TABLE OF CONTENTS

3 DESCRIPTION OF EXISTING SYSTEM AND ALTERNATIVES (PROJECT DESCRIPTION)

This chapter is organized into six sections:

- **Section 3.1 Project Location and Description of Alternatives** identifies the geographic location of the Project area in relation to governmental jurisdictions and major man-made and natural features. It also identifies the Project components which make up each of the five alternatives and describes subalternatives that are evaluated in this EIR/EIS. This section describes the process by which the Project alternatives were developed and evaluated, leading to the selection of the five Project alternatives which are the subject of this EIR/EIS. Finally, this section identifies alternatives which were considered and not carried forward as one of the selected Project alternatives.

- **Section 3.2 Existing System with Interim Improvements** describes the existing Subregional System, including the interim improvements completed in 1995 and 1996. This section also provides a background for understanding the other Project alternatives.

- **Section 3.3 Description of Project Components** describes the location and scope of individual Project components, including reuse, discharge, and storage components, included in the Project alternatives.

- **Section 3.4 Cost of Alternatives** identifies the estimated construction costs and the costs of operation and maintenance activities for the Project alternatives.

- **Section 3.5 Cumulative Projects** discusses the approach to evaluation of cumulative projects, that is, other proposed projects whose impacts, taken together with those of the Subregional Long-Term Wastewater Project, might compound or increase the environmental effects.

- **Section 3.6 Required Permits and Approvals** addresses the permits and other governmental approvals which are necessary to implement the Project.

3.1 PROJECT LOCATION AND DESCRIPTION OF ALTERNATIVES

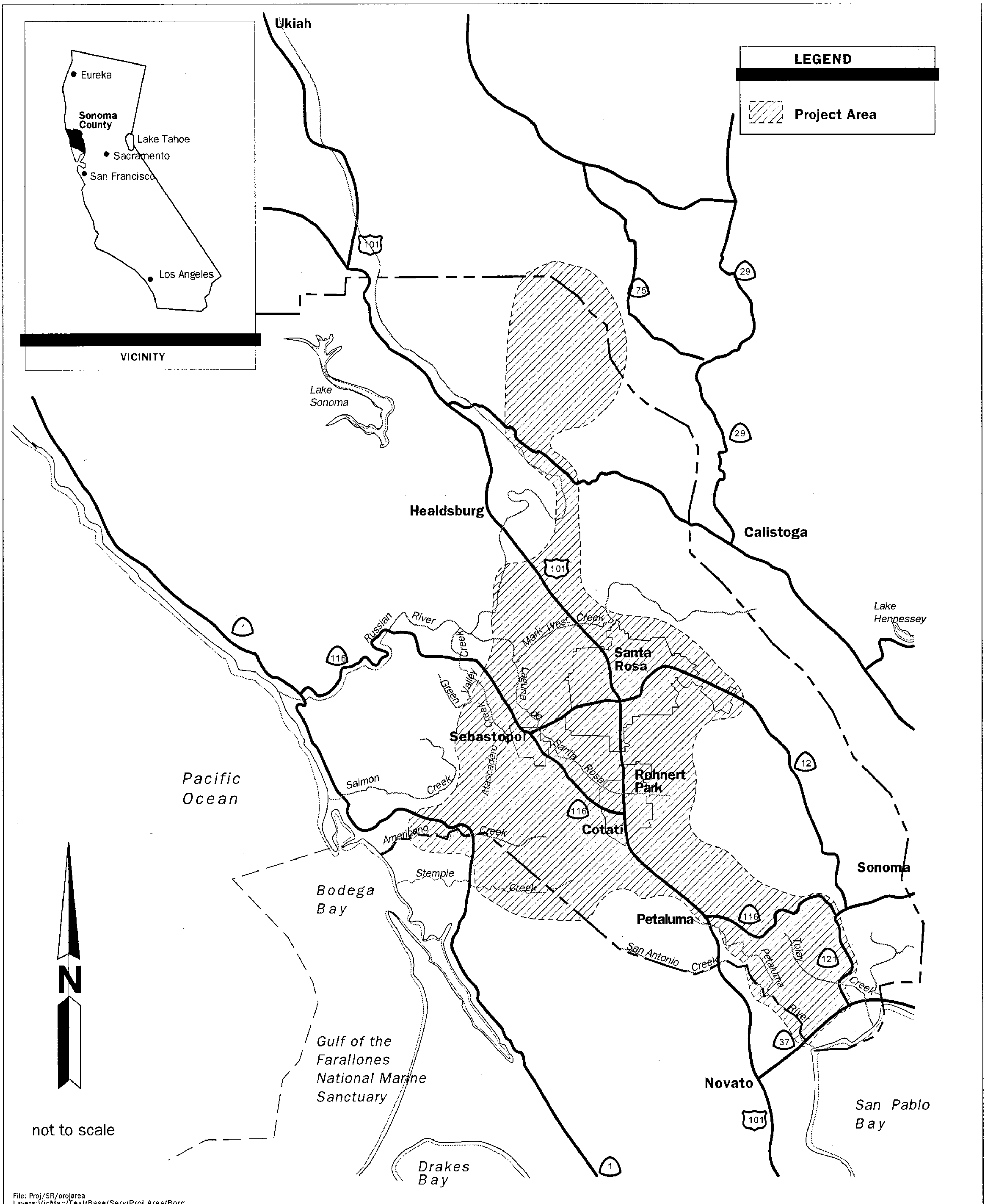
PROJECT LOCATION

The Santa Rosa Subregional Long-Term Wastewater Project consists of five alternative configurations adopted by the Board of Public Utilities on April 19, 1995 for purposes of analysis in the EIR/EIS. The alternatives encompass a large geographic area in Sonoma County and a portion of northern Marin County, covering approximately 400 square miles located in five cities as well as the two Counties. As shown in Figure 3.1-1, the Project area is focused on central Sonoma County within and adjacent to the cities of Santa Rosa, Rohnert Park, Cotati, Petaluma, and Sebastopol, but also extends from the geysers area north of Healdsburg to the Tolay Creek valley southeast of Petaluma and the San Antonio Valley in northern Marin County. The Project area extends from the low coastal hills around Valley Ford in the west, to the lower elevations of the Sonoma Mountains in the east. The Project area includes most of the Santa Rosa Plain, as well as portions of the Mayacmas Mountains, Alexander Valley, Cotati Valley, and Petaluma River Valley. Major waterways in the Project area are the Russian River, the Laguna de Santa Rosa, Santa Rosa Creek, Estero de San Antonio, Estero Americano, Americano Creek, Stemple Creek, Tolay Creek, and the Petaluma River.

DEVELOPMENT OF ALTERNATIVES

To ensure that a reasonable range of alternatives will be considered under NEPA and CEQA, the Santa Rosa Board of Public Utilities directed that alternatives be considered that will represent a wide spectrum of potential solutions to the Subregional System's need to dispose of reclaimed water. This process considered many types of alternatives, for example, construction of large and small reservoirs in South County and/or West County, an ocean outfall disposal, and expanded water conservation alternatives.

An extensive list of potential Project alternatives was developed at the onset of the Step I Scoping Phase (refer to *Final Scoping Report, Volume I*, in Appendix U-1. Appendix U is not found on the CD ROM). These alternatives were developed through the review of alternatives previously considered by the Board of Public Utilities; with input from the public; and from communications with individuals and groups in interviews, written correspondence, and meetings. The Board of Public Utilities identified 75 alternatives suggested prior to March 1993, and an additional 79 alternatives recommended by the public, Santa Rosa City staff, and individuals and agencies since March 1993.



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Santa Rosa
Subregional Long-Term Wastewater Project

Figure 3.1-1

VICINITY/PROJECT AREA

The list of potential alternatives and alternative components was carefully reviewed to develop a manageable list of alternatives for evaluation and screening. A preliminary list of 20 alternatives was prepared which was designed to include all feasible components suggested by the public and develop “all reasonable alternatives” as required by CEQA and NEPA for analysis in the EIR/EIS. This list was distributed to the public for review and comment to ensure that it adequately represented all alternative components nominated for consideration.

During the public review period, an additional 10 alternatives were suggested and were presented to the Board of Public Utilities, which directed that all 30 alternatives be evaluated in the screening process. Two additional alternatives were subsequently developed in response to a request from the public. The screening process was a pre-evaluation and analysis of how well each alternative will be likely to meet system objectives and environmental criteria. The process was designed to determine which of the 32 alternatives should be selected for full study in the EIR/EIS.

The Santa Rosa Long-Term Wastewater Project Screening Report (Harland Bartholomew & Associates 1994), evaluated all 32 alternatives according to criteria adopted by the Board of Public Utilities, following which public workshops were conducted to assist in the selection of alternatives to be studied in the EIR/EIS. The Policy Advisory Committee, Technical Review Group, and Technical Advisory Committee for the Santa Rosa Long-Term Subregional Wastewater Project each advised the Board of Public Utilities by reviewing and providing comment on the Screening Report. In addition, two joint study sessions on the Screening Report were held by the Santa Rosa City Council and Board of Public Utilities, during which public and agency comments concerning alternatives that should be carried forward for review in the EIR/EIS were received orally and in writing.

Based on the findings of the Screening Report and comments received from the public and agencies, the Board of Public Utilities at its May 27, 1994 meeting determined which of the potential Project alternatives and components were to be retained and which ones will be eliminated from further review in the EIR/EIS process. Following additional study sessions in January 1995, the Board of Public Utilities selected five primary alternatives, in addition to the No Action (No Project) Alternative, to be carried forward in the preparation of the EIR/EIS. One alternative, Community Separator/South County Reclamation, was later dropped by the Board of Public Utilities. The two primary components of the Community Separator, wetlands creation and aquifer storage and recovery, were both evaluated and found to be infeasible. After further consideration of the alternatives and comments from interested parties, on April 18, 1995, the Santa Rosa City Council confirmed that four primary alternatives along with the No Action (No Project) Alternative were to be considered equally as the Project for the purposes of the EIR/EIS. At its August 31, 1995 meeting, the Board of Public Utilities added Lakeville bay flats area as part of the Project’s agricultural irrigation component.

PROJECT ALTERNATIVES

The five Project alternatives, including the No Action (No Project) Alternative are described in the following sections and shown in Figures 3.1-3 through 3.1-8.

- Alternative 1: No Action (No Project), maintaining the existing Subregional Reclamation System, including the Interim Improvements constructed during 1995-96.
- Alternative 2: South County Reclamation, focusing on expansion of agricultural irrigation and associated reclaimed water storage in areas south of Santa Rosa.
- Alternative 3: West County Reclamation, focusing on expansion of agricultural irrigation and associated reclaimed water storage in areas west of Santa Rosa.
- Alternative 4: Geysers Recharge, focusing on injection of reclaimed water for recharge of the geysers steamfield located in the Mayacmas Mountains.
- Alternative 5: Discharge, focusing on the discharge of reclaimed water to the Russian River at a design discharge rate of up to 20% of river flow.

These alternatives include components which provide for agricultural and urban irrigation, recharge of the geysers steamfield, and design discharge to the Russian River at rates of 1% and 20% of river flow. Alternatives 2 and 3 (focusing on South County irrigation and West County irrigation, respectively) with a design discharge rate of 1%, and Alternative 5 with a design discharge rate of up to 20% of river flow will represent the extremes of this range. (Alternative 4, which uses reclaimed water for recharge of the geysers steamfield, will also have a maximum of 1% discharge, but only during peak wet weather periods.)

These alternatives thus allow the maximum range of levels of impacts to be evaluated for the Project, with Alternative 5 having greater discharge volume while Alternatives 2 and 3 have less discharge volume, but require more facility construction. Although the Project could utilize a design discharge rate anywhere between 1% and 20%, three intermediate discharge scenarios, using 5%, 10%, and 15% discharge rates were selected as benchmarks in evaluating the differences in impacts along the discharge rate continuum between 1% and 20%. These scenarios are discussed in the *Range of Discharge Evaluation* (see Appendix A) (Harland Bartholomew & Associates, Inc. 1996).

Because the Project alternatives include a series of Project components and a range of discharge rates to the Russian River, they encompass a wide scope of potential environmental impacts, and such impacts are analyzed for each individual component, as well as for each of the alternatives. Therefore, this analysis, by addressing impacts of individual components as well as the five alternatives, is intended to allow the selection of a Project that falls within the range of alternatives included in this EIR/EIS, and which may include components which are reduced in scope, or may combine components from more than one alternative.

Alternatives 2-5 were designed to meet the purpose and need of the Project: disposal of 10,050 million gallons (MG) of reclaimed water in a reliable, practicable manner that provides the best use of water resources, while protecting public health and the environment. To that end, options were developed to maximize reclamation, recycling, and reuse and to optimize water conservation. Alternatives 2 through 5 include conservation measures that will reduce the annual average production of reclaimed water to 8,220 MG. Alternatives 2 and 3 center around reuse of reclaimed water through irrigation for both agriculture and urban uses. Alternative 4 proposes reuse of the water to recharge the geysers steamfield and generate energy. Alternative 5 recycles the water by returning it to the Russian River at a location close to the point at which it was removed. The discharge option provides reuse of the reclaimed water by providing increased habitat in the Russian River during low flow periods.

DETERMINATION OF WASTEWATER FLOWS AND RECLAMATION SYSTEM REQUIREMENTS

Projection of Future Wastewater Flows

The first element in the planning and design of the Subregional System reclaimed water disposal facilities is to Project future wastewater flows. Typically future flows are projected based upon historical flow factors (such as flow per dwelling unit, flow per employee, or flow per capita) and projected numbers of dwelling units, employees, and population. The flow factors are normally estimated using current or historical wastewater flows, and current or historical data (e.g., number of dwelling units and employees) which matches the years when flow data are available.

However, in recent years, the State of California has instituted water conservation laws, and the Subregional System member entities have implemented programs which reduce water use and wastewater flow generation. These laws and programs result in a decrease in the flow factors and projected wastewater flows (termed the “with conservation” flows) below the expected flow if these laws and programs did not exist (termed the “non-conservation” flows). The non-conservation flow, therefore, will be the flow if there were no low flow toilets, no low flow showerheads, and none of the member entities of the Subregional System had metered water connections with commodity rates or were performing water audits. Table 3.1-1 shows the wastewater flow factors adjusted for the effects of current wastewater conservation programs.

Table 3.1-1

Wastewater Flow Factors Adjusted for Effects of Current Water Conservation Programs[1]

Member Entity	Residential (gallons/day/dwelling units)			Commercial/Industrial/Institutional (gallons/day/employee)		
	1994	Buildout	Non-Conservation	1994	Buildout	Non-Conservation
Santa Rosa[2]	192.0	171.0	214.4	40.5	35.5	43.7
Rohnert Park/Cotati	197.9	176.5	223.1	32.1	29.5	36.2
Sebastopol	126.0	109.3	141.4	41.7	38.9	45.2

Source: West Yost & Associates 1995

1 The non-conservation flow is the flow without use of low flow toilets or shower heads, and without implementation of water metering with commodity rate structures and without audit programs

2 Includes South Park County Sanitation District

For the purposes of determining future system requirements, the wastewater flows are projected on the basis of average dry weather flow, which is the average daily flow during dry weather, and consists mainly of wastewater, without any stormwater inflow. (Storm water inflow and groundwater that enters the system, is treated at the Laguna Plant, and thus becomes part of the volume of reclaimed water from the Plant, and is accounted for in the operation of the Water Balance Model described in the next section.)

Projected wastewater flows and resulting design criteria for the Project are based upon complete buildout as projected in the General Plans of the Subregional System's member entities (in effect in April 1994). At buildout, they will have 96,000 dwelling units and non-residential uses with 100,000 employees. The resultant projected wastewater flow is approximately 21 million gallons per day (mgd) average dry weather flow, a 22 % increase over the 1994 average dry weather flow of 17 mgd (See Table 3.1-2).

Table 3.1-2

Projected Average Dry Weather Wastewater Flow with Water Conservation

	1994			Buildout of the General Plan		
	Quantity (DU[1]) (employees)	Flow Generation Factor (gal / day / DU[1]) (gal / day / employee)	Proj. Flow (mgd)	Quantity (DU[1]) (employees)	Flow Generation Factor (gal / day / DU[1]) (gal / day / employee)	Proj. Flow (mgd)
Santa Rosa & SouthPark County Sanitation District						
Residential	49,501	192.3	9.52	72,900	171.4	12.47
Commercial/Industrial /Institutional	79,467	40.5	3.22	98,500	35.5	3.50
Santa Rosa Total			12.74			16.31
Rohnert Park						
Residential	13,978	192.8	2.69	15,510	171.7	2.66
Commercial/Industrial /Institutional	14,166	30.8	0.44	20,000	28.2	0.57
Sonoma State University	5,800 Stu	19.8 gallons/day/stu	0.115	10,000 stu	19.8 gallons/day/stu	0.20
Rohnert Park Total			3.24			3.43
Cotati						
Residential	2,544	192.8	0.49	4,066	171.7	0.69
Commercial/Industrial /Institutional	1,412	32.1	0.05	2,331	29.5	0.07
Cotati Total			0.53			0.76
Sebastopol						
Residential	3,015	126.0	0.38	4,359	109.3	0.48
Commercial/Industrial /Institutional	5,282	41.7	0.22	6,600	38.9	0.26
Sebastopol's Remaining Current Capacity						0.10
Sebastopol Total			0.60			0.84
Total						
Residential	69,258		13.08	96,835		16.74
Commercial/Industrial /Institutional	100,327		4.03	127,431		4.60
Subregional System Total			17.11			21.34

Source: West Yost & Associates 1995

1. DU - dwelling units

The conservation programs of the Subregional System's member entities have already produced a significant reduction in average dry weather flow and will produce an even larger reduction in the future (See Table 3.1-3). Without conservation (without the use of low-flow toilets, low-flow shower heads, and water meters with commodity pricing), it is estimated that the 1994 wastewater average dry weather flow will be 19 mgd, about 11 % above the actual average dry weather flow. Without conservation, the buildout wastewater average dry weather flow is estimated to be approximately 26 mgd, about 25 % above that with conservation. More detailed information about the projected wastewater flows and water conservation can be found in the Technical Memorandum, *Projected Wastewater Flows* (West Yost 1995).

