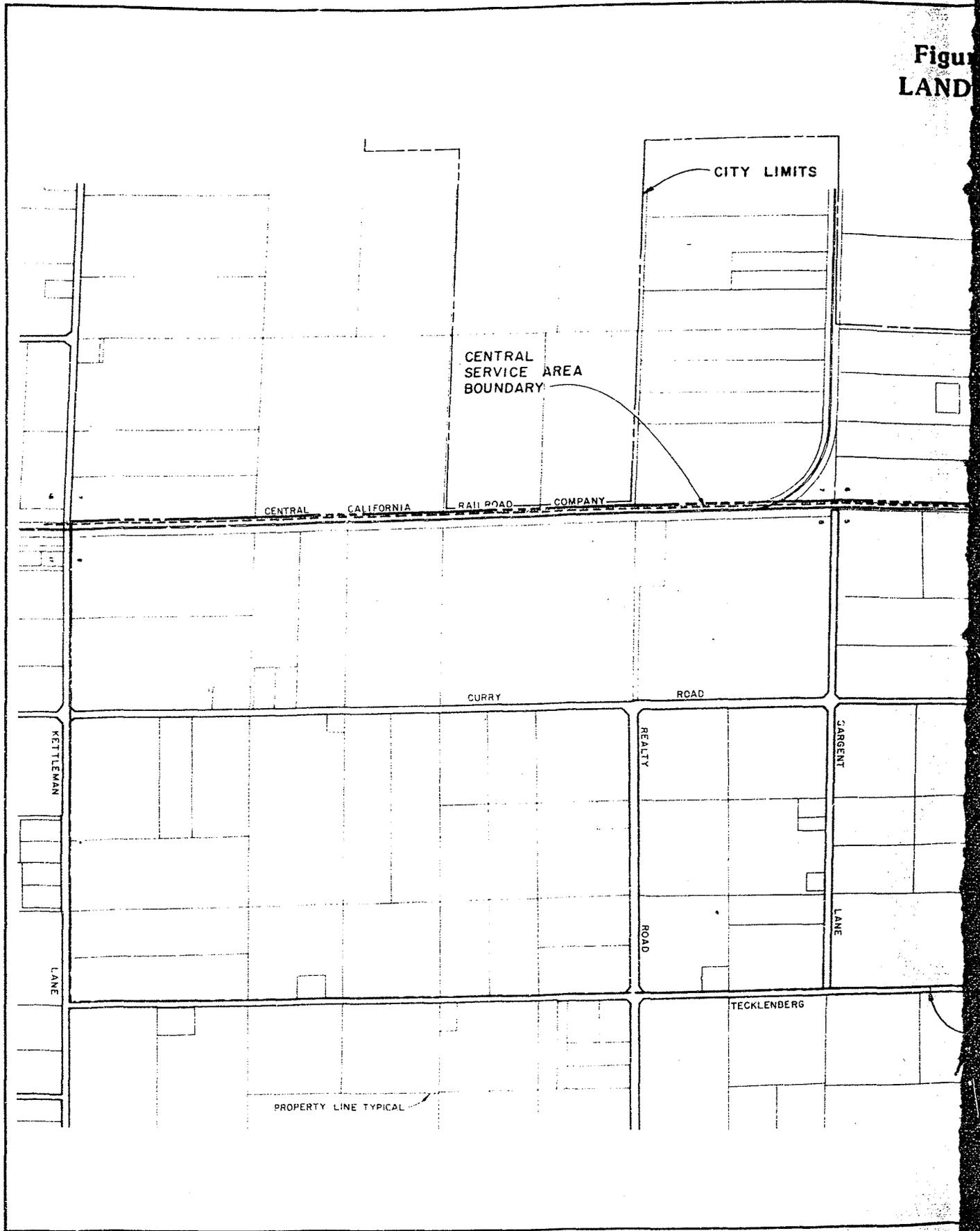
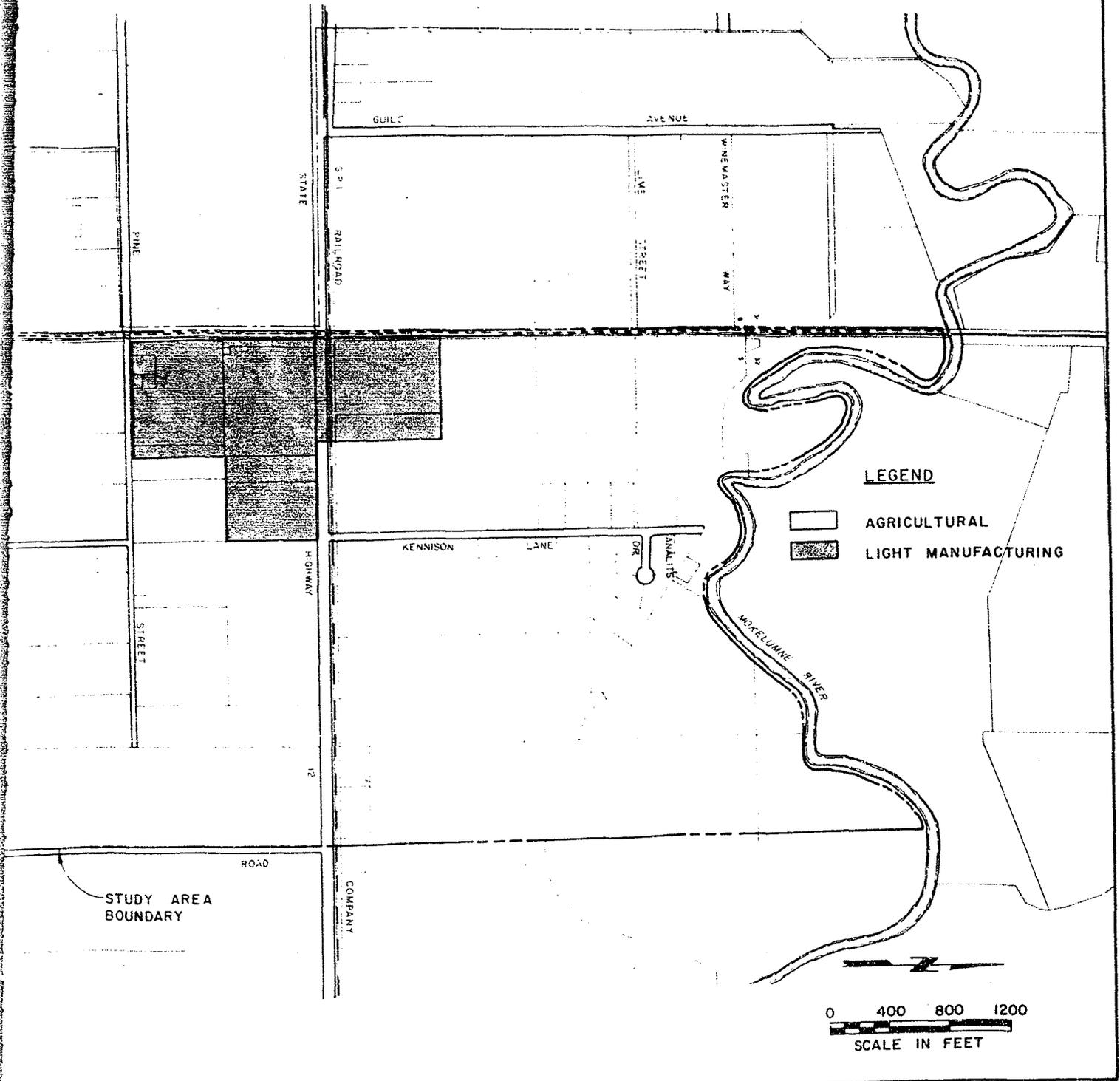


Figure 3
LAND USE



WATER LINES

Overlay No. 4, shown on Figure 4, consists of the proximity of a new well site to the existing water distribution system and proposed future distribution system conditions.