Table 3.1-3

Projected Average Dry Weather Wastewater Flow without Water Conservation[1]

	1994			Buildout of the General Plan		
	Quantity (DU) (employees)	Flow Generation Factor (gal / day / DU) (gal / day / employee)	Proj. Flow (mgd)	Quantity (DU) (employees)	Flow Generation Factor (gal / day / DU) (gal / day / employee)	Proj. Flow (mgd)
Santa Rosa & South Park County Sanitation District						
Residential	49,501	215.0	10.64	72,900	214.6	15.64
Commercial/Industrial /Institutional	79,467	43.7	3.48	98,500	43.7	4.31
Santa Rosa Total			14.02			19.95
Rohnert Park						
Residential	13,978	217.7	3.04	15,510	217.7	3.38
Commercial/Industrial /Institutional	14,166	34.9	0.50	20,000	34.9	0.70
Sonoma State University	5,800	19.8 gallons/day/Stu	0.115	10,000	19.8 gallons/day/Stu	0.20
Rohnert Park Total			3.66			4.28
Cotati						
Residential	2,544	217.7	0.55	4,066	217.7	0.89
Commercial/Industrial /Institutional	1,412	34.9	0.05	2,331	34.9	0.08
Cotati Total			0.60			0.97
Sebastopol						
Residential	3,015	141.4	0.43	4,359	141.4	0.62
Commercial/Industrial /Institutional	5,282	45.2	0.24	6,600	45.2	0.30
Sebastopol Total			0.67			0.92

Table 3.1-3

Projected Average Dry Weather Wastewater Flow without Water Conservation[1]

	1994			Buildout of the General Plan		
	Quantity (DU) (employees)	Flow Generation Factor (gal / day / DU) (gal / day / employee)	Proj. Flow (mgd)	Quantity (DU) (employees)	Flow Generation Factor (gal / day / DU) (gal / day / employee)	Proj. Flow (mgd)
Total						
Residential	69,258		14.66	96,384		20.53
Commercial/Industrial /Institutional	100,327		4.39	127,431		5.59
Subregional System Total			19.05			26.12

Source: West Yost & Associates 1995

1. The non-conservation flow is the flow without use of low flow toilets or shower heads, and without implementation of water metering with commodity rate structures and without audit programs.

Design Discharge Rate

Design discharge reflects the maximum monthly discharge rate during normal operations. For example, a 5% "design discharge" scenario indicates that the Project was designed with facilities that will allow monthly average discharge to the Russian River at 5% or less of the river flow in at least 19 out of 20 months. Median and average discharges will be well below the design discharge, as shown in the following table. This table demonstrates that for the 1% design discharge, there will be no discharge at all for over half of the discharge season. Higher percentages of discharge occur only when river flow is very low. Discharge is a very low percentage of river flow when water levels are high. Thus, when discharge percentage is highest, the total volume discharged is lowest. Although design was based on modeling of monthly flows, operation will be based on daily river flows. Therefore, hydrology and water quality analysis was based on a simulation of daily operations.

Table 3.1-4

Median and Average Discharge Proportions

Design Discharge as Proportion of River Flow	Average Annual Discharge Volume (MG/yr)	Median Monthly Discharge as Proportion of River Flow	Average Monthly Discharge as Proportion of River Flow
1 %	685	0 %	< 0.5 %
5 %	1,825	3 %	1 %
10 %	2,740	0.8 %	2 %
15 %	3,490	not calculated	not calculated
20 %	4,640	3.2 %	4 %
No Action	3,245	not calculated	not calculated

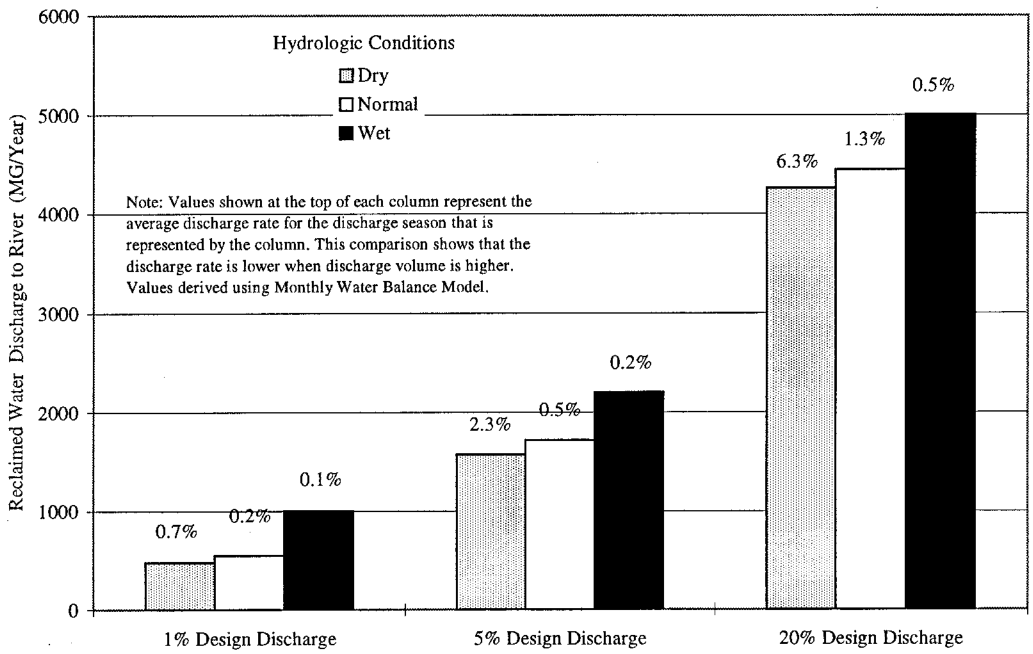
Souce: Parsons Engineering Science, Inc. 1996; Merritt Smith Consulting 1996

The design discharge rate is used to plan for the size of Project components, such as storage facilities, pipelines, and irrigation areas. For analysis of specific impacts that may result from the Project, other measures related to discharge may be used, such as the monthly maximum reclaimed water discharge to the Russian River, used in some water quality analyses. In addition to the design discharge rate, there is also a contingency discharge rate, as discussed at the end of this section.

The amount of reclaimed water that will be discharged to the Russian River via the Laguna each year depends on River flow. In wet years when River flows are relatively high, discharge volume will be higher than in dry years. The concentration of reclaimed water in the River and Laguna will generally be lower in wet years than in dry years. This relationship is shown on Figure 3.1-2.

Reclamation System Requirements

A Monthly Water Balance Model was used to determine system requirements (storage volume and irrigation area) for alternatives 2 and 3, South and West County, respectively. Other system requirements such as sizing of pipelines and pump stations for these alternatives, as well as alternatives 4 and 5, the geysers and discharge alternatives (which do not involve storage and irrigation), were developed concurrently, and based partially on the results from this model. System requirements for Project alternatives were established by simulating Subregional System operations for a 70-year period (1923-1992).



Source: Parsons Engineering Science, Inc. 1995
Merritt Smith Consulting 1996

DISCHARGE VOLUME and DISCHARGE RATE in DRY, NORMAL and WET YEARS

Figure 3.1-2

The Monthly Water Balance Model for reclamation system operations is based on monthly Russian River flow estimates generated by the Sonoma County Water Agency Russian River Flow Model. The Water Agency's model generated river flow estimates for the Hacienda Bridge (USGS) gaging station between 1923 and 1992. The Water Agency's model data is based on water use conditions projected for the year 2010.

The Monthly Water Balance Model includes components for reclaimed water inflow (i.e., treatment plant effluent or inflow to the irrigation system), irrigation requirements, storage requirements, and reclaimed water discharge to the Russian River. The model balances the reclaimed water inflow with the various demands for irrigation and storage and subsequently determines required discharge to the Russian River.

The system is subject to variations in inflow due to storm events and will also have operational limitations on the ability to move stored reclaimed water from one location to another to balance storage in the event of sudden large increases in wet weather flow. Designing a system for 100 % reliability to avoid exceedence of a specific discharge rate under these conditions will require an increase in system requirements which will be used only under extreme wet weather conditions. Providing this level of redundancy in system requirements will increase costs and potentially, environmental impacts. Therefore, the water reclamation system is being designed to have a reliability of 1:20, months, based on the 70-year history of river flow, i.e., normal system capacity may be exceeded only one month in 20 discharge months. Discharge is allowed between October 1 and May 14, approximately eight months of the year, and this translates to about one contingency event every 2-1/2 calendar years. Volumes in excess of the normal system capacity are considered as contingency volumes and addressed by the Contingency Plan discussed in Section 3.3 of this document.

The Monthly Model accounts for stormwater inflow by adjusting monthly flows upward based on hydrologic conditions. In a wet year, monthly reclaimed water flow will be much greater than in the same month of a dry year. Monthly reclaimed water flow in summer is less than that in winter because groundwater infiltration and stormwater inflow are much less than in winter.

Irrigation requirements, expressed in acres and annual volume of reclaimed water required for irrigation, are determined using annual application rate requirements for different irrigation uses (e.g., vineyards or pasture), local precipitation rates, and soil types. The annual volume requirements are further subdivided into monthly irrigation volumes for use in calculating storage requirements. After irrigation requirements are satisfied, actual river discharge is calculated by comparing water available for storage to the target storage volume. Target storage is defined as the accumulated volume desired in the storage system for any given month. Monthly target storage values are input to the model as a fraction of maximum storage. Collectively, the target storage values comprise the target storage curve, which was developed to minimize the storage necessary to meet a particular irrigation requirement. Preliminary storage volume (based on target storage), is compared to the maximum storage available to ensure that the maximum is not exceeded. The Daily Water Balance Model was developed using the same assumptions but simulated operations on a daily time step for purposes of evaluating Project impacts. The monthly and daily water balance model are compared in the *Analysis of Results from Daily and Monthly Water Balance Models* (Parsons Engineering Science, Inc. 1996b).

The model was run for both alternatives 2 and 3, under five design discharge rate scenarios: 1%, 5%, 10%, 15%, and 20%. As the design discharge rate increases, system requirements for irrigation and storage decrease (see Table 3.1-5). Irrigation requirements (i.e., the quantity needed to meet irrigation demand) differ between alternatives 2 and 3 because of the differing crop type, local precipitation, and soils between the South and West counties. The 1% design discharge rate with Sebastopol irrigation area requires the greatest total number of acres for irrigation because Sebastopol irrigation has the lowest annual irrigation demand or consumption rate. The total incremental required irrigated acreage (in addition to existing acreage) for the South County and Sebastopol is 5,200 acres, the maximum total for West County and Sebastopol is 6,900 acres. The maximum active reclaimed water storage volume that will need to be added for both alternatives, with or without Sebastopol agricultural irrigation, is 4,000 MG.

Table 3.1-5

Annual Reclamation System Requirements
(Based on Average Dry Weather Flow = 21 mgd)

System Requirements[1]	Russian River Design Discharge Rate[2] 1%	5%	10%	15%	20%
Alternative 2 - South County Reclamation					
Existing Storage (MG)	1,200	1,200	1,200	1,200	1,200
New Storage (MG)	4,000	2,900	1,900	1,000	0
Total Storage (MG)	5,200	4,100	3,100	2,200	1,200
Existing Irrigation Area (acres)	5,500	5,500	5,500	5,500	5,500
Urban Irrigation Area (acres)	400	400	400	400	100
South County Agricultural Irrigation Area (acres)	3,800	2,600	1,600	1,400	0
Total Irrigation Area (acres)	9,700	8,500	7,500	7,300	5,600
Contingency Volume Summary					
Average Contingency Volume (MG/month)[3]	124	137	111	112	118
Maximum Contingency Volume (MG/month)[3]	326	491	438	379	327
Alternative 2 - South County with Sebastopol Reclamation					
Existing Storage (MG)	1,200	1,200	1,200	1,200	1,200
New Storage (MG)	4,000	2,900	1,900	1,000	0
Total Storage (MG)	5,200	4,100	3,100	2,200	1,200
Existing Irrigation Area (acres)	5,500	5,500	5,500	5,500	5,500
Urban Irrigation Area (acres)	400	400	400	400	100
South County Agricultural Irrigation Area	2,600	1,300	300	300	0

Table 3.1-5

Annual Reclamation System Requirements
(Based on Average Dry Weather Flow = 21 mgd)

System Requirements[1]	Russian River Design Discharge Rate[2] 1%	5%	10%	15%	20%
(acres)					
Sebastopol Agricultural Irrigation Area (acres)	2,200	2,200	2,200	2,200	0
Total Irrigation Area (acres)	10,700	9,400	8,400	8,400	5,600
Contingency Volume Summary					
Average Contingency Volume (MG/month)[3]	125	137	109	112	118
Maximum Contingency Volume (MG/month)[3]	326	491	438	379	327
Alternative 3 - West County Reclamation					
Existing Storage (MG)	1,200	1,200	1,200	1,200	1,200
New Storage (MG)	4,000	2,900	1,900	1,000	0
Total Storage (MG)	5,200	4,100	3,100	2,200	1,200
Existing Irrigation Area (acres)	5,500	5,500	5,500	5,500	5,500
Urban Irrigation Area (acres)	400	400	400	400	100
West County Agricultural Irrigation Area (acres)	6,200	4,400	2,900	1,400	0
Total Irrigation Area (acres)	12,100	10,300	8,800	7,300	5,600
Contingency Volume Summary					
Average Contingency Volume (MG/month)[3]	126	137	109	112	118
Maximum Contingency Volume (MG/month)[3]	326	491	438	379	327
Alternative 3 - West County with Sebastopol Reclamation					
Existing Storage (MG)	1,200	1,200	1,200	1,200	1,200
New Storage (MG)	4,000	2,900	1,900	1,000	0
Total Storage (MG)	5,200	4,100	3,100	2,200	1,200
Existing Irrigation Area (acres)	5,500	5,500	5,500	5,500	5,500
Urban Irrigation Area (acres)	400	400	400	400	100
West County Agricultural Irrigation Area (acres)	4,300	2,600	1,000	300	0
Sebastopol Agricultural Irrigation Area (acres)	2,200	2,200	2,200	2,200	0
Total Irrigation Area (acres)	12,400	10,700	9,100	8,400	5,600
Contingency Volume Summary					
Average Contingency Volume (MG/month)[3]	126	137	109	112	118
Maximum Contingency Volume (MG/month)[3]	326	491	438	379	327

Source: Parsons Engineering Science, Inc. 1995

Notes:

1. System requirements are defined as the storage volume and irrigation area necessary to meet the reliability requirement. The reliability requirement is that reclaimed water production may exceed normal system capacity only one month in twenty.
2. Design discharge rate as a percentage of Russian River flow, as permitted by the Regional Water Quality Control Board.
3. Contingency volume is defined as the amount of reclaimed water produced in excess of the design discharge rate. Contingency volumes occur only one month in twenty discharge months (i.e., discharge months are

October to May) or about once every 2-1/2 years. Average and maximum contingency volumes are based on a statistical analysis covering a 70-year period of record of Russian River flow.

Contingency volume is defined as the amount of reclaimed water in excess of the allowable river discharge. Allowable river discharge is the monthly volume of Russian River flow multiplied by the allowable design discharge rate (1%, 5%, 10%, or 20% of river flow). The Contingency Plan (described further in Section 3.3) includes three elements to manage the contingency volume that will occur and to reduce the portion of the contingency volume that must be discharged. Contingency volumes will be managed through contingency storage, winter irrigation, emergency conservation, and as a last resort, additional river discharge. The storage and irrigation systems were sized so that contingency volumes will occur in just one of every 20 months (consistent with Regional Water Quality reliability requirements).

Average contingency volumes range from 109-137 MG per month in which a contingency volume occurs. The maximum contingency volumes estimated using the Monthly Water Balance Model are 326, 491, 438, and 327 MG, for the 1%, 5%, 10%, and 20% design discharge rates, respectively. When contingency discharge occurs, the maximum monthly discharge rates are estimated to be 1%, 7.3%, 13.4%, and 28.3% for the 1%, 5%, 10%, and 20% design discharge rates respectively. There is no contingency discharge for the 1% design discharge rate. The Contingency Plan is further discussed in Section 3.3 of this document.

RECLAIMED WATER ALLOCATION FOR PROJECT ALTERNATIVES

Based upon the projected flow of 21 mgd average dry weather flow, allocations have been prepared for the resulting reclaimed water flow from the Laguna Plant of 22.5 mgd average daily flow. (The projected flow for the No Action Alternative is 16.2 mgd average dry weather flow and 17.4 mgd average daily flow, see Table 3.1-6). The allocations for alternatives 2 and 3 represent a design discharge of 1% of river flow; the allocation for Alternative 5 represents a design discharge up to 20% of river flow. Thus, alternatives 2 through 5 represent the impacts associated with the range of potential discharge rates between 1% and 20% of river flow. Tables showing the allocation of reclaimed water for alternative discharge options of 5%, 10%, and 15% of river flow are provided in the *Range of Discharge Evaluation*, (Harland Bartholomew & Associates, Inc. 1996).

The reclaimed water allocations shown in Table 3.1-6 are presented on an annual basis, using average annual flows. These annual flows are based on the designated average dry weather flow of 21 mgd for alternatives 2, 3, 4 and 5, and 16.2 mgd for Alternative 1, and they account for inflow of storm water into the system. These data are based on assumptions, calculations, and results presented in a series of water balance technical memoranda (Parsons Engineering Science, Inc. 1995g-h, 1996b).

Table 3.1-6

Reclaimed Water Allocation

Alternative 1 - (No Project) No Action

AVERAGE ANNUAL FLOW					
WASTEWATER WITHOUT CONSERVATION (MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions (April 1995)					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		10			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Urban Irrigation - Rohnert Park
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)				Adopted Retrofit Program
			(350)		Russian River/Laguna Discharge
Alternative 1 Implementation(December 1997)					
380					Estimated Additional Output - Buildout
	(875)				State Regulations
	-				Expanded Retrofit Program
		-			Urban Irrigation - Fountain Grove
		-			Urban Irrigation - Bennett Valley
		-			Agricultural Irrigation - South County
		-			Agricultural Irrigation - West County
		-			Optional Irrigation - Sebastopol
		-			Geysers Steamfield Recharge
			(495)		Russian River/Laguna Discharge
				-	Storage - South County Reservoirs
				-	Storage - West County Reservoirs
				-	Optional Aquifer Storage and Recovery (ASR)
7,880	(1,055)	3,580	3,165	1,200	Total
	6,825	6,825			Grand Total

Table 3.1-6 (Continued)

Reclaimed Water Allocation

Alternative 2 - South County Reclamation

AVERAGE ANNUAL FLOW					
WASTEWATER WITHOUT CONSERVATION (MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions (April 1995)					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		10			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Urban Irrigation - Rohnert Park
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
					Adopted Retrofit Program
	(150)		350		
Alternative 2 Implementation					
2,550					Estimated Additional Output - Buildout
	(1,270)				State Regulations
	(380)				Expanded Retrofit Program
		190			Urban Irrigation - Fountain Grove
		190			Urban Irrigation - Bennett Valley
		3,575			Agricultural Irrigation - South County
		-			Agricultural Irrigation - West County
		Optional			Optional Irrigation - Sebastopol[1]
		-			Geysers Steamfield Recharge
			(3,055)		Russian River/Laguna Discharge
				4,000	Storage - South County Reservoirs
				-	Storage - West County Reservoirs
10,050	(1,830)	7,535	605	5,200	Total
	8,220	8,220			Grand Total

[1] Sebastopol Irrigation is an optional component which will reuse 1,200 MG of reclaimed water per year; if selected, only 2,400 MG/yr of reuse will go to Agricultural Irrigation - South County.

Table 3.1-6 (Continued)

Reclaimed Water Allocation

Alternative 3 - West County Reclamation

AVERAGE ANNUAL FLOW: WASTEWATER WITHOUT CONSERVATION (MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions (April 1995)					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		10			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Rohnert Park Urban Irrigation
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)				Adopted Retrofit Program
			(350)		Russian River/Laguna Discharge
Alternative 3 Implementation					
2,550					Estimated Additional Output - Buildout
	(1,270)				State Regulations
	(380)				Expanded Retrofit Program
		190			Urban Irrigation - Fountain Grove
		190			Urban Irrigation - Bennett Valley
		-			Agricultural Irrigation - South County
		3,585			Agricultural Irrigation - West County
		Optional			Optional Irrigation - Sebastopol[1]
		-			Geysers Steamfield Recharge
			(3,065)		Russian River/Laguna Discharge
				-	Storage - South County Reservoirs
				4,000	Storage - West County Reservoirs
10,050	(1,830)	7,545	595	5,200	Total
	8,220	8,220			Grand Total

[1] Sebastopol Irrigation is an optional component which will reuse 1,200 MG of reclaimed water per year; if selected, only 2,400 MG/yr of reuse will go to Agricultural Irrigation - West County.

Table 3.1-6 (Continued)

Reclaimed Water Allocation
Alternative 4 - Geysers Recharge

AVERAGE ANNUAL FLOW					
TOTAL WASTEWATER (MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		-			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Urban Irrigation - Rohnert Park
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)				Adopted Retrofit Program
			(350)		Russian River/Laguna Discharge
Alternative 4 Implementation					
2,550					Estimated Output - Buildout
	(1,270)				State Regulations
	(380)				Expanded Retrofit Program
		-			Urban Irrigation - Fountain Grove
		-			Urban Irrigation - Bennett Valley
		(1,700)			Agricultural Irrigation/Laguna Discharge
		-			Agricultural Irrigation - South County
		-			Agricultural Irrigation - West County
		-			Optional Irrigation - Sebastopol
		6,270			Geysers Steamfield Recharge
			(3,690)[1]		Russian River/Laguna Discharge
				-	Storage - South County Reservoirs
				-	Storage - West County Reservoirs
				-	Optional Aquifer Storage and Recovery (ASR)
10,050	(1,830)	8,220	0[1]	1,200	Total
	8,220	8,220			Grand Total

[1] Up to 0.65 % of Russian River flow may be discharged during peak wet weather events.

Table 3.1-6 (Continued)

Reclaimed Water Allocation
Alternative 5 - Discharge

AVERAGE ANNUAL FLOW					
WASTEWATER WITHOUT CONSERVATION(MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions (April 1995)					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		10			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Urban Irrigation - Rohnert Park
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)				Adopted Retrofit Program
			(3570)		Russian River/Laguna Discharge
Alternative 5 Implementation					
2,550					Estimated Additional Output - Buildout
	(1,270)				State Regulations
	(380)				Expanded Retrofit Program
		-			Urban Irrigation - Fountain Grove
		-			Urban Irrigation - Bennett Valley
		-			Agricultural Irrigation - South County
		-			Agricultural Irrigation - West County
		-			Optional Irrigation - Sebastopol
		-			Geysers Steamfield Recharge
			900		Russian River/Laguna Discharge
				-	Storage - South County Reservoirs
				-	Storage - West County Reservoirs
10,050	(1,830)	3,580	4,560	1,200	Total
	8,220	8,220			Grand Total

ALTERNATIVE 1 - NO ACTION (NO PROJECT)

The No Action Alternative evaluates impacts which will occur if no Project were implemented. In this case, the No Action Alternative consists of the existing Santa Rosa Subregional Water Reclamation System (as of April 19, 1995), plus various upgrades at the treatment plant, as well as other projects to improve the reliability of the reclamation system prior to implementation of the Long-Term Wastewater Project (see Figures 3.1-3 and 3.1-4). These projects are:

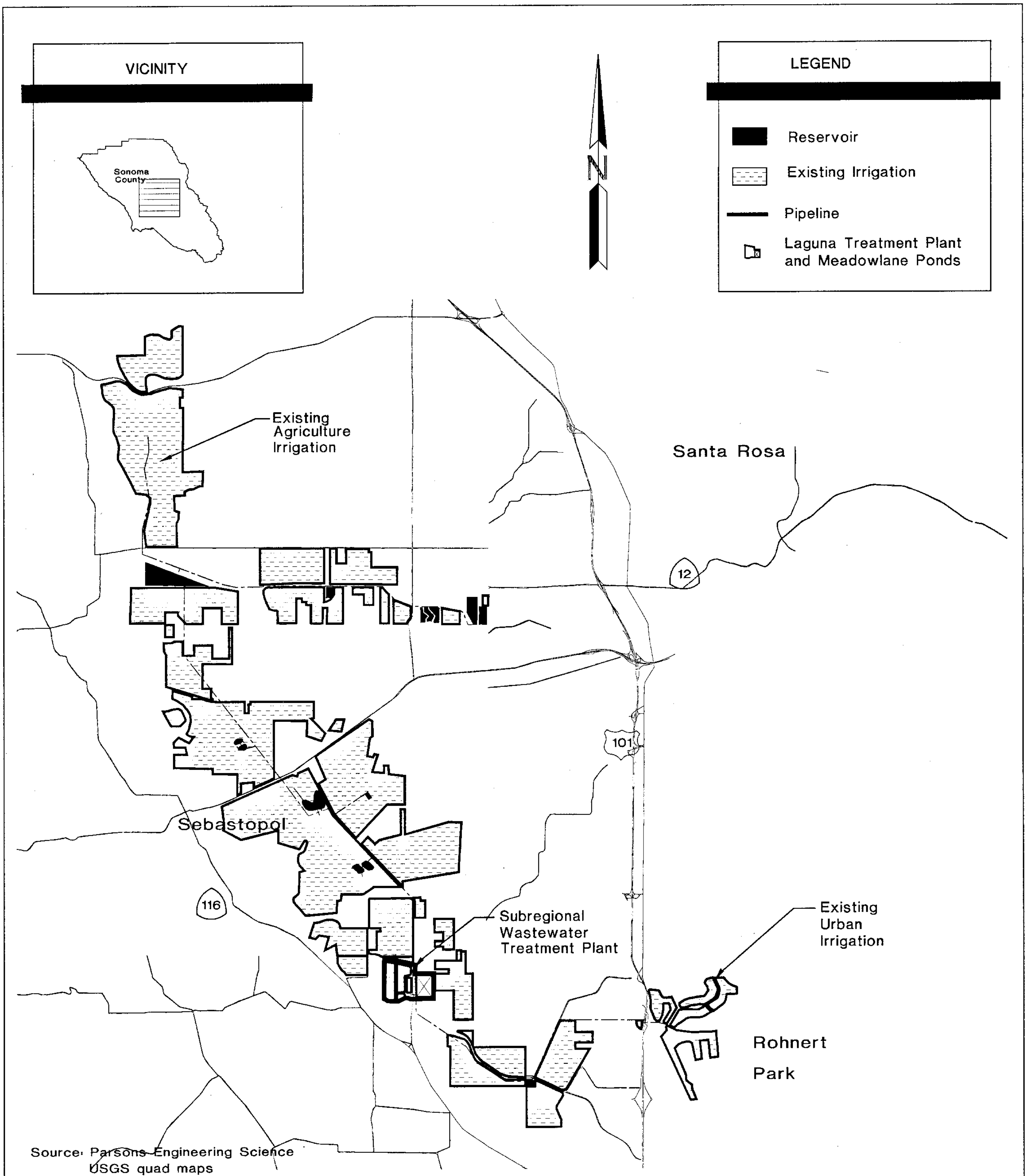
- The North Pipeline Extension;
- The Rohnert Park Reuse Project;
- The West Cotati Reclamation Pipeline Project;
- The Meadowlane Sludge Composting Facility; and
- The Laguna Joint Wetland Project.

These projects are described in Section 3.2.

The existing irrigation areas will be retained, including those which are part of the interim Project improvements identified above. No new storage, irrigation, or discharge facilities will be provided.

Under Alternative 1, the treatment capacity of the Subregional System will remain at 18 mgd average dry weather flow, limited by the capacity of the influent pumps. This Alternative assumes continuation by the Subregional System member entities of existing water conservation practices. It also assumes that projected growth as indicated in the General Plans adopted as of April 1994 of each of the Subregional entities will continue through December 1997. At this point it is assumed that no additional connections to the Subregional System will be allowed by the North Coast Regional Water Quality Control Board due to the inability of the system to comply with the Board's requirements.

With the additional development through December, 1997 the projected wastewater flow under Alternative 1 will be approximately 16.2 mgd average dry weather flow. This is a reduction from the 1994 flow of 17 mgd, and will result from the continued implementation of current conservation practices. The equivalent wastewater generation without conservation will be 20 mgd. However, for modeling of water quality impacts under the No Action Alternative, a projected wastewater flow of 17.42 mgd average dry weather flow was used, based upon the reported 1995 discharge from the Laguna Plant. This translates to annual flows under the No Action Alternative of almost 7,000 MG, as compared to a reliable annual reuse and disposal capacity of only about 3,800 MG with the current 1% discharge restriction. This large short-fall in disposal capacity means that under adverse weather conditions, with very low flows in the river, the City might be forced to discharge at rates up to 10% of river flow.



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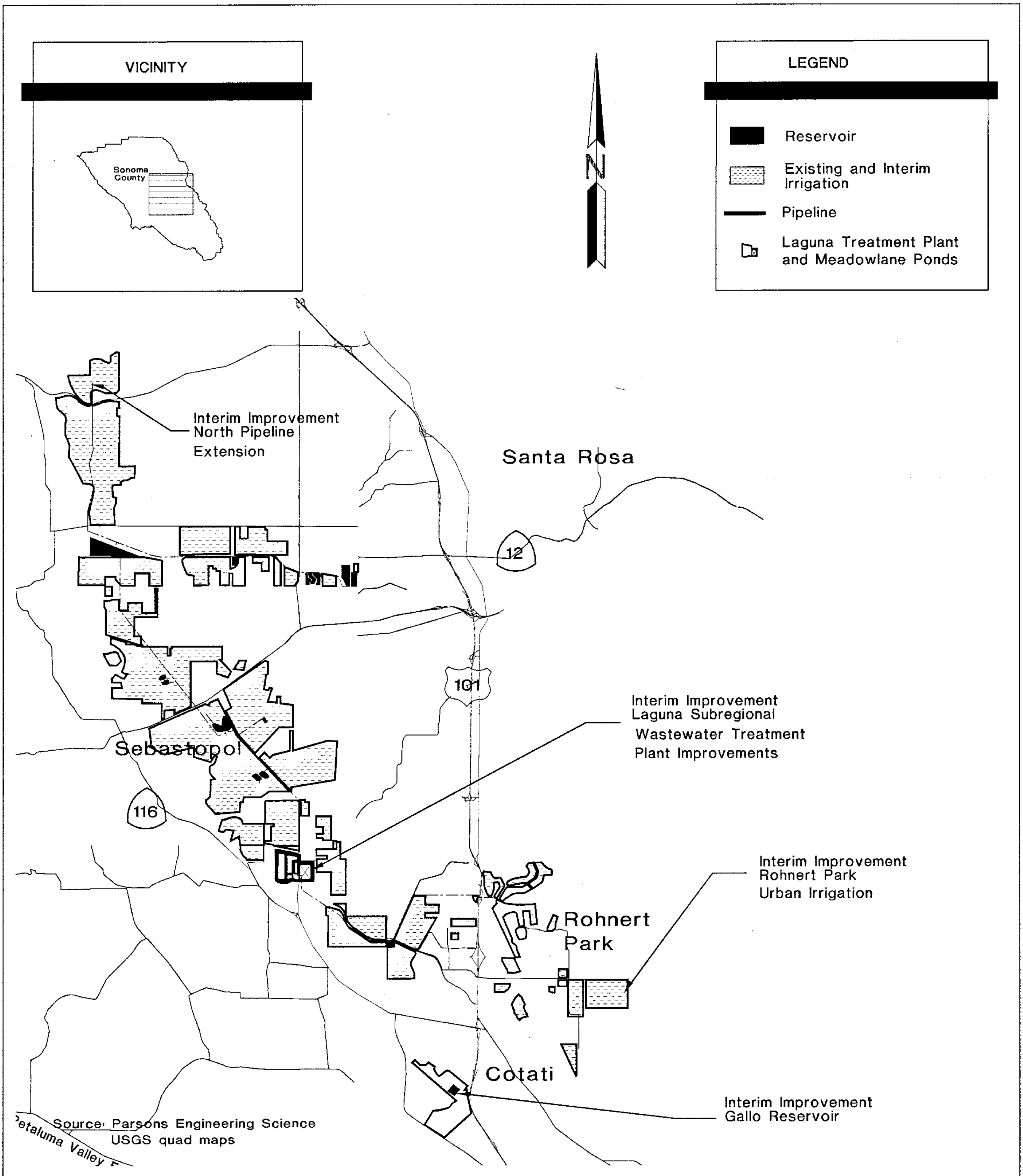
EXISTING RECLAMATION SYSTEM (as of April, 1995)

Figure 3.1-3



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INTERIM IMPROVEMENTS

Figure 3.1-4

Additional production of sludge will also occur. The impacts of disposing of this increased sludge production are addressed in the Santa Rosa Subregional Sludge Beneficial Use Project Environmental Impact Report (LSA 1991).

ALTERNATIVE 2 - SOUTH COUNTY RECLAMATION

The South County Reclamation Alternative focuses on the use of reclaimed water for agricultural irrigation in areas south and east of Santa Rosa (see Figure 3.1-5). The projected reclaimed water flow from the Laguna Plant will be 21 mgd average dry weather flow, and the design discharge rate to the Russian River will be 1% of river flow; however, a discharge rate of between 1% and 20% of river flow may also be considered under this Alternative as described in the *Range of Discharge Evaluation* (Harland Bartholomew & Associates, Inc. 1996). Discharge will occur at existing discharge locations (Delta and Meadowlane Ponds).

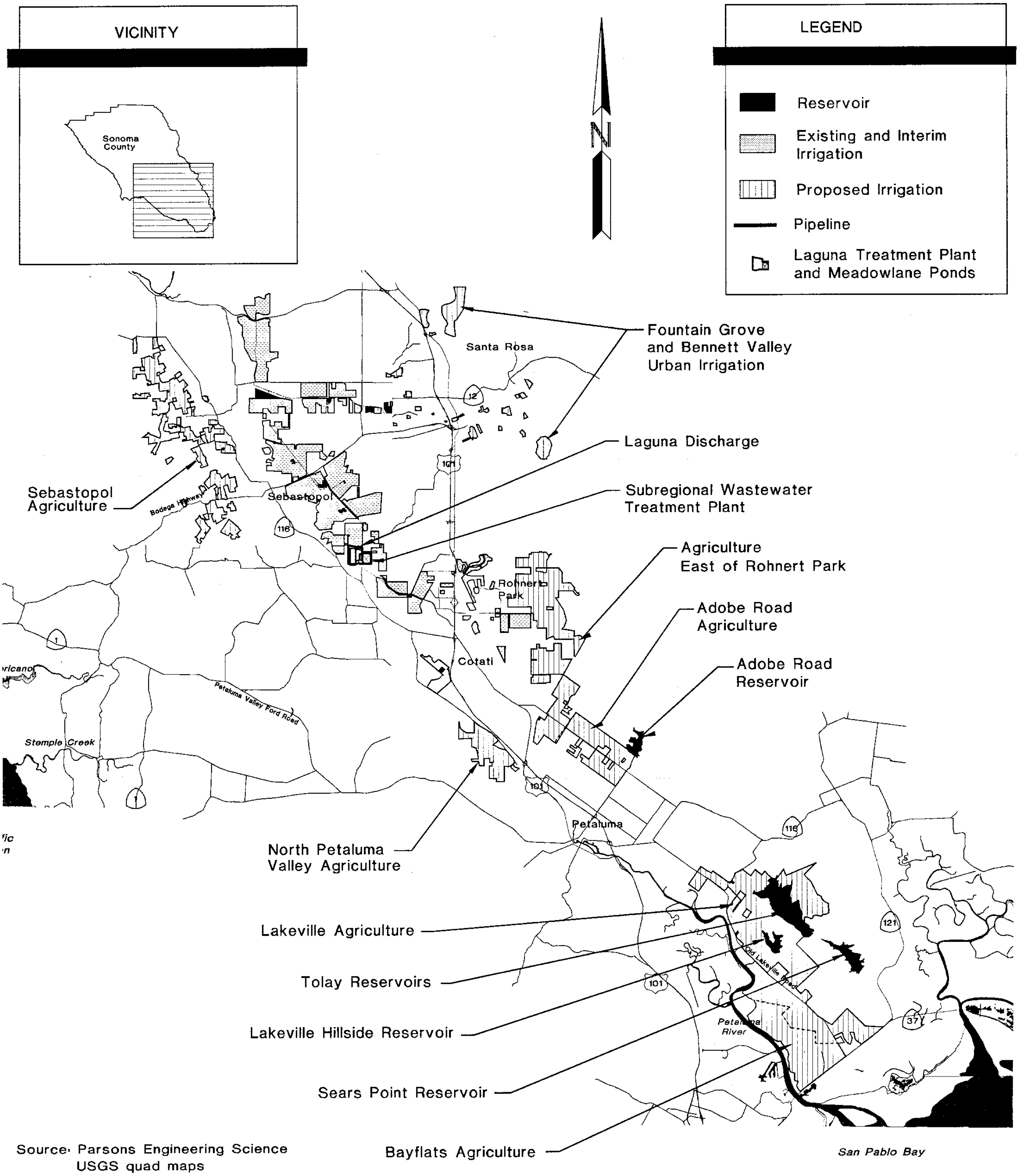
Within Alternative 2, four subalternatives have been defined. These subalternatives differ principally in the location of the proposed storage facilities for reclaimed water to be used in agricultural irrigation. The subalternatives with their associated storage facilities are:

- Subalternative 2A - Reservoir Site: Tolay Extended;
- Subalternative 2B - Reservoir Sites: Adobe Road and Lakeville Hillside;
- Subalternative 2C - Reservoir Site: Tolay Confined; and
- Subalternative 2D - Reservoir Sites: Sears Point and Lakeville Hillside.