This overlay represents the economic impact of placing a well at a range of distances from existing and future water mains. The study area is depicted in increasingly darker shades as the location becomes increasingly distant from water mains. Construction costs of installing a 12-inch water line from a new well to the existing distribution system is estimated to be \$30 to \$45 per foot. A distance of 0 to 100 feet is the most economically desirable and is white. A distance of 100 to 500 feet has a significant but manageable economic impact and is shaded 12.5 percent. Over 500 feet is economically undesirable and is shaded 25 percent.

POWER LINES

Overlay No. 5, shown on Figure 5, consists of the proximity of a new well site to existing 12 and 21 kV power lines.

This overlay represents the economic impact of placing a well at a range of distances from available power. The study area is depicted in increasing darker shades as location becomes increasingly distant from power. Within 100 feet of either 12 or 21 kV PGandE power, hookup is at no cost and is accordingly white. Beyond 100 feet, costs are estimated on a dollar per foot basis. Assuming each well site produces 2,000 gallons per minute, power capital costs are estimated to be \$30 to \$75 per foot. From 100 to 500 feet, power installation costs are significant but reasonable and the areas are shaded 12.5 percent. Beyond 500 feet, power installation costs are considered significantly more expensive and are shaded 25 percent.



Figure
WATER F
AS

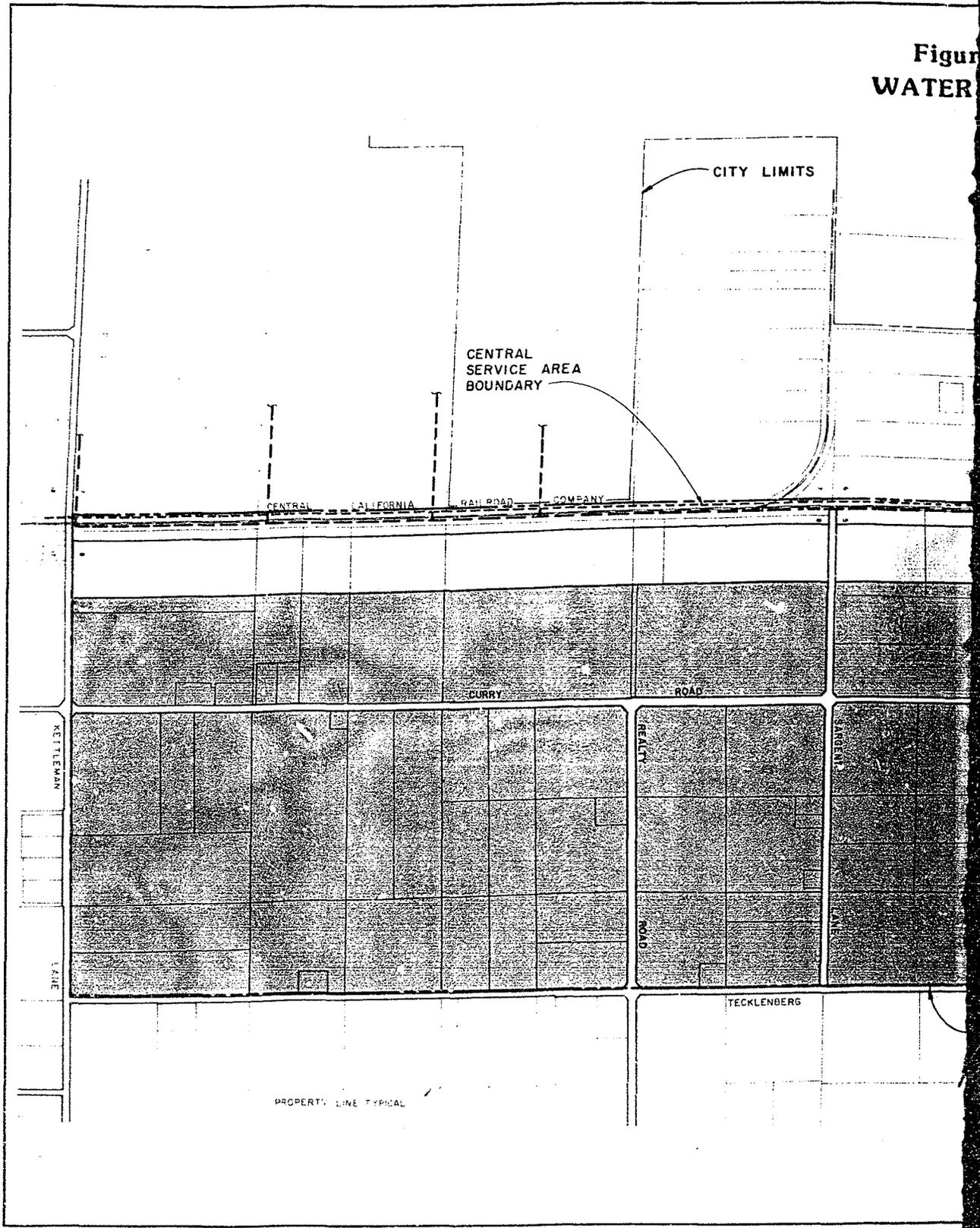


Figure 4
WATER LINES

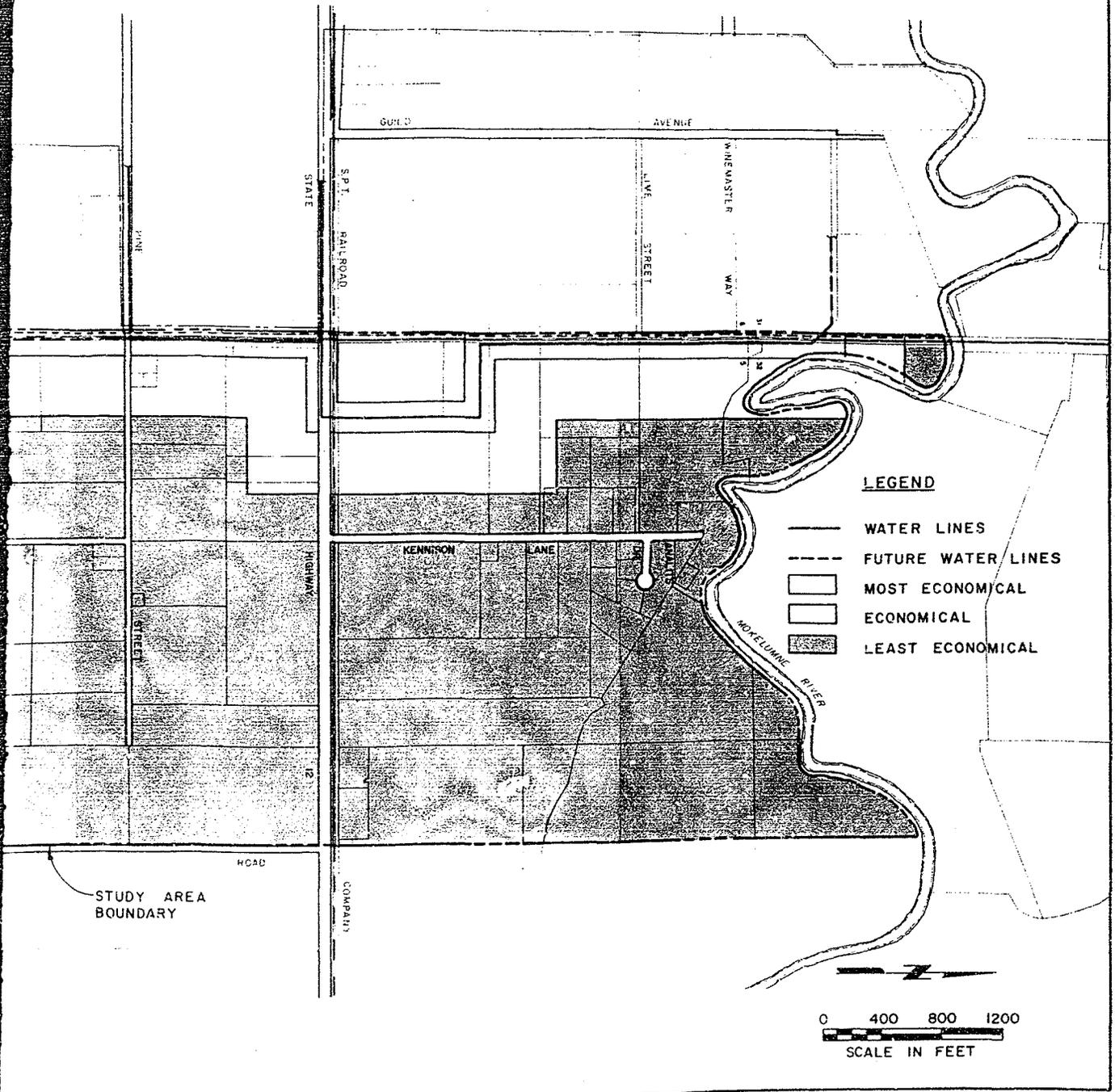


Figure
POWER

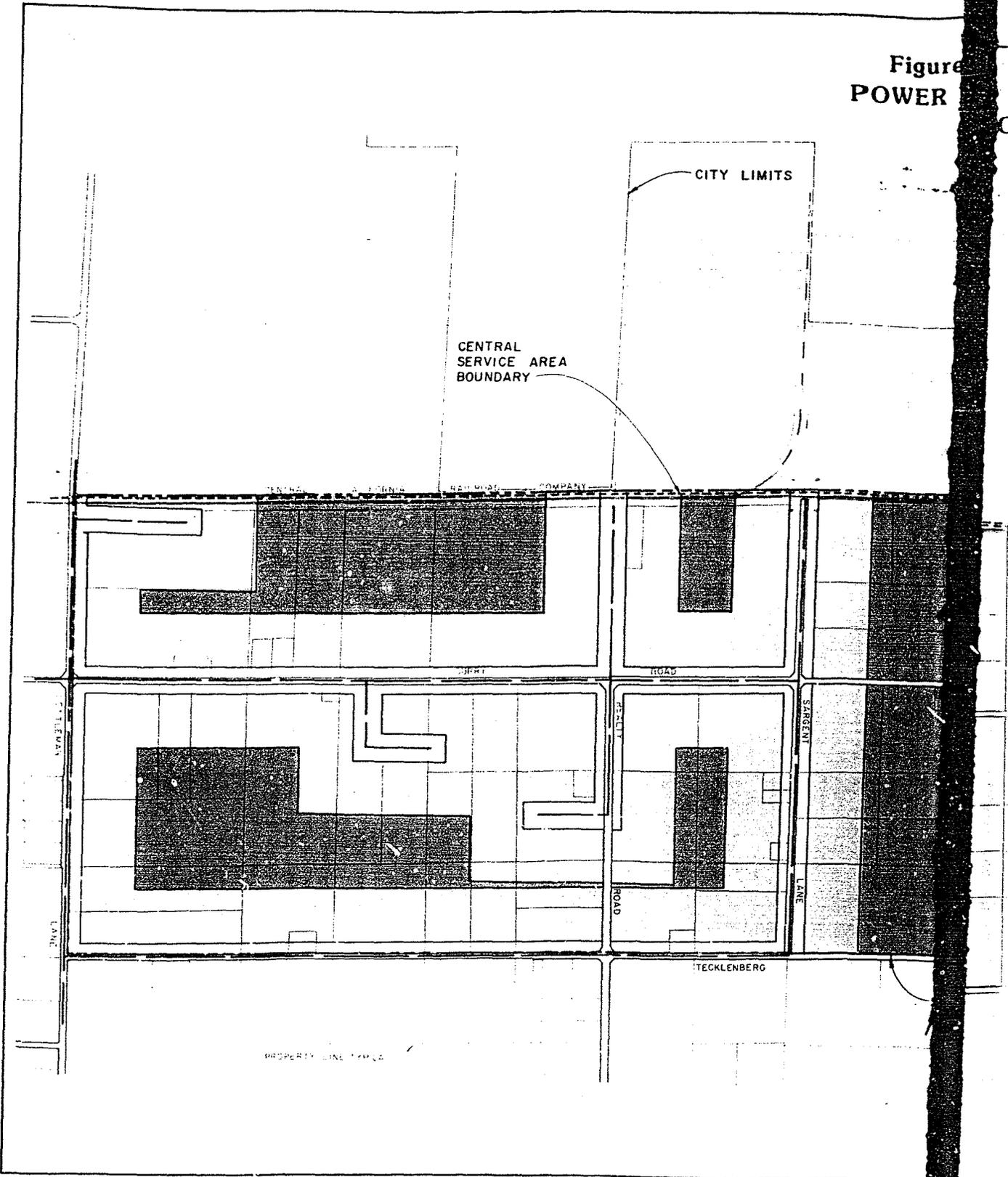
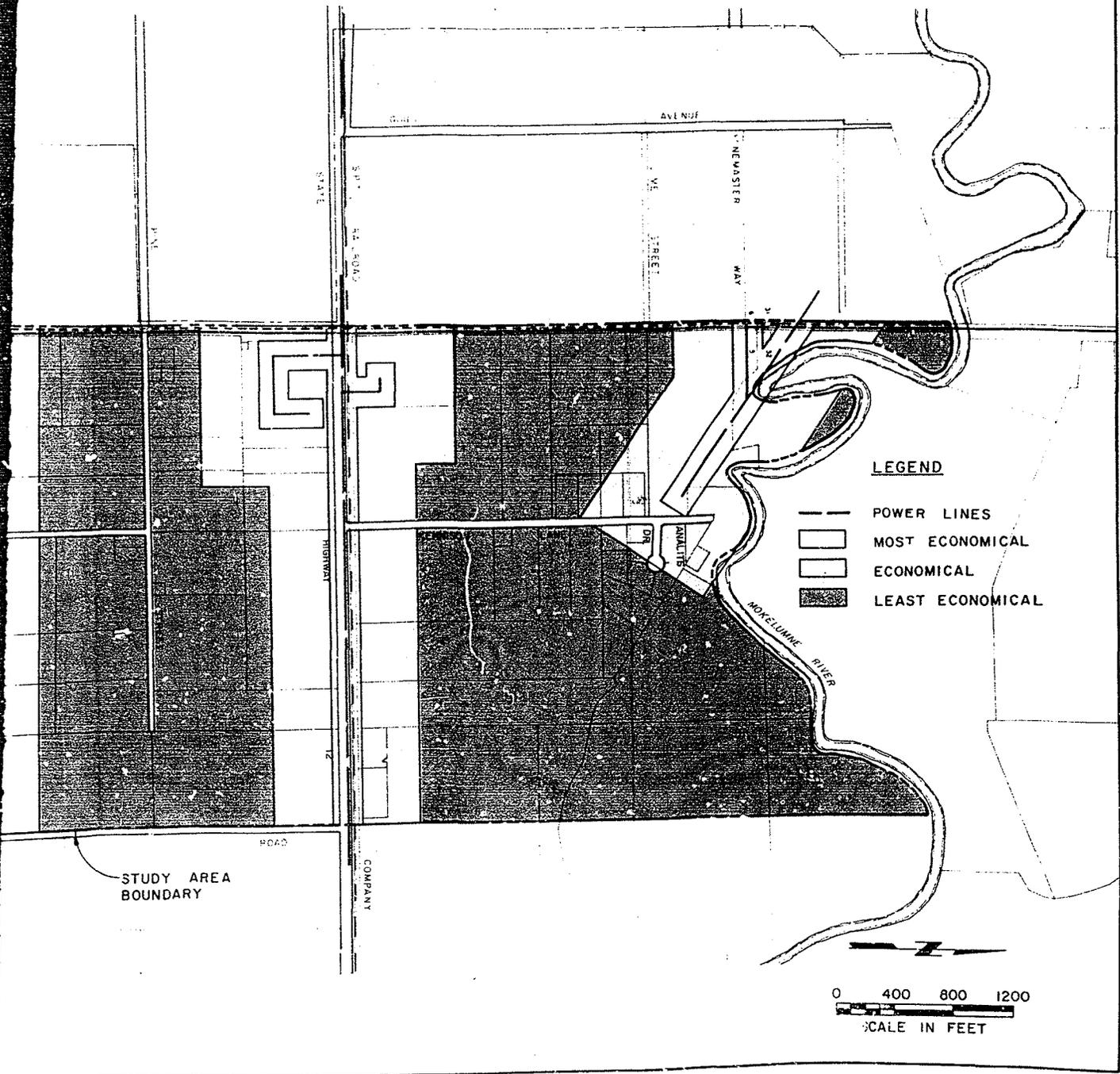