Principal Project components which are common to all four subalternatives are:

- Expansion of the influent pumping capacity at the Laguna Plant;
- Urban irrigation projects in the Fountaingrove and Bennett Valley areas;
- A transport system, consisting of transmission pipelines and pump stations, to carry the reclaimed water to storage and irrigation sites; and
- Potential agricultural irrigation areas west of Sebastopol, east of Rohnert Park, in the Adobe Road and Lakeville areas, north of Petaluma, and in the bay flats west of Lakeville Highway.

The components which comprise Alternative 2 are more fully described in Section 3.3.



Source: Parsons Engineering Science
USGS quad maps

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ALTERNATIVE 2
SOUTH COUNTY RECLAMATION

Figure 3.1-5

ALTERNATIVE 3 - WEST COUNTY RECLAMATION

The West County Reclamation Alternative focuses on the use of reclaimed water for agricultural irrigation in areas west of the Laguna de Santa Rosa (see Figure 3.1-6). The projected reclaimed water flow from the Laguna Plant will be 21 mgd average dry weather flow, and the design discharge rate to the Russian River will be 1% of the river flow; however, a discharge rate of between 1% and 20% of river flow may also be considered under this Alternative as described in the *Range of Discharge Evaluation* (see Appendix A, Harland Bartholomew & Associates, Inc. 1996). Discharge will occur at existing discharge locations.

Within Alternative 3, five subalternatives have been defined. The subalternatives with their associated storage facilities are:

- Subalternative 3A - Reservoir Site: Two Rock;
- Subalternative 3B - Reservoir Site: Bloomfield;
- Subalternative 3C - Reservoir Site: Carroll Road;
- Subalternative 3D - Reservoir Site: Valley Ford; and
- Subalternative 3E - Reservoir Site: Huntley.

Principal Project components which are common to all five subalternatives are:

- Expansion of the influent pumping capacity at the Laguna Plant;
- Urban irrigation projects in the Fountaingrove and Bennett Valley areas;
- A transport system, consisting of transmission pipelines and pump stations, to carry the reclaimed water to storage and irrigation sites; and
- Potential agricultural irrigation areas west of Sebastopol and in the Stemple and Americano Creek areas.

The components which comprise Alternative 3 are more fully described below in Section 3.3.

ALTERNATIVE 4 - GEYSERS RECHARGE

The Geysers Recharge Alternative provides for transmission of reclaimed water from Delta Pond, located south of Guerneville Road to the geysers, located northeast of Healdsburg, for injection and recharge of the geysers steamfield currently used as a source for geothermal energy. The projected reclaimed water flow from the Laguna Plant will be 21 mgd average daily weather flow, and approximately 75% of the total reclaimed water will be used for recharge at the geysers. The remaining 25% will be used for irrigation. This Alternative will involve discharge to the Laguna de Santa Rosa only during peak wet weather events at a maximum rate that will not exceed 1% of Russian River flow, and no additional storage or irrigation is proposed (see Figure 3.1-7).

Expansion of the influent pumping capacity at the Laguna Plant is also a component of Alternative 4.

Under this Alternative a reduction of 2,000 acres in existing agricultural irrigation acreage will be accomplished through attrition under current procedures for the Reclamation System and is not evaluated as part of this EIR/EIS. Non-renewal of irrigation contracts now occurs within the system and under this Alternative, the City of Santa Rosa will not replace contracts which are not renewed, rather than seeking to obtain new contracts.

The components which comprise Alternative 4 are more fully described below in Section 3.3.

ALTERNATIVE 5 - DISCHARGE

This Alternative provides for the discharge of reclaimed water to the Russian River at a design discharge rate of up to 20 % of river flow. Under Alternative 5, the projected reclaimed water flow from the Laguna Plant will be 21 mgd average dry weather flow, and no additional reuse or storage of reclaimed water will be required (see Figure 3.1-8).

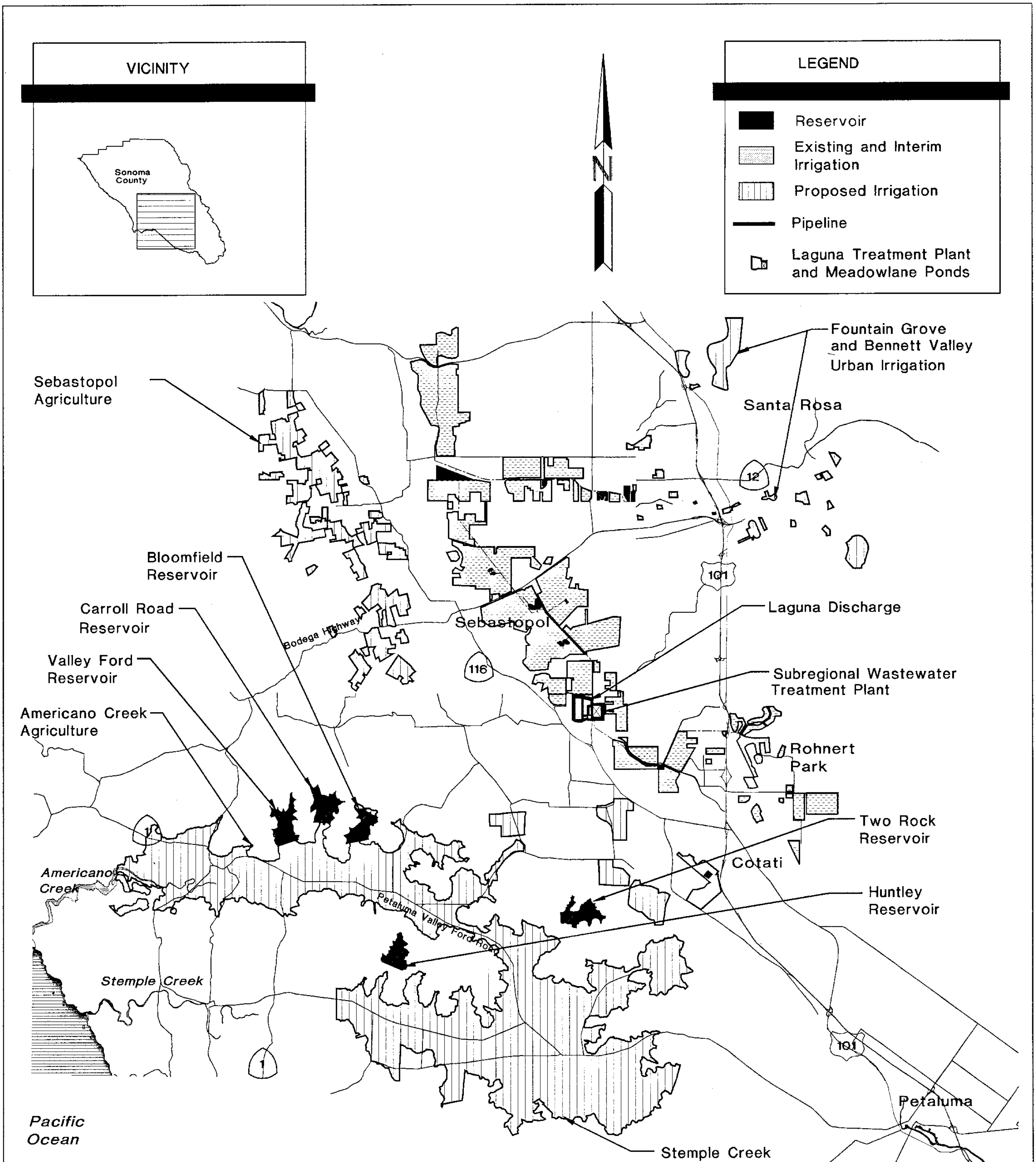
Within Alternative 5, two subalternatives have been defined. These subalternatives differ principally in the location at which discharge to the Russian River will take place. The subalternatives are:

- Subalternative 5A - Transmission of reclaimed water and discharge to the Russian River at a location above the Sonoma County Water Authority intakes;
- Subalternative 5B - Discharge of reclaimed water to the Laguna de Santa Rosa at the existing discharge locations.

Under the 20% design discharge rate for Subalternative 5A, minor amounts of reclaimed water may also be discharged to the Laguna at the existing discharge locations.

Also included in Alternative 5 is expansion of the influent pumping capacity at the Laguna Plant.

The components which comprise Alternative 5 are more fully described below in Section 3.3.



Source: Parsons Engineering Science
USGS quad maps

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ALTERNATIVE 3
WEST COUNTY
RECLAMATION

Figure 3.1-6

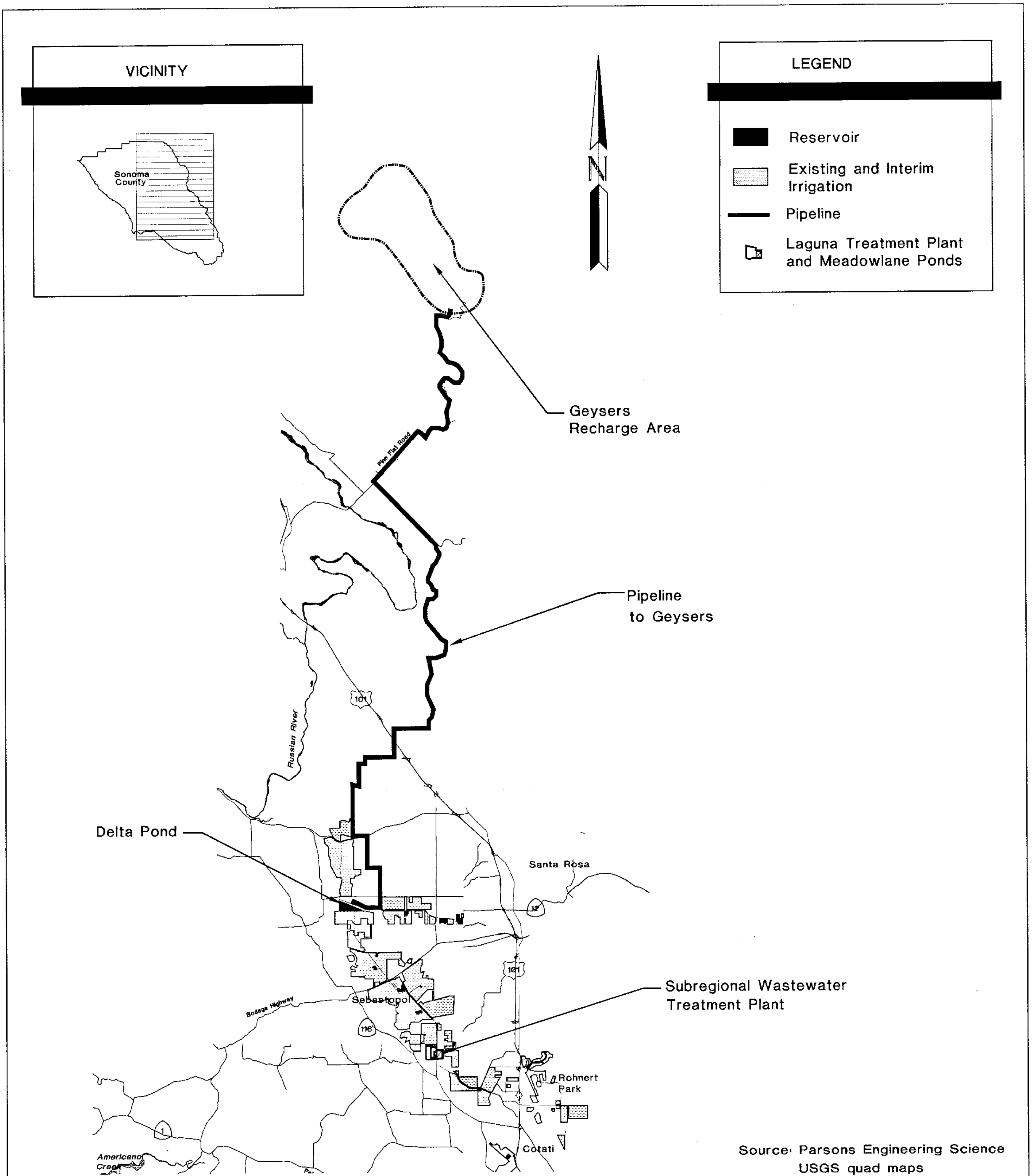

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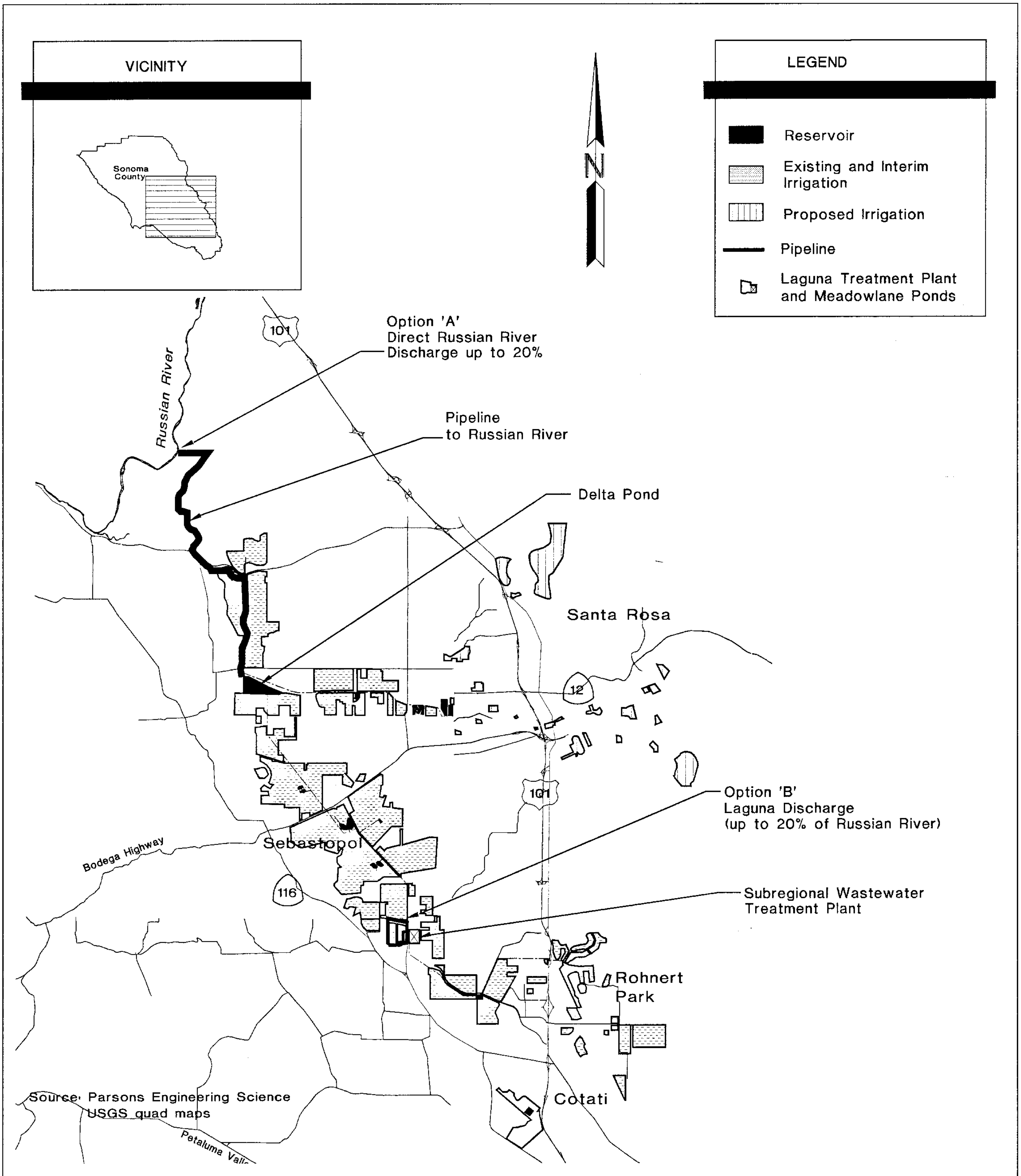
Figure 3.1-7

ALTERNATIVE 4
GEYSERS RECHARGE



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Wastewater Project

ALTERNATIVE 5
20% MAXIMUM
RUSSIAN RIVER DISCHARGE

Figure 3.1-8

ALTERNATIVES AND COMPONENTS CONSIDERED AND REJECTED

During the development of alternatives, a wide range of discharge and reuse options were considered in order to develop a practicable Project that could reliably manage reclaimed water. The selected alternatives described above include conservation, agricultural irrigation, urban reuse, reuse at the geysers, and discharge to the Russian River. In developing the proposed alternatives, an extensive screening of components was performed. The results of this screening were presented in the Santa Rosa Subregional Long-Term Wastewater Screening Report (Harland Bartholomew & Associates, Inc. 1994).

Evaluation Criteria for Screening of Alternatives and Components

A primary consideration in the screening of alternatives and components was the ability to accomplish the purpose and need of the Project. Once a component was determined to achieve the Project's purpose and need, practicability and logistics were the primary considerations in development of alternatives. The following factors were considered in the evaluation of potential Project components and alternatives.

- Purpose and Need. Project components were evaluated in terms of their ability to provide reliable wastewater disposal in a manner that maximizes reclamation and reuse and optimizes water conservation as defined by the Project purpose and need contained in Section 1.1 of this document.
- Cost. The costs of Project components and alternatives were considered, along with financing options for the Project. Both capital costs and operations and maintenance costs were estimated and used in the evaluation.
- Technology. The evaluation considers the technology to construct and operate the new components of the Subregional System. To ensure reliability of the system it is critical that the technology be proven, readily manageable, and sustainable.
- Logistics. Logistical factors include physical constraints on Project implementation. Physical constraints include site suitability and location.

Alternatives and Components Not Carried Forward

Based upon the evaluation of components and alternatives in the Screening Report, the following components were not carried forward as part of the Project alternatives for analysis in the EIR/EIS.

Maximum Water Conservation

Maximum conservation was not carried forward because it is unreliable and therefore does not meet the Project purpose and need. Maximum conservation goes beyond proven technologies to include greywater use for residences, composting toilets, electric toilets, and other social and behavioral changes to reduce wastewater production. The technologies for greywater, composting toilets, and electric toilets are relatively new, and have mostly been used in rural and recreational areas. Use in urban areas may be problematic and is as yet unproven. Other conservation methods are not technology based, but rely on changing behavior (e.g., shorter showers, reduced toilet flushing, reduction in water use in kitchen and bathroom sinks). Behavioral-based conservation efforts do not provide adequate reliability of flow reduction. The Subregional System must operate reliably under all conditions and thus cannot rely on behavioral changes to guarantee reductions in wastewater flow. In addition, there are physical constraints to the use of some technologies in urban areas. Small lots and multifamily dwellings have inadequate land area for greywater systems. Soils in the Santa Rosa area are not amenable to construction of greywater systems. Because of these constraints, the City of Santa Rosa voted on May 23, 1995 not to adopt the proposed state regulations for greywater systems, and have prohibited the construction of such systems in the City. There are also regulatory constraints to the use of composting toilets, which are not currently approved by the Sonoma County Health Department.

Stream Flow Augmentation

This component was not carried forward because it does not meet Project capacity needs and because of high long-term management costs which rendered it infeasible. Flow augmentation considered summer discharge of reclaimed water to Americano and Stemple Creeks in the West County as well as various South County streams including the Petaluma River, Lichau Creek, Copeland Creek and Lynch Creek to augment natural dry season flows, and although it could provide a beneficial reuse of water, it makes a relatively small contribution to the central purpose of wastewater disposal. Also, costs of studying flow augmentation streams before and after implementation of a flow augmentation program could exceed the minor benefit associated with this type of reuse. Long-term monitoring requirements might entail substantial costs, which could be on the order of $150,000 per year or $3,000,000 over the life of the Project.

Decentralized Treatment Systems

This alternative was not carried forward because it will not provide additional reuse or other disposal capacity for reclaimed water and therefore does not meet the Project purpose and need. Decentralized Treatment Systems include construction of new wastewater treatment systems by the various Subregional entities: Cotati, Rohnert Park, Sebastopol, and South Park Sanitation District. This will take the place of expansion of the Laguna Wastewater Treatment Plant. Cost of construction of new treatment plants will be substantial and will have to be added to the cost of increasing wastewater disposal capacity. In addition, new treatment systems will not solve the basic problem facing the Subregional System, which has adequate ability to treat wastewater but is lacking disposal capacity.

Central Valley Irrigation/Storage

This alternative was not carried forward because of high costs and logistical problems which will make implementation of this alternative infeasible. This alternative includes construction of a pipeline to transport reclaimed water to the Central Valley for irrigation. Construction of a storage reservoir in the irrigation area will be necessary. While it will be possible to construct and operate a Central Valley irrigation system, the logistics of managing 60 miles of pipeline and operating a remotely-located reclamation system make this alternative infeasible. This alternative will still require construction of a major storage reservoir and it is certain the reservoir will have wetland/riparian impacts similar to those associated with Sonoma County reservoir locations.

San Pablo Bay Discharge

This alternative was not carried forward because of inability to fulfill the Project purpose and need. This alternative will include a variety of potential discharges to San Pablo Bay, either through a deep or shallow bay outfall or through the Petaluma River. All of these options were associated with a South County irrigation alternative. San Pablo Bay discharge will constitute a significant method of wastewater disposal but will be limited to the rainy season, and does not achieve the Project purpose of reuse or water conservation.

Ocean Discharge

This alternative was not carried forward because it does not meet the Project purpose and need. This alternative will discharge wastewater directly to the ocean near Salmon Creek. This area is just north of the Gulf of the Farallones Marine Sanctuary, which is an Area of Special Biological Significance. An ocean outfall will allow year-round disposal of wastewater and will meet all of the disposal requirements of the Subregional System. However, this alternative does not achieve the purpose of maximizing reclamation or optimizing water conservation, and therefore will not fulfill the purpose and need for the Project. There are also physical constraints to outfall construction. Construction of an ocean outfall will involve considerable construction-period disruption to both the marine environment and to coastal areas adjacent to the outfall. Construction of the pipeline to the outfall will cross coastal areas where pipeline construction will be difficult. Pipeline construction will disrupt both coastal dune habitat and narrow roads in residential areas.

Lake Sonoma Discharge

This alternative will pipe reclaimed water to Lake Sonoma for discharge. It will effectively be equivalent to a 20% Russian River discharge because Lake Sonoma empties into the Russian River; only the location of the discharge will be different. Because of pumping costs, annual operations and maintenance costs for this options will be relatively high, at about $5 million per year. These costs are considerably higher than a 20% discharge direct to the Russian River. Environmental effects of constructing a new pipeline to Lake Sonoma will also be greater than maintaining the existing discharge to the Russian River. Because there are no environmental benefits to be gained by changing the location of discharge to a point far upstream, this option was deemed unreasonable and not appropriate for further consideration.

Community Separator Wetlands

This component was not carried forward due to logistical constraints which render the component infeasible. Community separator wetlands were proposed during public workshops as a method for storing reclaimed water while providing open space between Santa Rosa and surrounding communities. Although wetlands will not provide significant amounts of storage, it was initially agreed to evaluate this component in one of the Project alternatives because wetlands consume wastewater, provide a land use benefit, and may also be used for polishing wastewater, that is removing nitrogen from the water. However, after extensive research it was determined that suitable sites for community separator wetlands were not available because significant impacts on oak woodlands and vernal pools will result.

To achieve the necessary acreage for water use and polishing, between 500 and 1,200 acres of wetlands will be needed. The criteria for acceptable sites required areas containing no oak woodland habitat or valuable vernal pool wetlands. Sites which are part of the existing Subregional irrigation system were not considered suitable because they already consume wastewater and are mostly operated by property owners with long-term contracts for irrigation. The search for appropriate sites was confined to parcels of 20 acres or larger because of the substantial acreage of wetlands required and the desire to create larger areas of contiguous wetlands. No suitable land was found within the community separator areas suggested by the public during Project workshops. The search was extended beyond this area, and only two suitable parcels were found, one of which was already in the existing irrigation system.

The two functions of constructed wetlands, use of reclaimed water and removal of nitrogen, can be served by other Project components. Reclaimed water use by irrigation is slightly more cost effective, and nitrogen removal can be accomplished within the wastewater treatment plant. Because the community separator wetlands were the only unique component of the Community Separator/South County Reclamation Alternative, this alternative was dropped from the list of alternatives to be evaluated in the EIR/EIS. All of the other components of the alternative are included in other alternatives, specifically in the South County Reclamation Alternative.

Rapid Infiltration

This component was not carried forward due to logistical constraints. The component will involve construction of rapid infiltration beds in the gravel soils along the Russian River as a means of discharging reclaimed water to the River. From a regulatory standpoint, this component will be considered a direct discharge to the River, even though the water passes through soils prior to entering to the River. Physical constraints to this option include the lack of sufficient Cortina (gravel) soils on the east bank of the Russian River. Use of Cortina soils significantly upstream or on the west bank of the River will prove costly from both a construction and operations and maintenance standpoint.

On-Farm Storage Ponds

This component was not carried forward because the acreage requirement for individual on-site storage ponds for each user of reclaimed water will be approximately one-fourth of the total farm acreage, drastically reducing the area of productive farmland. This will make on-farm storage unfeasible for typical agricultural users. In addition, the logistics of water management under a multiple pond system are problematic, because each user will manage their own storage and water demand, without the ability to draw water from other areas during times of high demand. These factors have made it extremely difficult to manage the existing small ponds in the Subregional System.

Storage Tanks

Use of this component for the necessary 4,500 MG of storage will require the construction of between 500 and 900 tanks**,** which will cost over $2 billion, well beyond the ability of the Subregional System to fund. The logistics of siting, constructing and operating this many tanks will be virtually impossible.

Aquifer Storage and Recovery (ASR)

This component was not carried forward due to technological and logistical constraints. Wastewater injection into a potable aquifer and recovery from that aquifer is not yet proven technology. Although injection of reclaimed water for groundwater recharge has been practiced for some time, projects of this type are based upon the principle that groundwater is further treated by natural processes as it moves from the point of injection to the point of removal. This is different than ASR, which uses the aquifer only for temporary storage, injecting and removing reclaimed water at the same location, without affecting the native groundwater.

Also, preliminary modeling efforts have shown that aquifer characteristics are only marginally suitable for ASR. Two study areas were evaluated. The most important parameter determining suitability of the area is its specific capacity, which expresses how well water can be moved in and out of the aquifer. The minimum long-term injection specific capacity for a feasible ASR Project is 5 gallons per minute per foot (gpm/ft). Studies by CH2M Hill have shown that Study Area 1 has a specific capacity of 6 gpm/ft, but Study Area 2 has a specific capacity of only 1.5 gpm/ft. This indicates that ASR will not be feasible in Study Area 2.

Specific capacity of Study Area 1 is marginal, and considerable additional testing will be required to determine whether ASR will work for the Project area. Tests will need to include pump tests to further delineate aquifer characteristics, followed by trial injection of potable water to measure migration and recovery of the injected water. Finally, a pilot Project for injection of reclaimed water will need to be conducted before a full-scale ASR Project could be approved.

The regulatory framework for ASR is uncertain. The California Department of Health Services has draft guidelines for groundwater recharge with reclaimed water, but has not developed guidelines for permitting ASR projects. Given that the North Coast Regional Water Quality Control Board has mandated an aggressive schedule for selection of a long-term wastewater Project, there is not enough time to fully demonstrate the performance of ASR and resolve the regulatory issues allowing permitting of this component.

Chileno Valley Irrigation

This potential irrigation area, located southwest of Petaluma along Chileno Creek, was eliminated from further study because the relative lack of landowners interested in reclaimed water resulted in a lack of adequate available land and relatively high cost for pipeline construction.

Schellvillle Irrigation

This potential irrigation area, generally located north of Highway 37 and east of Highway 121, was eliminated from further study because it is traversed by the Napa Slough system creating logistical problems associated with the extensive wetlands in this area. Also, large portions of this area are used for the Vallejo Sanitary District biosolids management program.

A discussion of the alternatives and components considered and rejected, including the Community Separator/South County Reclamation Alternative is contained in the Technical Memorandum, *Documentation in Support of the Elimination of Alternatives* (Parsons Engineering Science, Inc. 1996a).

3.2 EXISTING SYSTEM WITH INTERIM IMPROVEMENTS

The Santa Rosa Subregional Water Reclamation System utilizes wastewater treated and reclaimed at the Laguna Plant. The plant has a design capacity of 18 million gallons per day (average dry weather flow or ADWF) and serves the cities of Santa Rosa, Rohnert Park, Cotati, and Sebastopol, and the South Park County Sanitation District, located south of the City of Santa Rosa. The System disposes of reclaimed water by means of a combination of methods, including discharge to the Russian River via the Laguna de Santa Rosa, urban irrigation, created wetlands in the Santa Rosa Plain, and agricultural irrigation. The System treats the solids removed from the wastewater (sludge) and the resulting sludge is applied to agricultural lands or disposed of at the Sonoma County Central Landfill. The principal components of the existing system and interim improvements now under construction are described in the following sections. The existing system along with the interim improvements described in this section are considered part of the No Action (No Project) Alternative.

LAGUNA SUBREGIONAL WASTEWATER TREATMENT PLANT

The Laguna Plant is located on Llano Road, in the Santa Rosa Plain, west of the City of Santa Rosa and adjacent to the Laguna de Santa Rosa. The plant is an activated sludge and tertiary treatment plant. The plant is designed to treat 18 million gallons per day (mgd) ADWF.

RECLAIMED WATER STORAGE

The reclamation system includes a series of storage ponds, which are connected through pipelines to the Laguna plant and to transmission pipelines supplying the irrigation system. Total available storage is approximately 1,500 million gallons (MG). Reclaimed water storage is targeted to meet reuse needs (irrigation contracts) and at the end of the irrigation season in September, the operational target is to essentially empty the storage ponds. Increases in reclaimed water storage occur in the fall when the irrigation demand decreases and the water flow in the Russian River is too low to allow discharge to the River. During discharge months (October to May 14th) reclaimed water storage is managed to meet a target storage curve and reclaimed water is discharged to the River when storage volume exceeds the curve. Reclaimed water storage is increased in the spring to provide adequate water for reuse during the summer irrigation season.

RECLAIMED WATER DISPOSAL AND REUSE

Disposal and reuse of reclaimed water is through agricultural and urban irrigation, operation of wetland areas, and discharge to the Russian River via the Laguna de Santa Rosa.

Irrigation

The existing reclamation system is composed of a large network of pipelines, pump stations, and storage ponds that distributes the reclaimed water to approximately 5,300 acres of irrigated land (see Figure 3.1-3). Both agricultural and urban irrigation sites are included in the system, although the majority are in agricultural use. During the irrigation season, typically from April through October, reclaimed water comes directly from the Laguna Plant, supplemented by water stored in ponds. (There is also a Winter Irrigation Program which can be implemented when weather during the winter season is dry and less water than expected can be discharged to the Laguna). Peak monthly irrigation volumes typically occur in June, July, and August at rates between 4.5 and 5.5-inches of water per month per acre. During this peak season, up to 35 MG per day may be pumped through the system for irrigation use.

Wetlands

The reclamation system has operated and managed two wetland areas that use reclaimed water. These are the Kelly Farm demonstration wetland, constructed in 1992, and the LaFranchi marsh. The wetlands are supplied with reclaimed water from the Laguna Plant and are monitored as part of the demonstration Project. An additional wetland area was developed in 1995-6 as described below in the Interim System Improvements

Discharge to the Russian River

Reclaimed water which is not stored or directly conveyed for irrigation or wetlands use is discharged to the Russian River via the Laguna de Santa Rosa in compliance with the System's permit from the North Coast Regional Water Quality Control Board. Treated wastewater may be discharged to the Laguna de Santa Rosa from numerous points. The two principal discharge locations are at the Meadowlane Ponds west of Llano Road and at Delta Pond, located south of Guerneville Road. The actual volume and frequency of discharge at any given location varies due to operational and seasonal considerations, including irrigation needs, storage levels, and weather.

Ordinarily, discharge is limited to a maximum of 1% of river flow. Discharge is increased to 5% of river flow when required (with the permission of the North Coast Regional Water Quality Control Board) between October 1st and May 14th. However, due to limited storage and a combination of weather conditions that may occur during this period, the Subregional System currently has the potential to exceed the legal maximum discharge to the Russian River. These conditions, although infrequent, occur during winters characterized by periodic light rain and overall drier-than-normal conditions.

During very high flow events the hydraulics of the system preclude discharge, and the gates are opened to allow water to flow into the ponds which are emptied as flood waters subside.

SLUDGE DISPOSAL

Disposal of sludge generated as a by-product of treatment processes at the Laguna Plant is accomplished through trucking of the waste to the Sonoma County Central Landfill on Meacham Road, the Redwood Landfill near Novato, and through land application of sludge at sites in the Santa Rosa Plain and along Lakeville Highway south of Petaluma under the Biosolids Beneficial Reuse Project. In 1994, approximately 35 percent of the total sludge generated by the Laguna Plant was used in land application. The Subregional System Compost Facility will substantially reduce the amount of biosolids being landfilled and is scheduled to be operational in Fall 1996.

WATER CONSERVATION

The member entities of the Santa Rosa Subregional Water Reclamation System have existing water conservation programs which may consist of water audits; aggressive enforcement of water conservation laws; metering; and rebate and retrofit programs. Additional information about water conservation in the Subregional System may be found in the Technical Memorandum, *Wastewater Flow Projections* (West Yost 1996). Conservation programs include:

- Implementation of water audit programs. Santa Rosa has both a residential and a non-residential (commercial, industrial and institutional uses) audit, which identifies ways that individual water users can reduce their water use.
- Enforcement of the State of California conservation fixtures laws. State of California legislation includes maximum flow standards for new shower heads and faucets, and requires Ultra-Low-Flow Toilets.
- Metering of water services. Santa Rosa and Sebastopol meter all services with a commodity rate price structure. Cotati meters all services, and Rohnert Park meters all services except single-family residences.
- Rebate and retrofit programs. In 1992-1993, Santa Rosa participated in an evaluation of low-flow fixtures and provided test sites for a pilot toilet retrofit Project. Santa Rosa also has a shower head exchange program. In 1992, Rohnert Park developed and implemented a toilet retrofit and low-flow shower head replacement program, although the program will be concluded soon due to decreased demand. As part of the approval for construction of each new dwelling unit, Cotati collects a fee used to retrofit four existing dwelling units. Sebastopol

has a toilet rebate program, and has conducted a mass-mailing of conservation kits to promote efficient water use.

The Santa Rosa Board of Public Utilities has formed a Technical Committee to evaluate developing water conservation technologies and bring recommendations to the Board as these technologies become practicable.

In addition, the Sonoma County Water Agency, which supplies water to Santa Rosa, Rohnert Park, and Cotati, has provided water conservation information and education to its customers. Most of these conservation programs are directed toward public information for motivating voluntary customer conservation. For example, conservation kits are made available that help customers detect leaks in toilets and incorporate water saving behavior into daily routines.

INDUSTRIAL WASTE PRETREATMENT

The Santa Rosa Subregional Water Reclamation System has an active Industrial Waste Division that implements the U.S. Environmental Protection Agency (EPA)-approved Industrial Wastewater Pretreatment Program. This program, by requiring the pretreatment of certain wastes to eliminate or reduce the amounts of pollutants such as organic polymers, silver, and heavy metals entering the collection system, reduces the concentration and loading of such pollutants in the treatment system. The Laguna Plant's Pretreatment Program includes minimizing pollutants of concern; permitting and monitoring when applicable; enforcing pretreatment regulations; and sampling industrial/commercial pollutant discharge as well as background domestic pollutant data.

INTERIM PERIOD SYSTEM IMPROVEMENTS

During the period 1995-1996, additional improvements have been constructed to improve the reliability of the reclamation system prior to implementation of the Long-Term Wastewater Project. These improvements, as shown in Figure 3.1-4, and discussed below are considered to be part of the No Action (No Project) Alternative.

Additional improvements planned but not approved, such as the expansion of the Sludge Beneficial Use Project, are included as Cumulative Projects, Section 3.5. They are not part of the interim improvements identified here.

Laguna Advanced Treatment Upgrade Project

The Laguna Advanced Treatment Upgrade Project provides improvements necessary to maintain reliable treatment of currently permitted flows in compliance with existing standards for water and biosolids quality. All improvements are to be constructed within the existing Laguna Plant site on the east side of Llano Road, north of the Laguna de Santa Rosa.