Figure 5
POWER LINES



SUMMARY

Overlays developed for each of the five site criteria were combined and used to develop the composite map shown on Figure 6. The most desirable well sites appear white with the increasing darkness of shading indicating less desirable areas.



Figure CT
SITE SELECTION

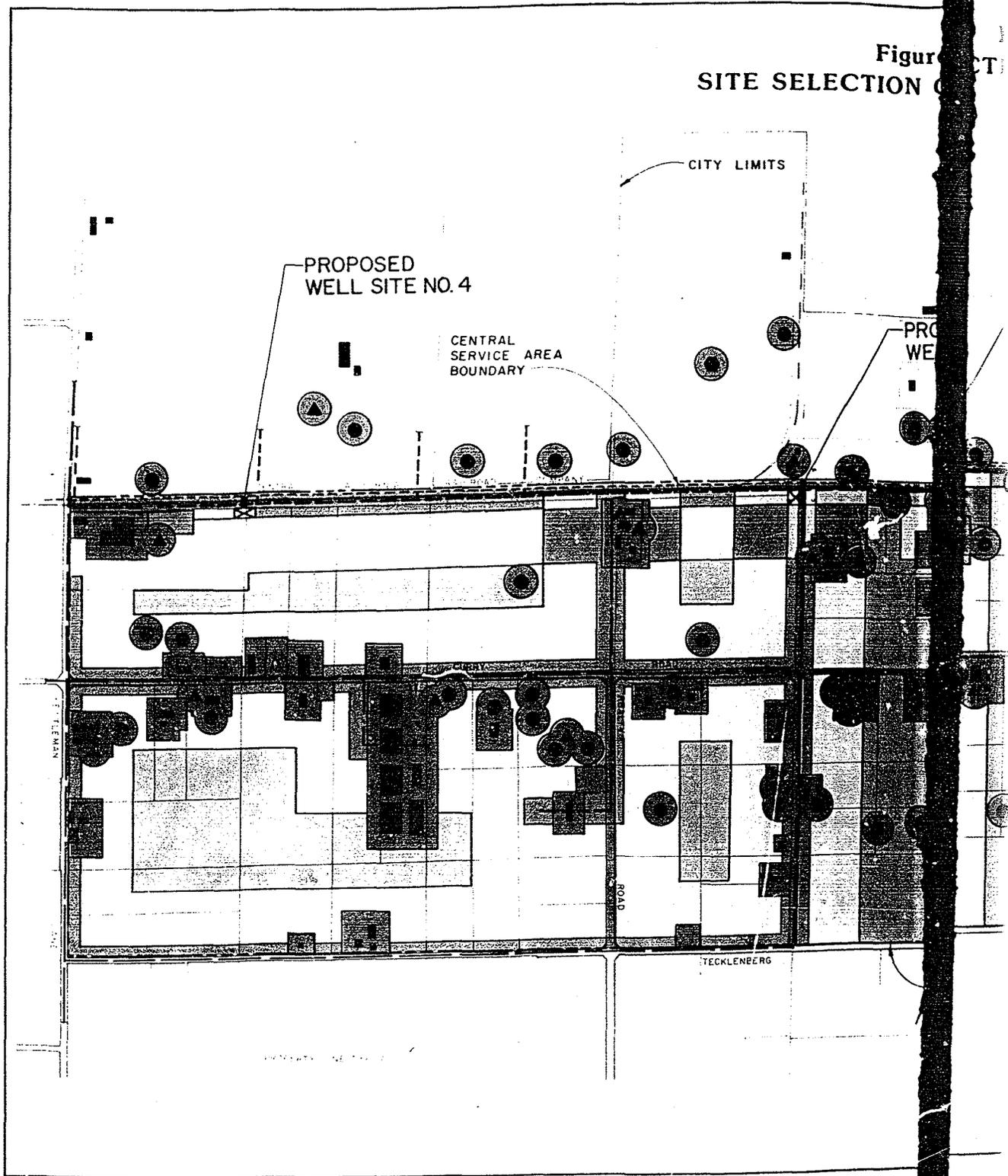
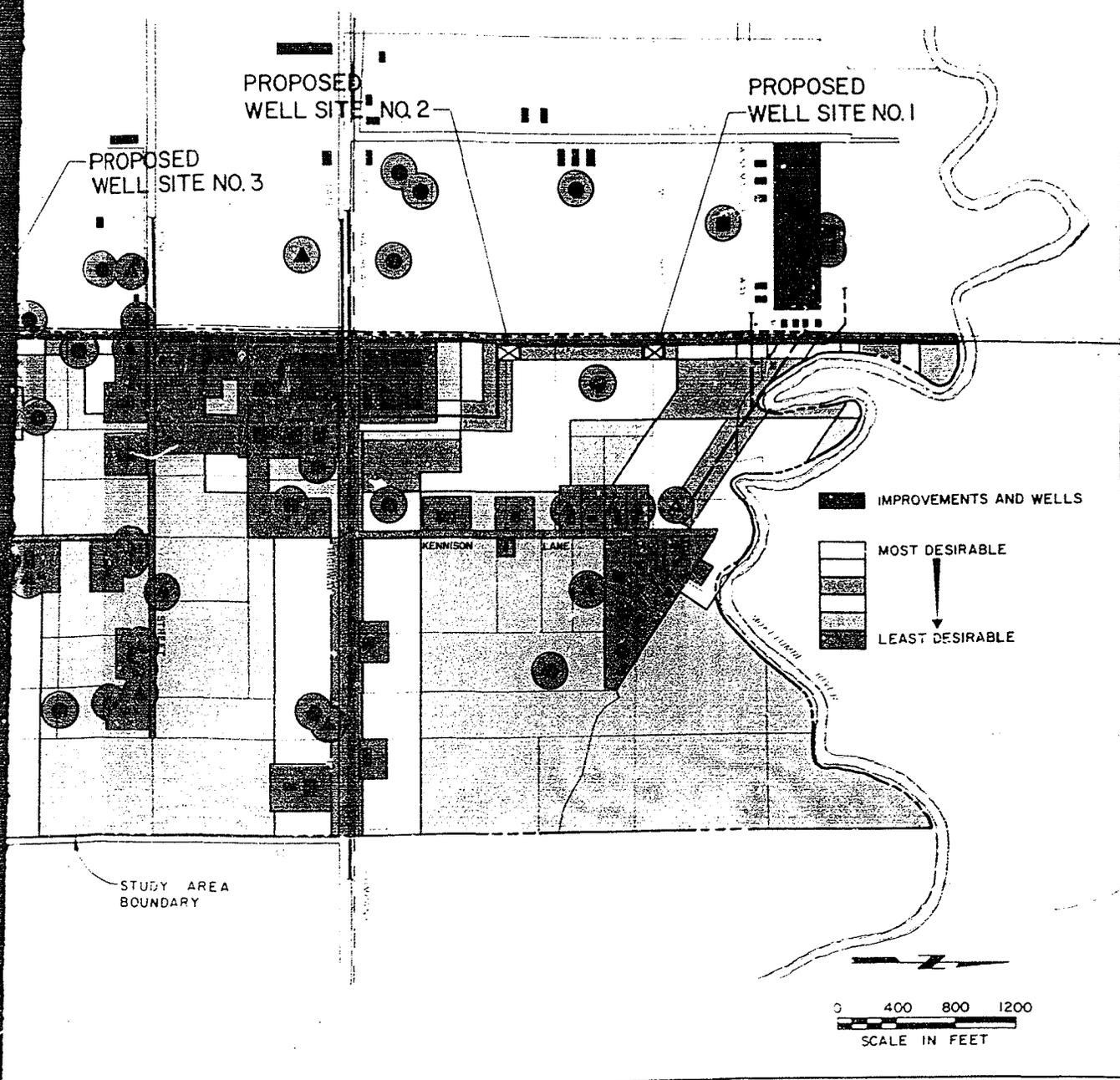


Figure 6

PROTECTION COMPOSITE MAP



TECHNICAL CONSIDERATIONS

Once the most desirable sites were identified based upon general siting criteria, the technical aspects of ground water hydrology, and distribution system hydraulics were evaluated. This information is used to validate the technical feasibility of available sites.

GROUND WATER HYDROLOGY ANALYSIS

Aquifer characteristics used as input coefficients to the Eastern San Joaquin County ground water flow model (Ref. 1) study are listed in Table 2 and have been adopted as representative values for calculating well drawdown curves in the study area. The aquifer is a water table aquifer underlain by an aquiclude and is assumed to be of uniform thickness.

The aquifer's hydraulic conductivity is assumed to be constant and independent of both position and direction of measurement. Well drawdown for wells of different depths have been computed at various aquifer permeabilities and are presented in Table 3. The drawdown curves for the probable range of permeabilities found in the Lodi area are presented on Figure 7, for a well depth of 600 feet. Drawdown depths were calculated from Boulton's (Ref. 2) aquifer equation as rewritten in the gallon-day-foot system of units by Prickett (Ref. 3).

Table 2. AQUIFER CHARACTERISTICS FOR THE LODI AREA

Item	Range for Flow Model	Lodi Area
Permeability, gpd/ft ²	50-400	300
Storage factor, gal/ft	5-20x10 ⁶	20x10 ⁶
Aquifer thickness, ft	150-1500	900-1000