The Upgrade Project will not increase the overall permitted capacity of the Laguna Plant, currently at 18 mgd ADWF. The existing influent pumps, which limit overall plant capacity, will not be changed under the Advanced Treatment Upgrade; expansion of the influent pumping capacity is considered part of the Long-Term Wastewater Project Alternatives 2, 3, 4, and 5.

The major improvements in the Advanced Treatment Upgrade include:

- Replacement of existing comminutors, which shred larger material in the influent at the headworks with bar screens;
- Construction of new secondary treatment aeration basins (which will have the incidental benefit of reduced nitrate/nitrogen in reclaimed water, from 16.3 mg/L at least to 14 mg/L), along with an additional clarifier;
- Construction of new filter cells and a permanent ammonia feed system;
- Construction of additional sludge disposal facilities including an anaerobic digester, gas mixing compressors and a third gravity belt thickener; and
- Construction of co-generation facilities using methane gas generated by the digestion process.

Individual process units may have greater capacity due to standard equipment sizes or the need for uniform sizes of multiple structural units (for efficient construction, operational practicality, and exchangeability of parts). However, these will not increase the overall capacity of the plant, which will remain at 18 mgd ADWF.

Irrigation System Improvements

The North Pipeline Extension in the Santa Rosa Plain and an urban irrigation Project in Rohnert Park were completed in 1995-1996 under the Interim Period Reclamation System Master Plan.

The North Pipeline Extension, running approximately 7,600 feet of pipeline north from the existing Denner Ranch pump station, adds the capability of irrigating approximately 150 acres and has the capacity to supply an additional 100 acres in the future (see Figure 3.1-4). Also, a new North Booster pump station located at the south end of the pipeline extension replaced the existing Denner Ranch pump station.

The Rohnert Park Water Reuse Project, constructed during 1995, adds 18 parks, schools, and other open landscape sites covering a total of 280 acres to the existing water reuse system (see Figure 3.1-4). The Project allows delivery of reclaimed water from the Laguna to previously irrigated sites, replacing the use of potable groundwater. The Project included a new pump station adjacent to Poncia Pond, a new trunk pipeline extending to the eastern part of Rohnert Park, and lateral pipelines to the 18 irrigation sites.

An additional irrigation Project, the West Cotati Reclamation Pipeline Project, has been approved by the Board of Public Utilities, and will carry reclaimed water to the Gallo property, located west of Cotati between Highway 101 and Stony Point Road, for the irrigation of a vineyard. The property will provide its own storage, which the proponent will construct. The vineyard is expected to utilize 80 MG of reclaimed water per year. This Project will preclude the need for additional storage or disposal to meet the Regional Water Quality Control Board permit requirements during the interim period prior to construction of an approved Long-Term Project.

Sludge Composting Facility

Under the Santa Rosa Subregional Sludge Beneficial Use Project, a new sludge composting facility was completed in early 1996. The composting facility site, located at the Meadowlane Ponds, is six acres in size and the facilities include a structure to house an agitated bed composting system, along with a covered receiving/mixing/loading area.

Laguna Joint Wetland Project

An additional wetland Project is located on the southerly portion of the Laguna Plant property. This Project, jointly developed with the County of Sonoma, is has a reclaimed water pond and other site enhancement features similar to the previously implemented Kelly Demonstration Wetland Project.

3.3 DESCRIPTION OF PROJECT COMPONENTS

The five Project alternatives include numerous Project components. These components are the individual elements or building blocks that make up the system proposed to accomplish the Project objective of beneficial reuse of reclaimed water. This reuse is accomplished under the alternatives by three principal means: use of reclaimed water for agricultural and urban irrigation; use of reclaimed water for recharge of the geysers steamfield; or discharge of reclaimed water to either the Laguna de Santa Rosa or the Russian River. Some Project components, such as pipelines, are common to virtually all alternatives, while others such as reservoirs or the geysers steamfield may be part of only one or two alternatives. Project components are described in the following sections. Table 3.3-1 identifies the Project components associated with each Project alternative. The *Alternative Project Facilities Plans*, contain the preliminary engineering designs for the Project components (See Appendix D-32).

The analysis of environmental consequences (impacts) contained in each section of Chapter 4 of this document is organized by component, and with the same sequence in the discussion of component impacts for each section. This has been done to facilitate the comparison of impacts by the components which make up each alternative, and allow a better understanding of which components contribute to which impacts. This organization and structure also recognizes that, in the selection of a Project, there are options available for certain components. For example, in the selection of the agricultural irrigation component under alternatives 2 and 3, the Sebastopol irrigation areas may or may not be included, while the extent of other irrigation areas may be modified. This would also mean that certain segments of pipelines and pump stations would not be required. The analysis by component allows the impacts associated with these individual components to be analyzed during Project selection in relation to other options, but also to the total impacts for an alternative.

All Project components would comply with the following design measures, and thus each measure is a part of the Project. Each measure is described in full in Section 2.2.:

- 2.2.1 Irrigation Conservation and Management Programs
- 2.2.2 Irrigation Site Resource Maps
- 2.2.3 Restrict Surface and Subsurface Irrigation Water Runoff
- 2.2.4 Restrict Soil Erosion and Sediment Movement (Irrigation Sites)
- 2.2.5 Avoid Sensitive Biological Resources (Irrigation Areas, Pipelines, Pump Stations, and Electrical Support Systems)
- 2.2.6 Agrochemical and Fertilizer Best Management Practices
- 2.2.7 Prohibit Creation of Mosquito Habitat
- 2.2.8 Revegetate Temporarily Disturbed Sites
- 2.2.9 Retain Stripped Topsoil

2.2.10 Storm Water Pollution Prevention Plan
2.2.11 Protect Creeks from Toxic Discharge
2.2.12 Concrete Waste Management
2.2.13 Pipeline Features in Active Fault Zones
2.2.14 Dam Safety
2.2.15 Standard Traffic Control Procedures
2.2.16 Emergency Response Vehicles Will Not be Impeded
2.2.17 Maintain Maximum Number of Open Lanes on Roadways
2.2.18 Jack and Bore Construction at Major Highways
2.2.19 Fence or Cover Trenches
2.2.20 Access to Businesses and Residences
2.2.21 Repair Road Damage
2.2.22 Park Within Construction Easements
2.2.23 Limit Delivery Hours
2.2.24 Limit Ingress/Egress of Construction Equipment
2.2.25 Minimize/Reduce Fossil Fuel Consumption
2.2.26 Odor Control for Sludge Handling
2.2.27 Uniform Relocation Assistance

The Project also will comply with the applicable regulations of Federal, State and local agencies as identified in Section 2.1.

The components of the existing system and interim improvements which make up the No Action Alternative have been described in Section 3.2. The components which comprise Alternatives 2, 3, 4, and 5 are described below in the following order.

- Headworks Expansion
- Urban Irrigation
- Pipelines
- Storage Reservoirs
- Pump Stations
- Agricultural Irrigation
- Geysers Steamfield
- Discharge

Following the description of these components is a discussion of the Contingency Plan for excess volumes under the Project Alternatives.

Table 3.3-1

Components Utilized for Alternatives Analysis

COMPONENT	ALTERNATIVES												
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B
1. NO ACTION ALTERNATIVE	▓												
2. HEADWORKS EXPANSION		░	░	░	░	░	░	░	░	░	░	░	░
3. URBAN IRRIGATION													
Fountain Grove		░	░	░	░	░	░	░	░	░			
Bennett Valley		░	░	░	░	░	░	░	░	░			
4. PIPELINES		░	░	░	░	░	░	░	░	░	░	░	
5. STORAGE RESERVOIRS													
South County Reservoirs													
Tolay Extended		░											
Adobe Road			░										
Tolay Confined				░									
Lakeville Hillside			░		░								
Sears Point					░								
West County Reservoirs													
Two Rock						░							
Bloomfield							░						
Carroll Road								░					
Valley Ford									░				
Huntley										░			
6. PUMP STATIONS		░	░	░	░	░	░	░	░	░	░		
7. AGRICULTURAL IRRIGATION											1		
South County													
East of Rohnert Park		░	░	░	░								
Adobe Road		░	░	░	░								
North of Petaluma		░	░	░	░								
Lakeville		░	░	░	░								
Bayflats		░	░	░	░								
West County													
Americano						░	░	░	░	░			
Stemple						░	░	░	░	░			
Miscellaneous						░	░	░	░	░			
Sebastopol		░	░	░	░	░	░	░	░	░			
8. GEYSERS STEAMFIELD											░		
9. DISCHARGE													
Laguna - 1%		░	░	░	░	░	░	░	░	░	2	2	
Laguna - Range of discharge between 1% and 20%	▓	░	░	░	░	░	░	░	░	░			
Laguna - 20% of river flow	3												░
Russian River - 20% of river fow												░	

Notes: ░ Component is optional ▓ Component is part of Alternative

1. Existing agricultural irrigation acreage is reduced to 2,000 acres under Alternative 4 through attrition.
2. Minor discharges to the Laguna, not to exceed 1% could occur.
3. Discharge rate under the No Action Alternative would be no greater than 10%.

HEADWORKS EXPANSION (ALTERNATIVES 2, 3, 4, AND 5)

In the headworks at the Laguna Plant, raw sewage (influent) enters at two locations approximately 40 feet below grade, and after passing through bar screens, is pumped to the primary clarifiers. Six influent pumps, three on each side of the headworks, have a combined influent pumping capacity of 60 mgd peak hourly wet weather flow when one of the largest pumps is out of service for repair or maintenance. Four are 15-mgd capacity two-speed pumps, and two are 7.5-mgd capacity variable speed pumps.

Expansion of influent pumping capacity would be accomplished by replacing the existing pumps with six new 18-mgd capacity pumps, which would provide a firm capacity of 80-mgd peak hourly wet weather flow with one pump out of service to meet the required hydraulic capacity associated with the design capacity for this Project of 21 mgd ADWF.

With expansion of the headworks, sludge production at the Laguna Plant is projected to increase as a greater volume of effluent is treated. The impacts of disposing of this projected sludge production are addressed in the Santa Rosa Subregional Sludge Beneficial Use Project Environmental Impact Report (LSA 1991).

URBAN IRRIGATION (ALTERNATIVES 2 AND 3)

Two urban irrigation projects, as shown in Figure 3.1-5, are included in this component:

- The Fountaingrove Urban Irrigation system is an extension of the existing irrigation system into the north Santa Rosa area, providing year-round irrigation of approximately 230 acres, including schools, parks, the Fountaingrove Golf Course, and other properties; and
- The Bennett Valley/East Santa Rosa Urban Irrigation system is an extension of the existing irrigation system into the east Santa Rosa area, providing year-round irrigation of 350 acres, including parks, schools, and the Bennett Valley Golf Course.

Each of the two systems would deliver reclaimed water to existing irrigated areas to replace the water source now used, primarily groundwater. The pipelines and pump stations used for the urban irrigation component are not included as part of this component, but are included under the Pipelines and Pump Stations components. More detailed information about the urban irrigation systems can be found in Technical Memorandum, *Urban Irrigation Component of the Alternative Projects* (Parsons Engineering Science, Inc. 1995f).

PIPELINES (ALTERNATIVES 2, 3, 4, AND 5)

Pipelines in the three- to four-foot diameter range would be required to transport reclaimed water from the Laguna Plant to the storage reservoirs, to the discharge point at the Russian River, or to the geysers steamfield. Generally, pipelines in the one- to three-foot diameter range would be required to distribute stored water from reservoirs to agricultural and urban irrigation areas. Some of the local distribution lines may be less than one foot in diameter.

General Pipeline Characteristics

All pipelines (except for those distributing water to the geysers injection wells within the Geysers Geothermal Reserve) would be buried and would most likely follow public rights-of-way. To reach reservoir sites some pipelines follow private roads or cross-country alignments. Acquisition of property would be required for construction of these pipelines. Parcels or easement to be acquired are listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel required for construction of the pipelines. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is prepared by the City. If necessary, the City would use its power of condemnation to acquire property or easements necessary to construct Project facilities.

In general, pipes would be buried with about 3 feet of cover and would be constructed in one lane or shoulder of the road, typically at 10 feet off the road centerline. However, where topographic or other physical constraints (such as proximity to buildings, fences, or vegetation) occur, the pipeline alignment may be moved closer to the centerline. With this practice, considerable repaving of roads would be required, but the pipelines would be readily accessible for maintenance.

All pipelines would have intermediate isolation valves at certain points along the pipeline. The number and spacing of these valves would vary depending upon the type of pipeline, as identified in the discussion of specific pipelines types in the following sections. At each valve location, a valve would be located in a below ground vault atop the pipe, and there would also be an air/vacuum release valve at these locations. Pipeline air/vacuum release valve stations would be located at all local high points along the pipeline alignment, and at the isolation valve stations with a vent above grade. Pipeline blowoff valve stations also would be located at all local low points, to allow periodic flushing of the pipeline to remove accumulated solids, with a drain outlet above grade.

The pipelines would cross numerous perennial or intermittent streams. As identified in Section 2.2, bore and jack crossings which avoid construction within the waterway would be utilized at 33 locations. At these locations, the waterways have surface flow throughout the year or maintain substantial pools of water at the crossing (with riparian woodland and freshwater or brackish marsh) and have sufficient water quality to maintain aquatic life for most of the year.

Bore and jack crossings would also be used where the pipelines cross rail lines, major highways (such as Highways 101 and 12), and other major underground facilities (such as the Sonoma County Water Agency aqueduct).

Three stream crossings on the pipeline serving the Bennett Valley urban irrigation system would have pipelines suspended from existing bridges, these are:

- Santa Rosa Creek - Madison Street
- Santa Rosa Creek - 3rd Street
- Santa Rosa Creek - Olive Street

Rupture of a transmission or distribution pipeline would result in the release of reclaimed water. The amount of water that would leak from a pipe break depends on the size of the break, the pressure of the line at the break, the opportunity to isolate the section of pipeline with the break, and the length of time the leak continues.

The length of time a leak may continue would relate to the time the break went undetected and the time it would take to close an isolation valve. Because nearly all pipelines are along public rights-of-way, it is expected that a major pipeline break would show itself and be detected within several hours of the break. Smaller leaks could go undetected or be confused with natural drainage flows. In either case, several tens of thousands of gallons of reclaimed water could leak from such a pipeline break before detection and repair. Visual inspection for detection of pipeline breaks is proposed as the most practical and reliable method. Once detected, the closest isolation valve on either side of the break could be located and closed in about one hour.

The major conditions which could lead to pipeline breaks include seismic activity, landslides, and unusual pressure spikes due to improper system operation. Pressure spikes due to improper operation would be protected against by designing the pipeline to accommodate these spikes. This would include extra pipeline wall thickness and inclusion of pressure surge equipment and controls at the pump stations (where pressure spikes are usually initiated).

The Project area, as a whole, does not have a high seismic threat. The only proposed pipelines which would cross known fault zones are the urban irrigation mainlines (12" size to the Fountaingrove area and 18" size to the Bennett Valley area) and the geysers pipeline at two locations (one 42" size and one 48" size). Potential landslides are a threat for the Bennett Valley urban irrigation pipeline and for the geysers pipeline along Pine Flat Road (42" size). To illustrate the relative magnitude of such events, the maximum volume of water released from a rupture of the geysers pipeline would be 1.7 million gallons; this would be from a rupture at the Maacamas Fault, located just above Pump Station G-2. Rupture of an urban irrigation pipeline (12” diameter) along the Rodgers Creek Fault would result in the release of up to 100,000 gallons of water.

Transmission Pipelines (Alternatives 2 and 3 - All Subalternatives)

Transmission pipelines are required to transport reclaimed water from the new pump station at the Laguna Plant to the reservoir sites for storage, as shown in Figures 3.1-5 and 3.1-6. Alignments primarily follow public rights-of-way, except for short cross-country sections to enter the reservoirs. These pipelines are typically 48 inches in diameter. Pipelines would be welded steel pipe construction, cement mortar lined and coated, with welded joints and intermediate isolation valves (normally open) located at 2,500-foot intervals. Additional information on the proposed transport pipelines is contained in *Transmission Pipeline Routes to All Reservoir Sites* (Parsons Engineering Science, Inc. 1995e).

Irrigation Distribution Pipelines (Alternatives 2 and 3 - All Subalternatives)

The irrigation distribution pipeline system includes those pipelines which convey the stored reclaimed water from the irrigation pump station, located at the storage reservoir, to agricultural irrigation areas, as shown in Figures 3.1-5 and 3.1-6. (Some transmission pipelines may also function as distribution pipelines during the irrigation season). Distribution pipelines are also proposed for the Fountaingrove and Bennett Valley urban irrigation systems, conveying reclaimed water from a pump station at the West College Ponds to the various urban irrigation sites. No new pipelines within the urban irrigation sites would be constructed as part of the Project. The pipeline widths for the distribution system, typically 12 to 36 inches, are smaller than for the transport pipelines. Pipelines 24 inches in diameter and larger would be welded steel pipe construction, cement mortar lined and coated with welded joints; pipelines smaller than 24 inches in diameter would be ductile iron, polyethylene encased. Intermediate isolation valves (normally open) would be located at major pipe junctions and at 1,500-foot intervals. Alignment of the distribution pipelines would follow public rights-of-way. Pipelines within the agricultural irrigation areas are addressed under the agricultural irrigation component.

Pipeline Tunnel (Subalternatives 2C, 2D, and 3A)

Tunnels are proposed to carry transmission pipelines through the ridge west of Tolay Valley to enter Tolay Confined reservoir (Subalternative 2C) or Sears Point reservoir (Subalternative 2D); and to carry the transport pipeline through the ridge north of Two Rock reservoir (Subalternative 3A), as shown in Figures 3.1-5 and 3.1-6. These tunnels would have a diameter of 10 feet and a length of 1,800 feet for the tunnel entering Tolay Confined or Sears Point reservoirs and 2,400 feet for the tunnel entering the Two Rock reservoir. The pipeline invert elevation at the bottom of the pipe through the tunnel would be 270 feet for the Tolay Confined or Sears Point reservoirs and 390 feet for the Two Rock reservoir. There would be concrete portal structures on either end of the tunnel, and the tunnel itself would be backfilled and the portals sealed. Additional information on the proposed tunnels is contained in *Transmission Pipelines to Storage* Tunnel Length Optimization Analysis (Parsons Engineering Science, Inc. 1995d).