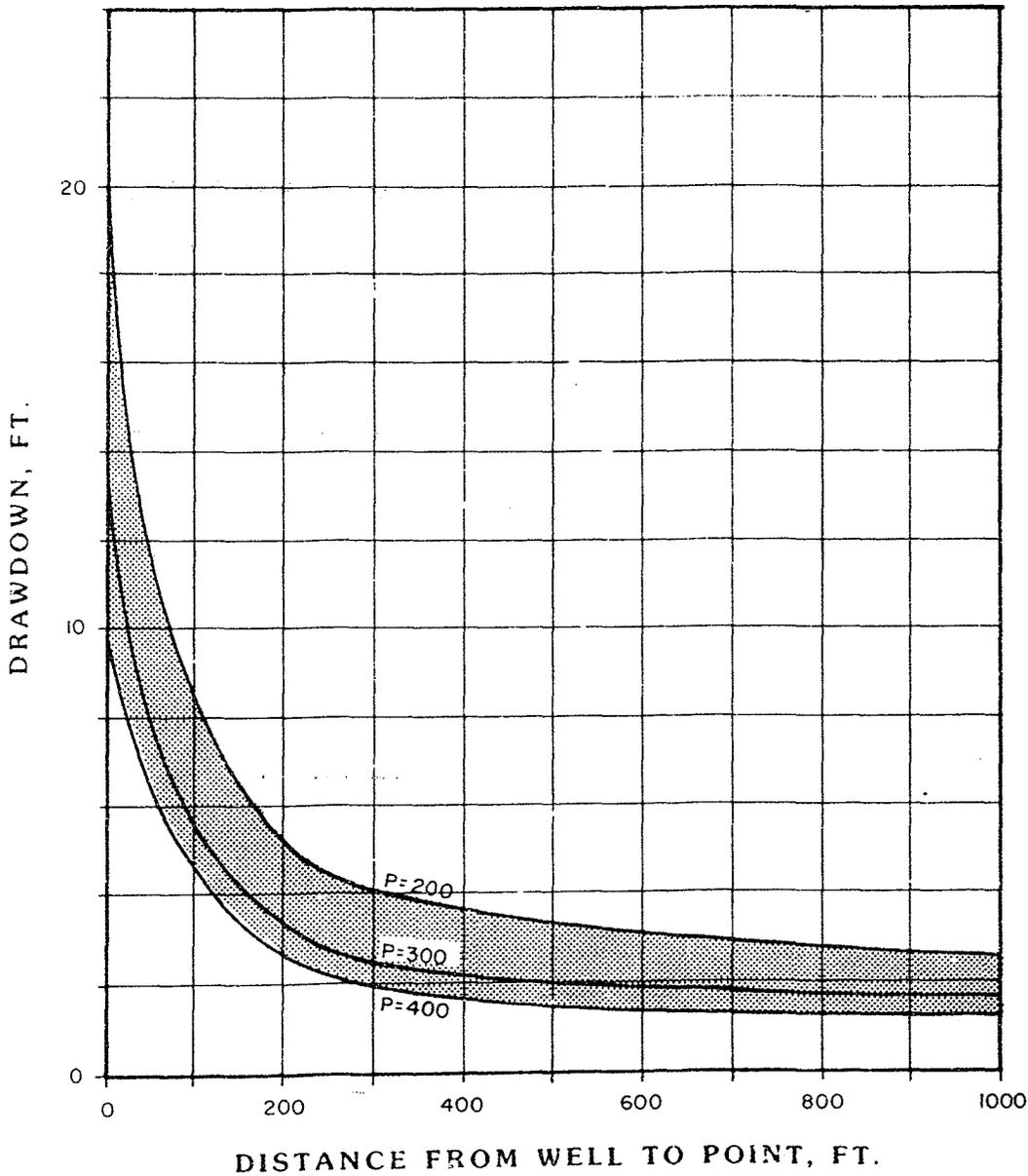
Table 3. WELL DRAWDOWN AT VARIOUS DEPTHS

Well Depth, ft	Distance to Point, ft	Drawdown, ft at 2,000 gpm			
		Permeability, gpd/ft ²			
		50	200	300 ^a	400
600	0	86.6	21.7	14.4	10.8
	100	32.5	8.1	5.4	4.5
	250	16.9	4.2	2.8	2.1
	500	12.4	3.1	2.1	1.6
	1,000	10.2	2.6	1.7	1.3
700	0	72.2	18.1	12.0	9.0
	100	27.0	6.8	4.5	3.4
	250	14.1	3.5	2.3	1.8
	500	10.4	2.6	1.7	1.3
	1,000	8.5	2.1	1.4	1.1
800	0	61.9	15.5	10.3	7.7
	100	23.2	5.8	3.8	2.9
	250	12.1	3.0	2.0	1.5
	500	8.9	2.2	1.5	1.1
	1,000	7.3	1.8	1.2	0.9

^aRepresentative value for permeability in Lodi area.



Figure 7
DRAWDOWN CURVES
AT VARIOUS PERMEABILITIES
FOR A 600 FT. DEEP WELL
PUMPING AT 2000 GPM



Results of the drawdown calculations, listed in Table 3, indicate that new city wells placed at 500 foot centers, 600 feet deep, would have a drawdown between the two wells of 5.6 feet (2.8 ft + 2.8 ft). Drawdown at the well centers would be 16.5 feet (2.1 ft + 14.4 ft). These drawdown depths are acceptable values. However, with a factor of safety included, the spacing of wells at 500 feet is considered a minimum separation, and an 800 to 1000 foot spacing is desirable wherever possible.

WATER DISTRIBUTION REVIEW

Existing and future water lines are shown on Figure 4 and presented in more detail in the Lodi Water Master Plan (Ref. 4). A hydraulic analysis on the existing 14 inch line along the Traction Company right-of-way was performed to evaluate any hydraulic limitations. This existing branch can reasonably transport 4,000 gpm into the distribution system. Two new wells can be developed to feed into this line with no hydraulic limitations to well placement.

Hydraulic network capacity for the proposed future system was evaluated. No hydraulic limitations to well placement were identified for the recommended sites.



RECOMMENDED SITES

The recommended locations of four new well sites are shown on Figure 6. Detailed sketches of each well site are illustrated on Figures 8 through 11. Each well site overlaps two or three parcels. The specific piece of property to be acquired should be selected based upon the success of negotiations with each owner. All recommended sites lie outside the central service area boundary which legally restricts the amount of water withdrawn within the city's central area. Property owners that may be affected by the new sites are shown in Table 4. Following is a discussion of each recommended well site.

SITE NO. 1 - END OF LIME STREET, ADJACENT TO CENTRAL CALIFORNIA TRACTION COMPANY (CCTC) RAILROAD TRACKS

This site is located at the eastern end of Lime Street, an unpaved county road located 700 feet south of Winemasters Lane. As shown on Figure 8, there are no major physical barriers to constructing a well in the area. The CCTC railroad right-of-way extends approximately 50 feet east of the end of Lime Street. East of the CCTC railroad right-of-way lies private property. The proposed site can lie on either one of the two parcels shown on Figure 8. A private road running parallel to

Table 4. PROPERTY OWNERS AFFECTED BY RECOMMENDED WELL SITES

Site No.	Assessor's Parcel No.	Property Owner	Property Address	Owner's Mailing Address
1	049-130-3	William M.S. Johnson	17087 N Kennison	207 Tara Pl. Lodi, CA 95240
	049-130-26	Ramm Ranches c/o William Johnson	18695 N Kennison	907 Tara Pl. Lodi, CA 95240
2	049-130-23	Anthony J. Costa et al.	17307 N Kennison	P.O. Box 670 Lodi, CA 95240
	049-130-22	Paul J. Gerdes c/o Fred Sorovl, Jr.	6161 E State Rte 12	P.O. Box 728 Lodi, CA 95240
3	(50-ft easement)	Central California Traction Company	None	Cherokee Road Stockton, CA 95201
	049-112-1	Melinda S. Barbara et al.	16463 N Curry	P.O. Box 789 Lodi, CA 95240
	049-111-2	Stanley G. Vollbrecht	6195 E Sargent	6195 Sargent Lane Lodi, CA 95240
4	049-100-75	Blue Anchor, Inc.	6021 E Kettleman	P.O. Box 15498 Sacramento, CA 95813
	049-100-56	Richard & Ruth Diekman	15403 N Curry	15415 N Curry Lodi, CA 95240



Figure 8
WELL SITE NO. 1

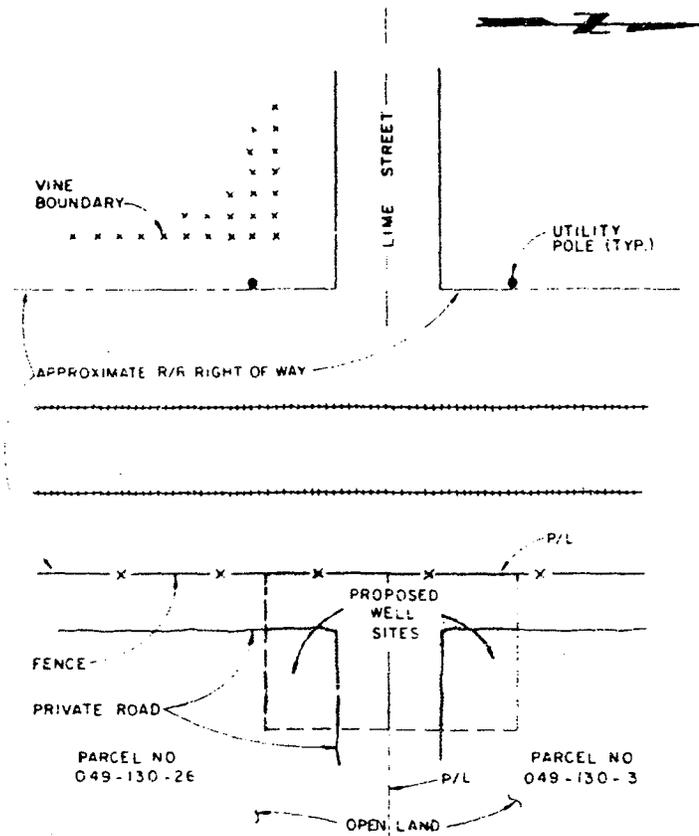
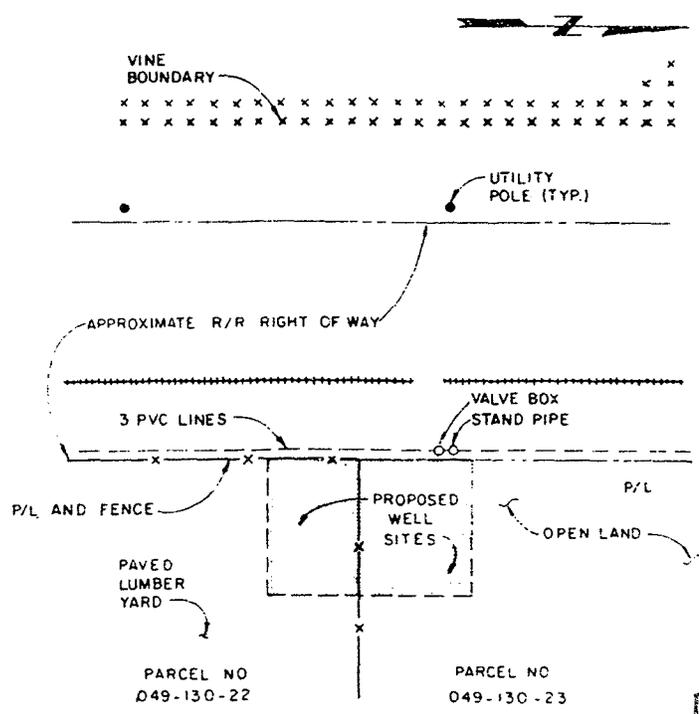


Figure 9
WELL SITE NO. 2



the CCTC railroad tracks, along the eastern edge of the railroad right-of-way, would have to be considered in the design of the site.

Site No. 1 is located adjacent to an existing 14-inch water main, and approximately 1,000 feet from available power. The immediate surroundings of the site are agricultural lots with no existing structures. The nearest existing well is approximately 500 feet away and is used for irrigation purposes. The site's proximity to the Mokelumne River provides an adequate ground water recharge potential and reduces any problem with well drawdown.

SITE NO. 2 - ADJACENT TO CCTC RAILROAD TRACKS, APPROXIMATELY 1,000 FEET NORTH OF THE SOUTHERN PACIFIC RAILROAD TRACKS

This site is located at the northwest corner of San Joaquin Warehouse, formerly Roma Winery Co., adjacent to the CCTC railroad as shown on Figure 9. The site can be located either on San Joaquin Warehouse property or the property immediately north, depending upon access to the site and cost of the site acquisition. Access will have to be attained either by construction of a road along the west side of the CCTC railroad in the right-of-way, access through the warehouse property, or access through the agricultural lot north of the warehouse property.

The major advantage of this location consists of proximity to available water and power. The site is adjacent to an existing 14-inch water main, and approximately 600 feet from available power.

SITE NO. 3 - END OF SARGENT LANE, ADJACENT TO CCTC RAILROAD TRACKS

This site is located at the western end of Sargent Lane, which dead ends at the CCTC railroad tracks. As shown on Figure 10, there are no



Figure 10
WELL SITE NO. 3

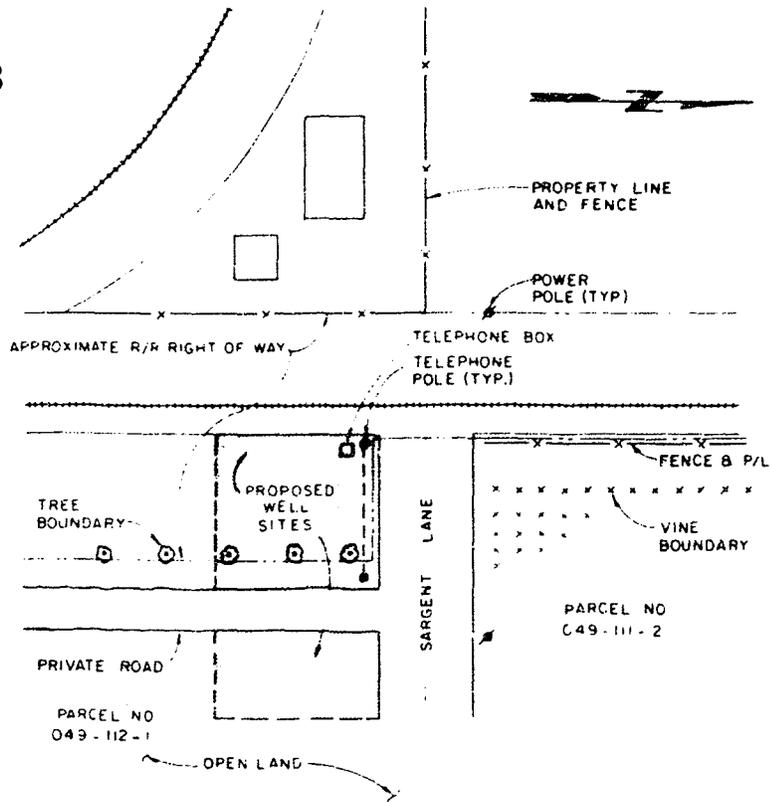
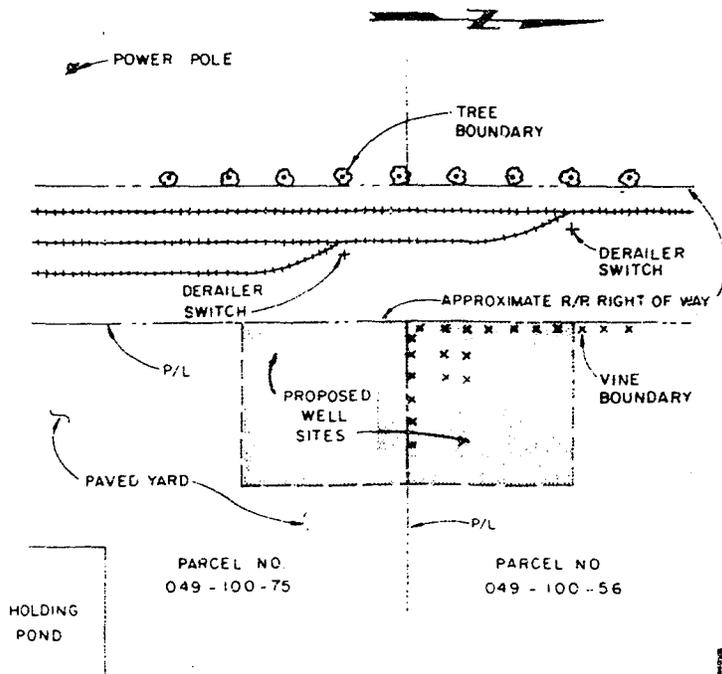