Geysers Pipeline (Alternative 4)

Pipelines are required to transport reclaimed water from Delta Pond to the geysers steamfield, as shown in Figure 3.1-7. The pipeline alignment follows public rights-of-way, including Pine Flat Road, except for cross-country sections at the top of Pine Flat Road to the two storage/distribution tanks and from the storage tanks to the steamfield area. The pipeline varies from 42 to 48 inches in diameter. Along Pine Flat Road, the alignment would be along the up-slope lane where possible. Substantial grading would be required in local areas to provide a sufficient construction easement and/or to stabilize the slope prior to installing the pipeline. In locations where the cliff is rocky and steep, construction would stay in the roadbed, with construction staged from downslope areas.

Pipelines would be welded steel pipe construction, cement mortar lined and coated with welded joints. Isolation valves would be located every five miles between Delta Pond and the foot of Pine Flat Road, and every 1.25 miles beyond that location, to allow isolation and draining of the pipeline in the event of rupture. Additional information on the geysers transport pipeline is contained in *Geysers Recharge Water Balance and Operation Considerations* (Parsons Engineering Science, Inc. 1995b). Pipelines within the geysers steamfield are addressed under the geysers steamfield component.

Russian River Discharge Pipeline (Subalternative 5A)

The proposed routing of the direct discharge pipeline to the Russian River would utilize an existing 27-inch pipeline and construct new 48- and 54-inch pipelines. The new 48-inch pipeline would exit the Delta pump station and run parallel to the existing 27-inch line, with the flow split between these two pipes. Prior to entry to the North Booster pump station, the two pipes merge into a 54-inch line which leads to the river discharge location.

The alignment follows public rights-of-way or city easements except for a short cross country section to the outfall structure. Pipelines would be welded steel pipe construction, cement mortar lined and coated with welded joints. Isolation valves would be located every 5,000 feet to allow isolation and draining of short sections for repair in the event of rupture.

STORAGE RESERVOIRS (ALTERNATIVES 2 AND 3 - ALL SUBALTERNATIVES)

Ten sites for storage reservoirs are included in the Project, five each in South County and West County (see Figures 3.3-1 through 3.3-10). No new storage in the Laguna de Santa Rosa watershed is proposed. Each individual reservoir site could satisfy the maximum storage requirement for the Project, except for the Sears Point, Adobe Road, and Lakeville Hillside reservoirs. Combinations of two of these three reservoirs are necessary