Figure 11
WELL SITE NO. 4



major physical obstructions in the area other than a telephone shed owned by the railroad company. South of Sargent Lane is a 50-foot strip of vacant right-of-way owned by CCTC which runs parallel to the CCTC railroad tracks. East of this strip, a 15-foot private, unpaved road has been constructed. North of Sargent Lane, a vineyard exists adjacent to the CCTC railroad tracks.

The advantages of this area are proximity to existing power, proximity to a proposed future water line, no existing structures in the immediate area, and there is easy access to the site. Site No. 3 is located adjacent to existing power which runs along Sargent Lane. The site is 1,300 feet from an existing 10-inch water line, but adjacent to a future water main running parallel to the CCTC railroad tracks. This future water main is described in the 1977 City of Lodi Water Master Plan. The vacant land adjacent to the CCTC tracks, south of Sargent Lane is an optimal location for this site, if acquisition costs are not a problem.

SITE NO. 4 - ADJACENT TO THE CCTC RAILROAD TRACKS, 1,300 FEET NORTH OF KETTLEMEN LANE

This site is located at the northwest corner of the Blue Anchor, Inc. The site can be located either on Blue Anchor, Inc., property or the property immediately north of Blue Anchor, Inc., depending upon access to the site and cost of the well site. Access will have to be attained either through the Blue Anchor, Inc., property or through the parcel immediately north of Blue Anchor. Unlike site No. 2, there is no room for construction of an access road along the west side of the CCTC right of way, as an established vineyard is planted up to CCTC right-of-way.

The advantages of this area are proximity to existing power, proximity to a future water line, and there are no existing structures in the immediate area. Site No. 4 is approximately 1,200 feet from a 21 kV power line running along Curry Road and 500 feet from power running into the Blue Anchor, Inc., property. The site is adjacent to a proposed



future water main running parallel to the CCTC railroad tracks. This future water main is described in the 1977 City of Lodi Water Master Plan. There are no physical obstructions in the immediate area, although there is an existing well west of the CCTC railroad tracks. This existing well is located on an agricultural lot and is approximately 370 feet from the northern property line of Blue Anchor, Inc. Access to the proposed site should be obtained through the back storage yard of Blue Anchor, Inc.

Blue Anchor has a holding pond onsite for washdown water and storm drainage. This should not be a hazard to a properly constructed well.

SEQUENCE OF DEVELOPMENT

To best reinforce the existing water system grid and maintain adequate system pressure for future development as described in the 1977 Water Master Plan, the recommended sequence of constructing the four proposed well sites is: Site 1, Site 3, Site 2, then Site 4. The sequence of construction has the effect of immediately adding capacity to both the north and middle sections of the existing distribution system and provides an orderly system of water use development.



RECOMMENDATIONS FOR IMPLEMENTATION

Following is a discussion of the steps necessary to complete the goal of acquiring the recommended well sites. Because the nature and intensity of the opposition to new wells by property owners is not certain, two or three properties at each site were identified as possible locations to allow more flexibility in negotiations. Once the City Council has adopted this report, the following steps are recommended:

1. Have the properties being considered appraised.
2. Begin negotiations with property owners to determine if the properties can be obtained through negotiation rather than condemnation.
3. If negotiations are successful, a condition of sale would be positive results for a test well on the site. Obtain right-of-access to drill a test well.
4. If negotiations are unsuccessful, select a specific parcel and begin condemnation proceedings. As a first step, obtain right-of-entry to drill a test well.
5. If test wells are satisfactory, complete negotiations or condemnation proceedings for the sites.



6. If test wells are not satisfactory, review the data in this report and select a new site and begin the process again.
7. Prepare a negative declaration and file a parcel map with the county.
8. Design and construct the new well facilities.

Although an EIR is not required, the city will have to have a parcel map prepared and filed for each proposed site. A negative declaration can be used on each individual site and the city should act as the lead agency. Because the city is exempt from county minimum acreage requirements in this case, a County Use Permit will not have to be obtained.



APPENDIX A



APPENDIX A REFERENCES

1. Brown and Caldwell Consulting Engineers; Eastern San Joaquin County Groundwater Flow Model; Preliminary Draft Information.
2. Boulton, N.S.; Analysis of Data from Nonequilibrium Pumping Tests Allowing for Delayed Yield from Storage, Proc. Inst. Civil Engrs. (London), Vol. 26, No. 6693, 1963.
3. Prickett, T.A.; Type-Curve Solution to Aquifer Tests under Water Table Conditions, Ground Water, Vol. 3, No. 3, 1965.
4. Trotter-Yoder & Associates; City of Lodi Water System Analysis and Master Plan Reevaluation, March, 1977.

APPENDIX B



CITY OF LODI
WELL SURVEY QUESTIONNAIRE

Name: _____
Address: _____

Telephone Number: _____
Assessor's Parcel No.: _____

1. Do you have any water wells on your property Yes No
2. Number of wells _____ Are wells active Yes No

For items 3 through 7 list data for each well

- | | | | |
|--|-------|-------|-------|
| 3. Year drilled, if known | _____ | _____ | _____ |
| 4. Depth of well(s) in feet | _____ | _____ | _____ |
| 5. Diameter of well(s) in inches | _____ | _____ | _____ |
| 6. Size of pump(s) (horsepower) | _____ | _____ | _____ |
| 7. Size of pump(s) (gallons per minute) | _____ | _____ | _____ |
| 8. Amount of use (gallons per day)
or
(hours per year) | _____ | _____ | _____ |
| 9. Water is used for _____ irrigation (indicate crop _____)
_____ domestic _____ livestock _____ commercial | | | |
| 10. Name of driller if known | _____ | | |
| 11. Describe or show on a simple sketch below, location of well(s) on your property. | | | |