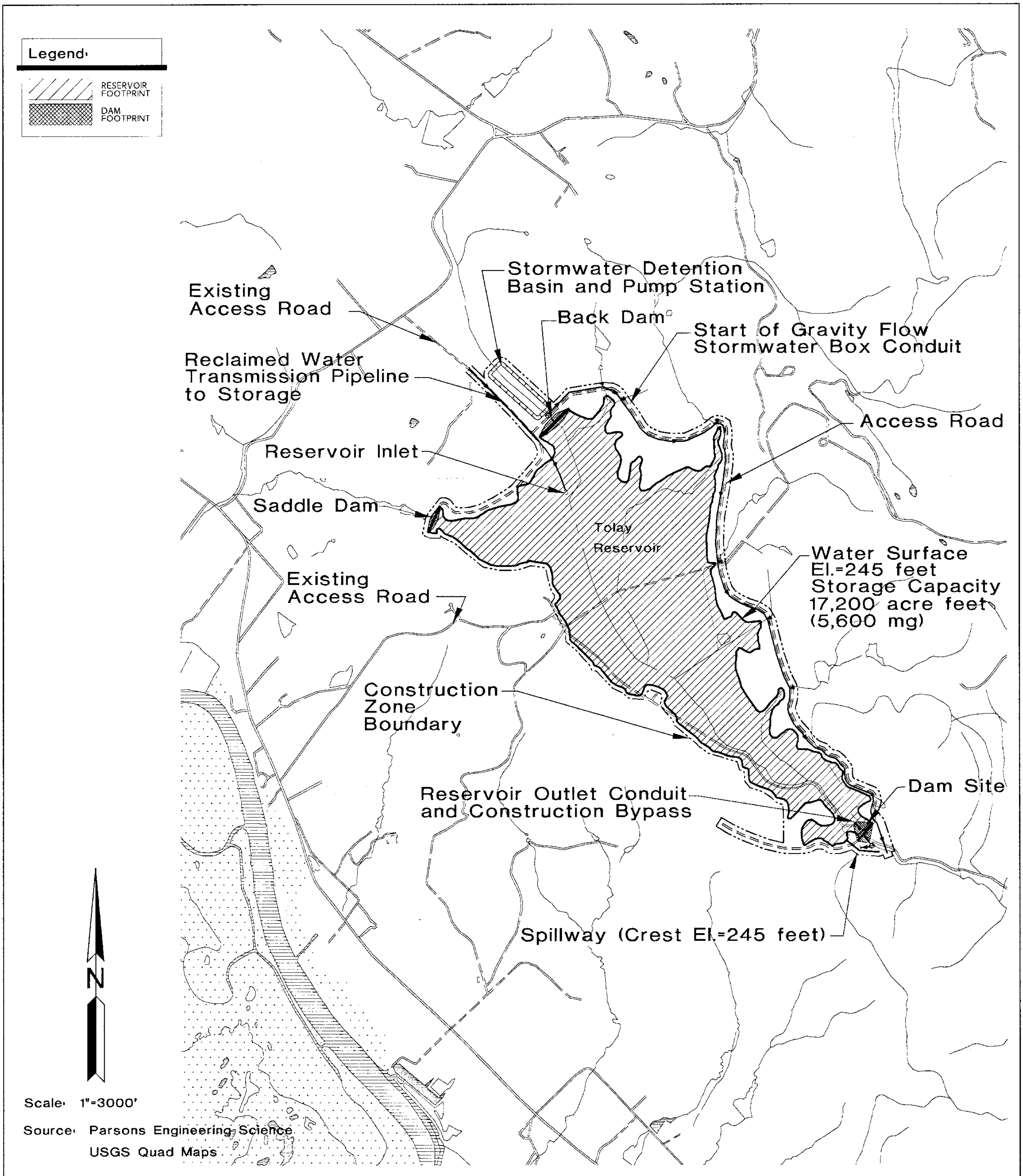

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Figure 3.3-1

TOLAY EXTENDED RESERVOIR

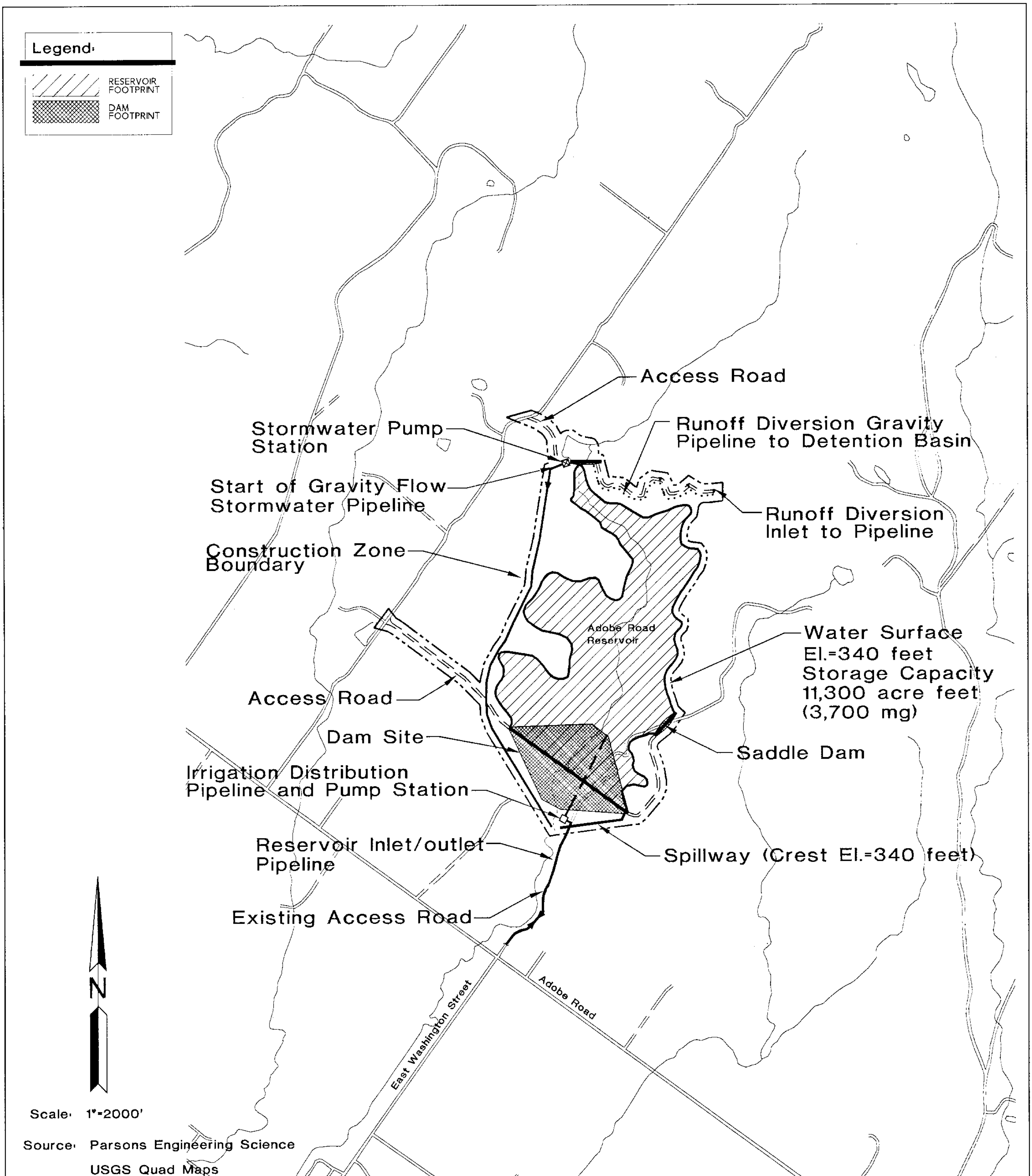

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Figure 3.3-2

ADOBE ROAD RESERVOIR

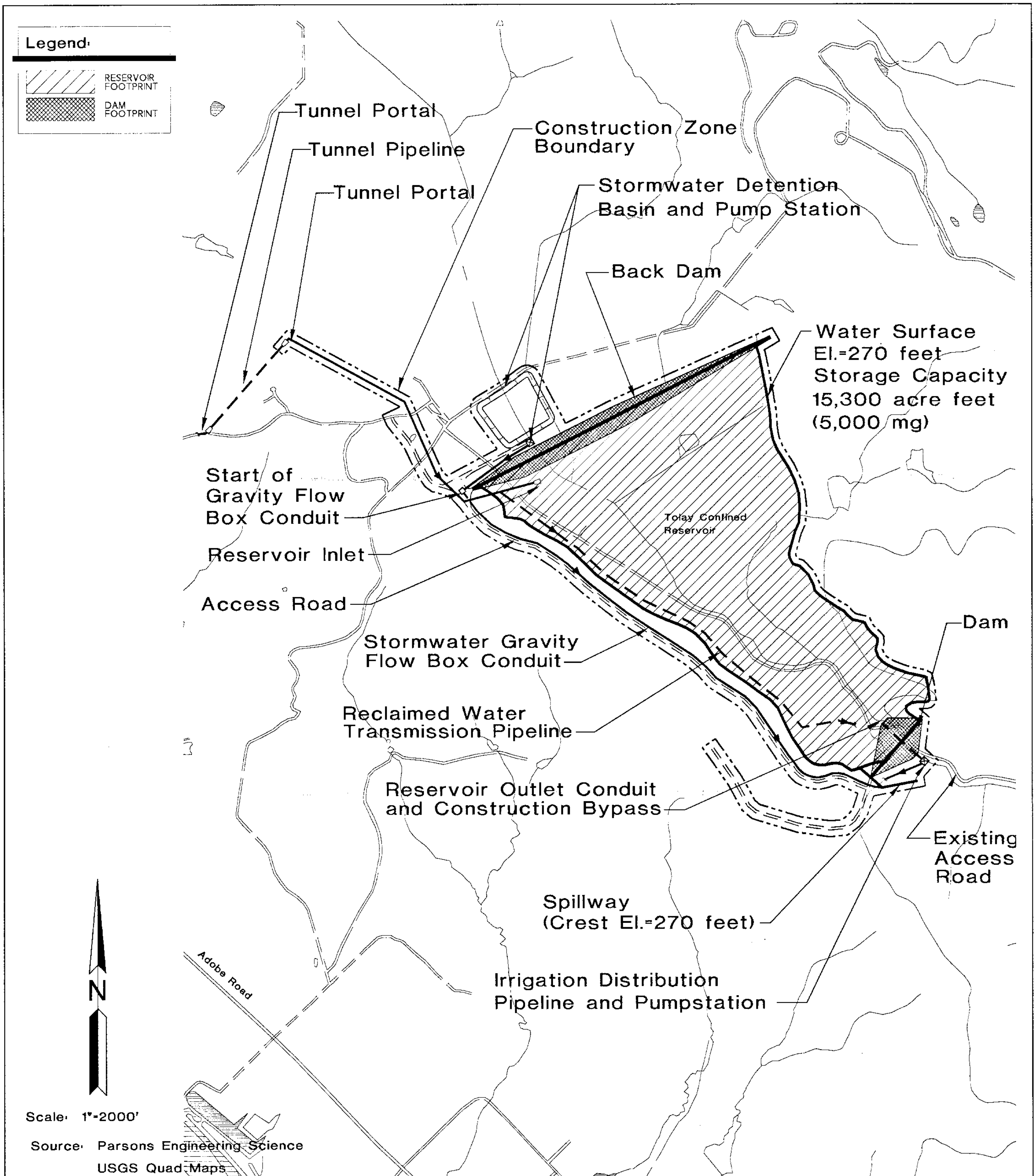

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Figure 3.3-3

TOLAY CONFINED RESERVOIR

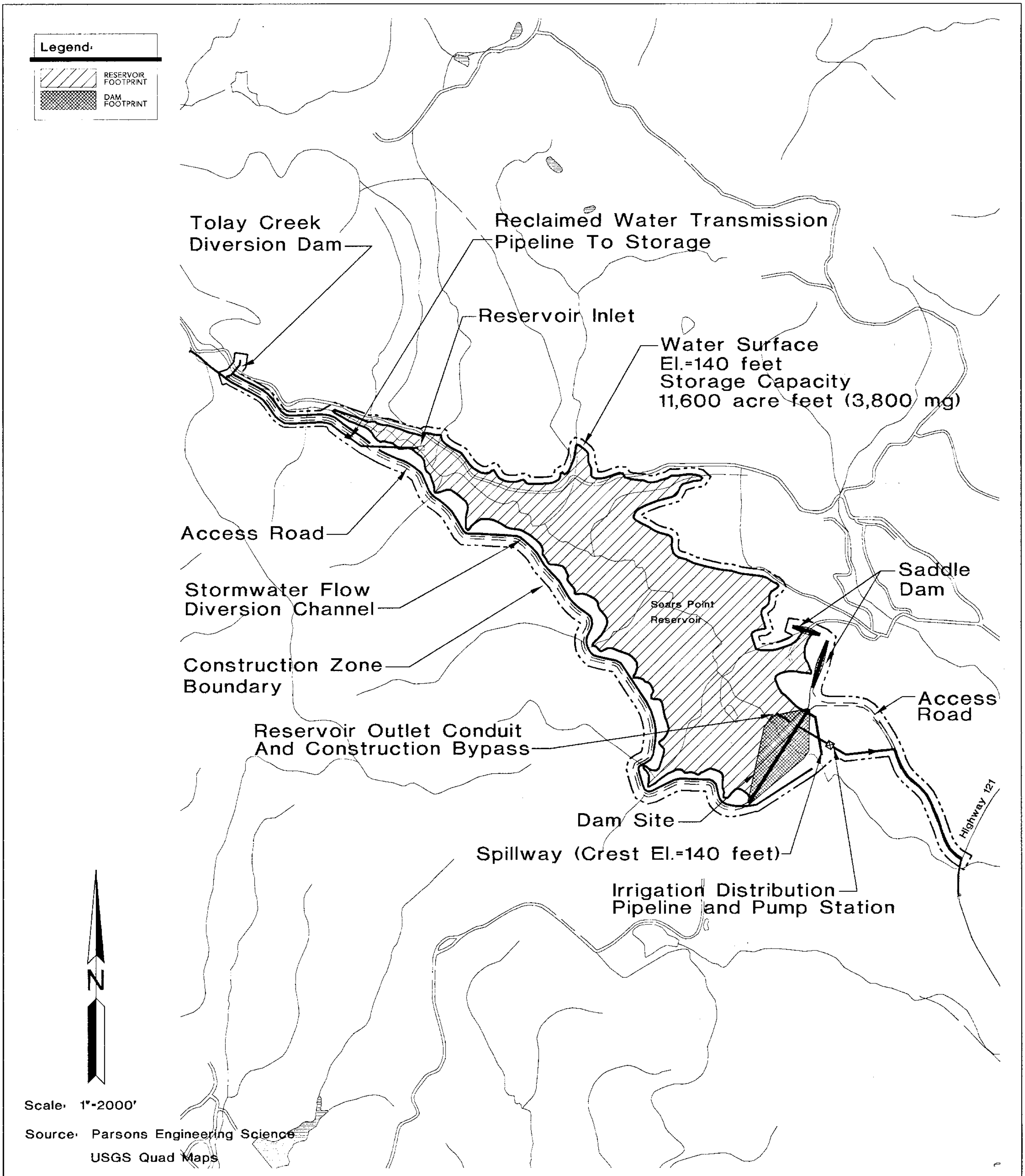

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Figure 3.3-4

SEARS POINT RESERVOIR

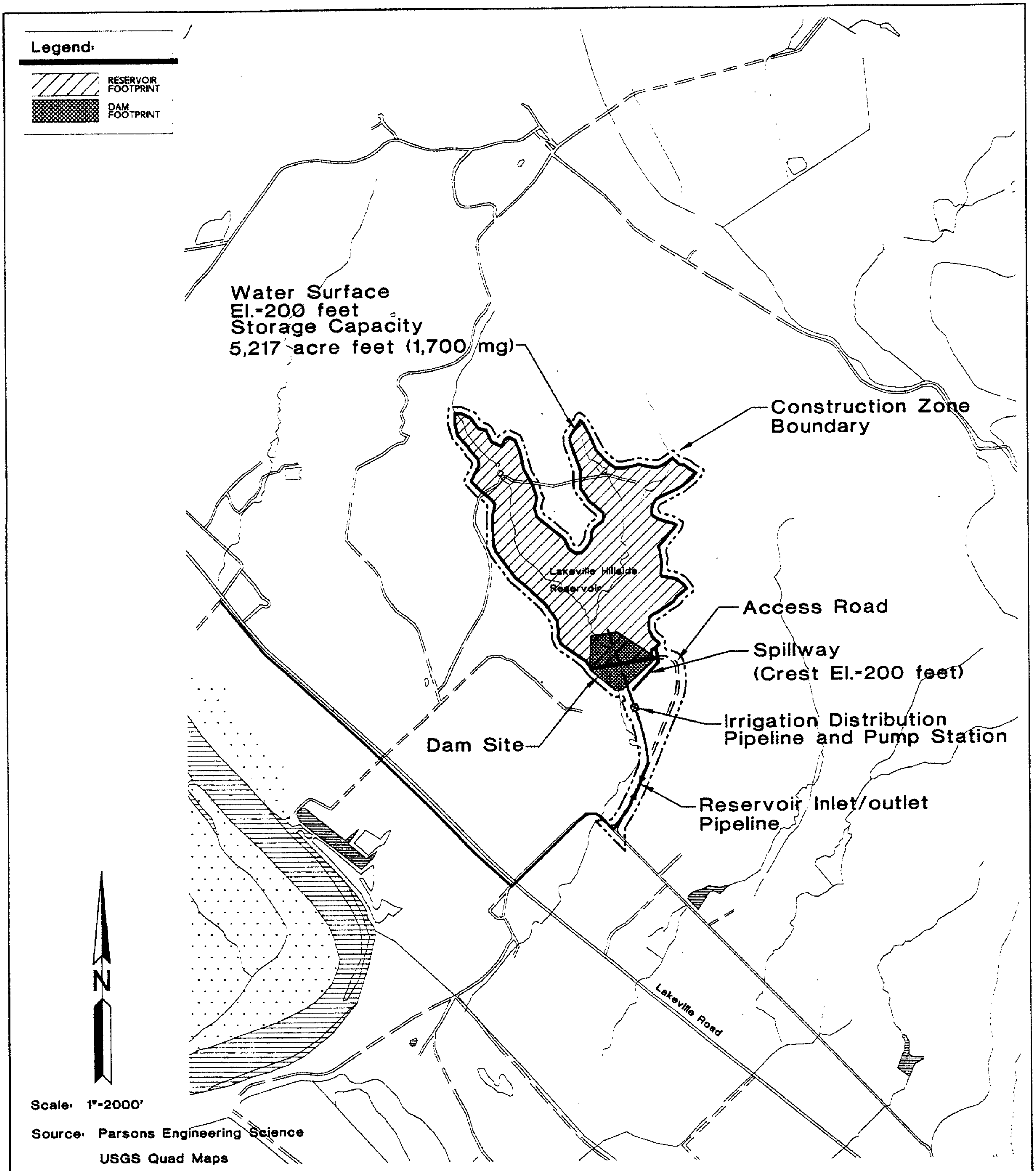

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Figure 3.3-5

LAKEVILLE HILLSIDE RESERVOIR

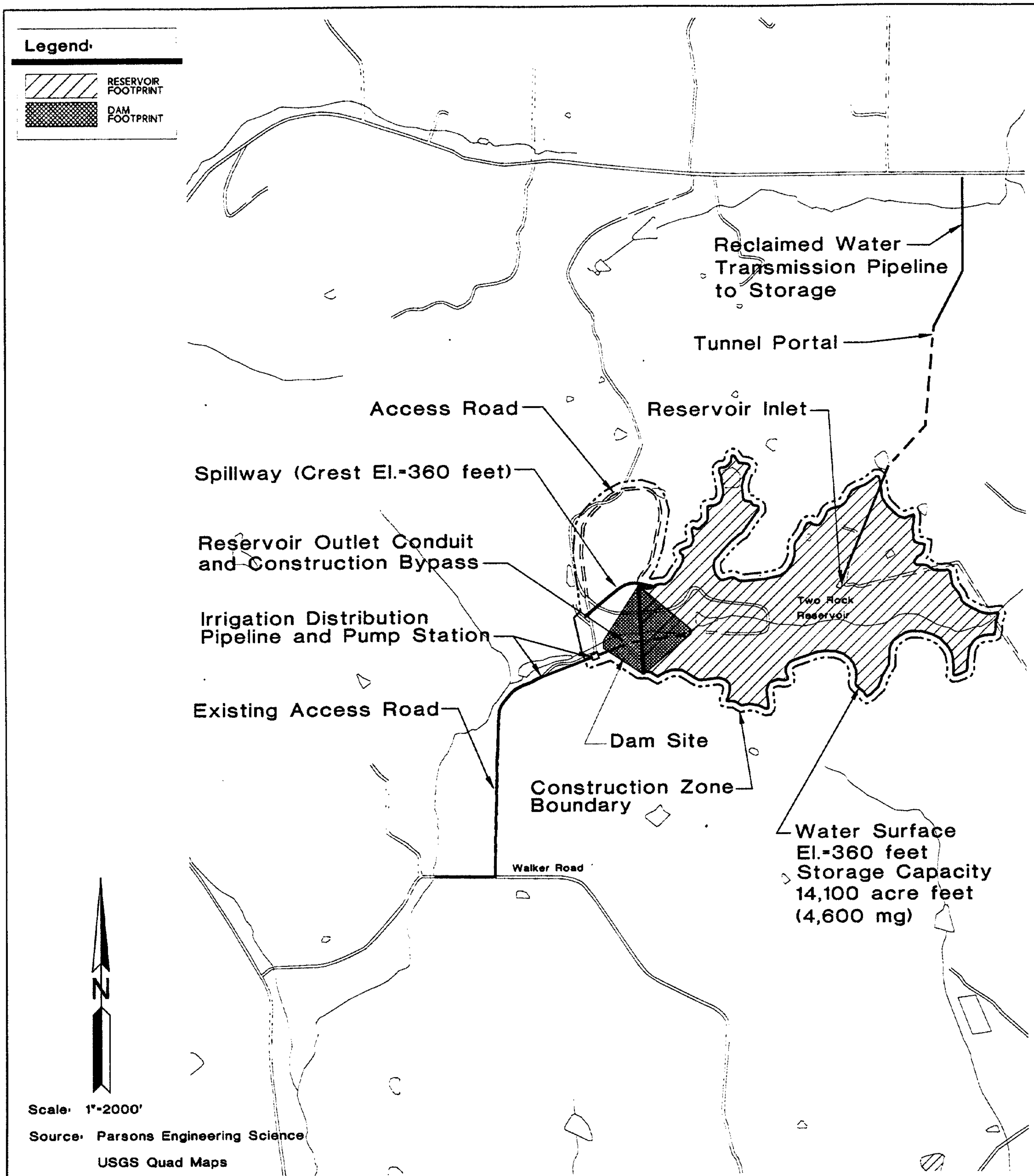

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Figure 3.3-6

TWO ROCK RESERVOIR

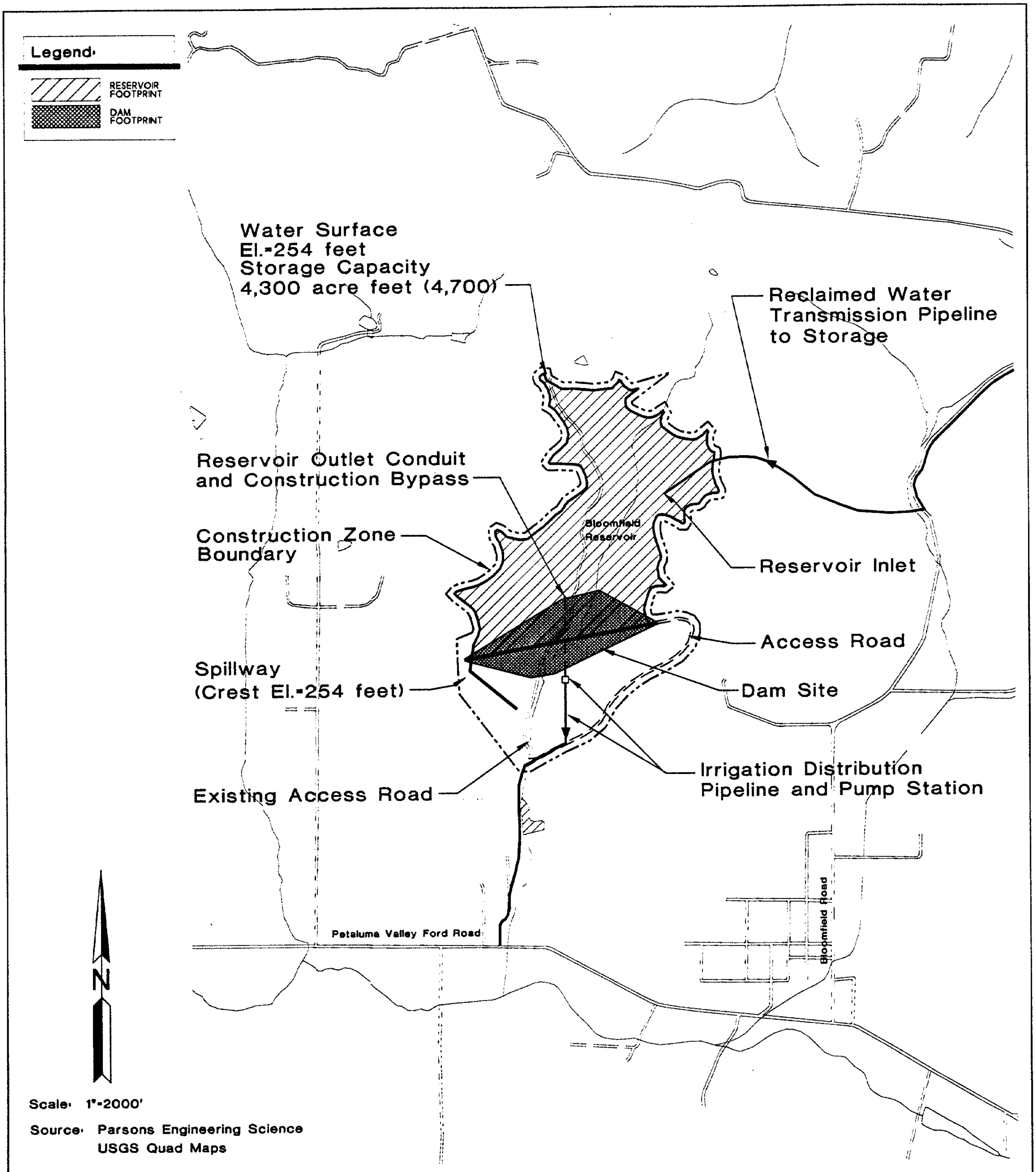

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Figure 3.3-7

BLOOMFIELD RESERVOIR

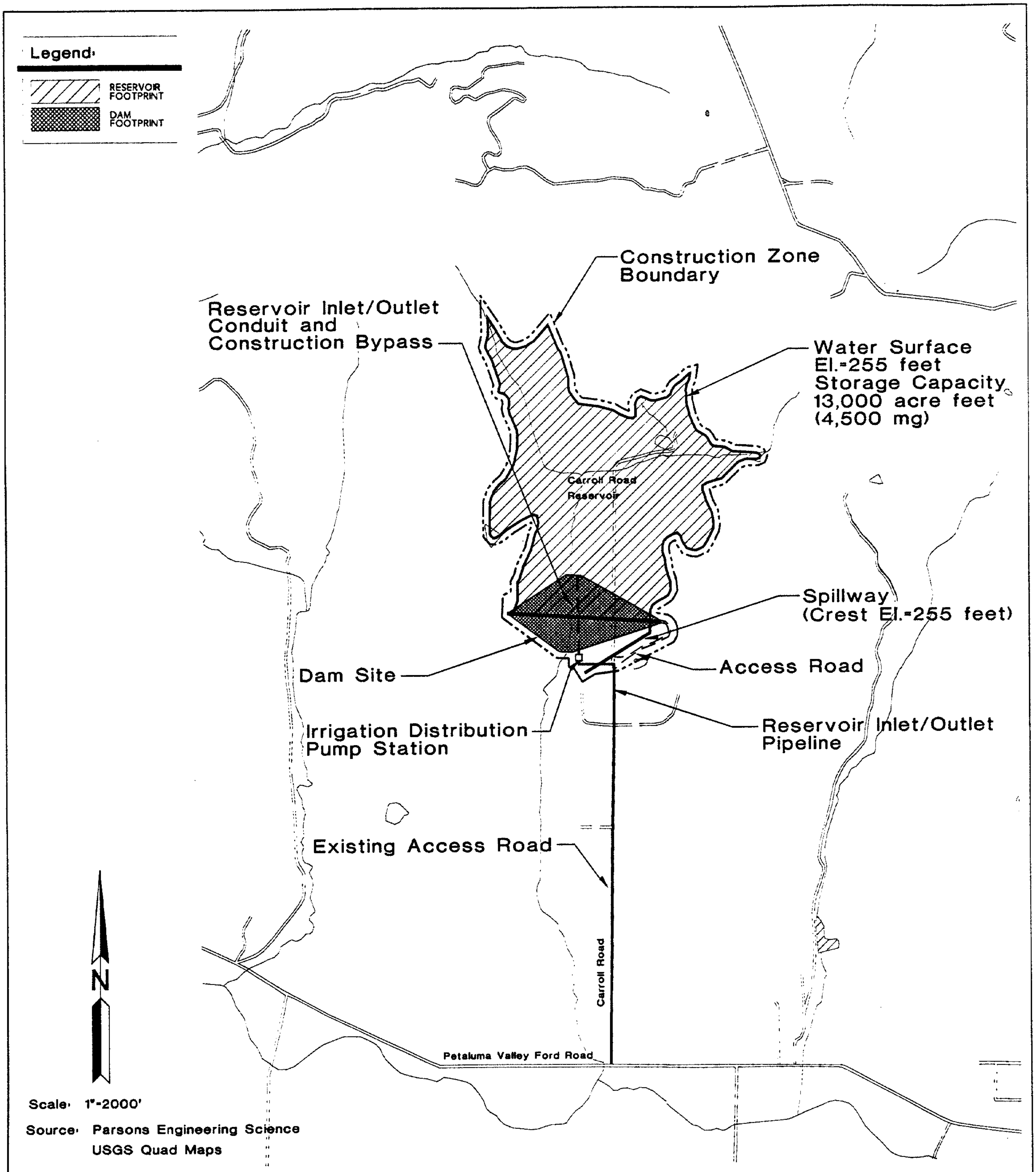

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Figure 3.3-8

CARROLL ROAD RESERVOIR

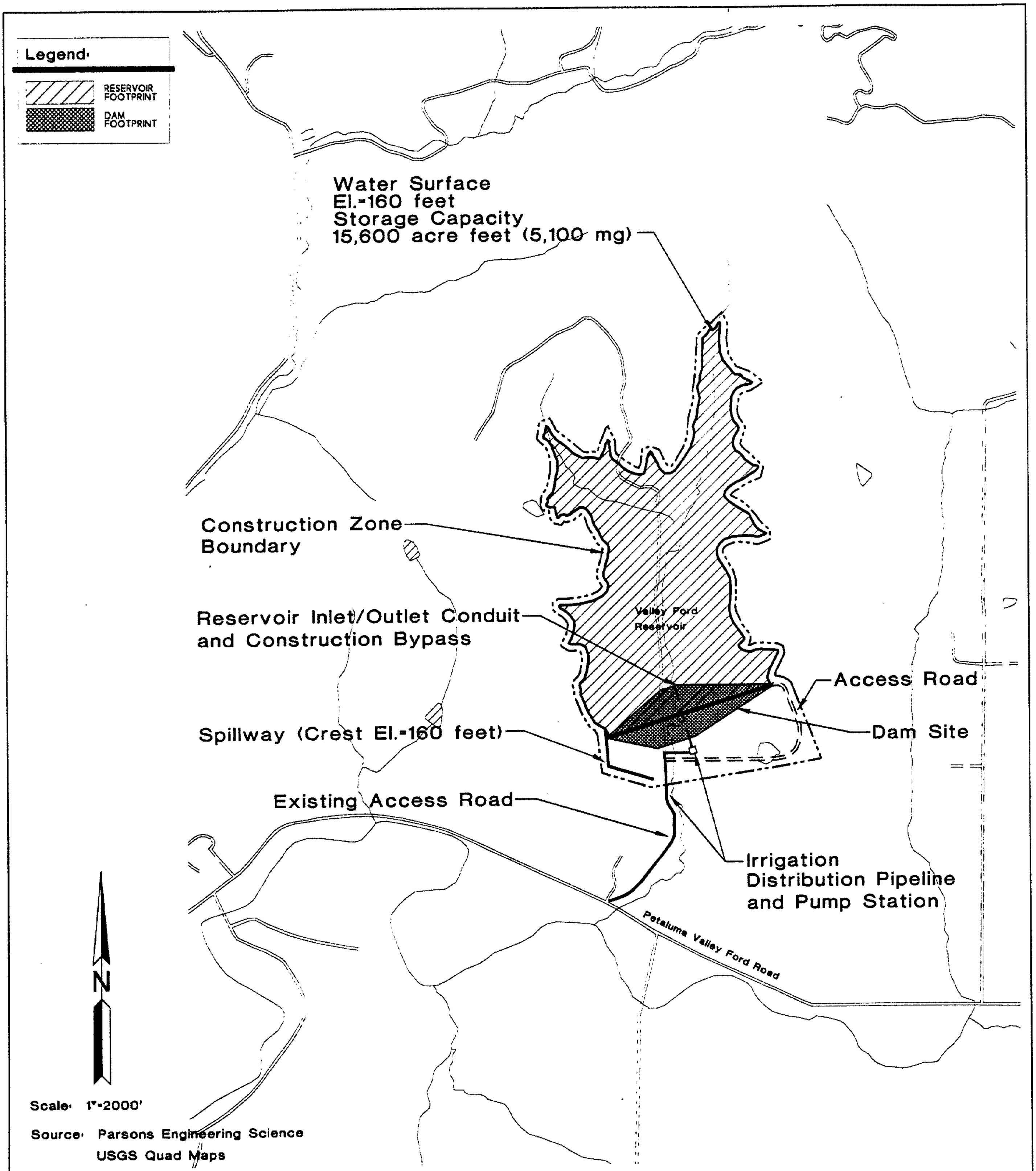

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Figure 3.3-9

VALLEY FORD RESERVOIR

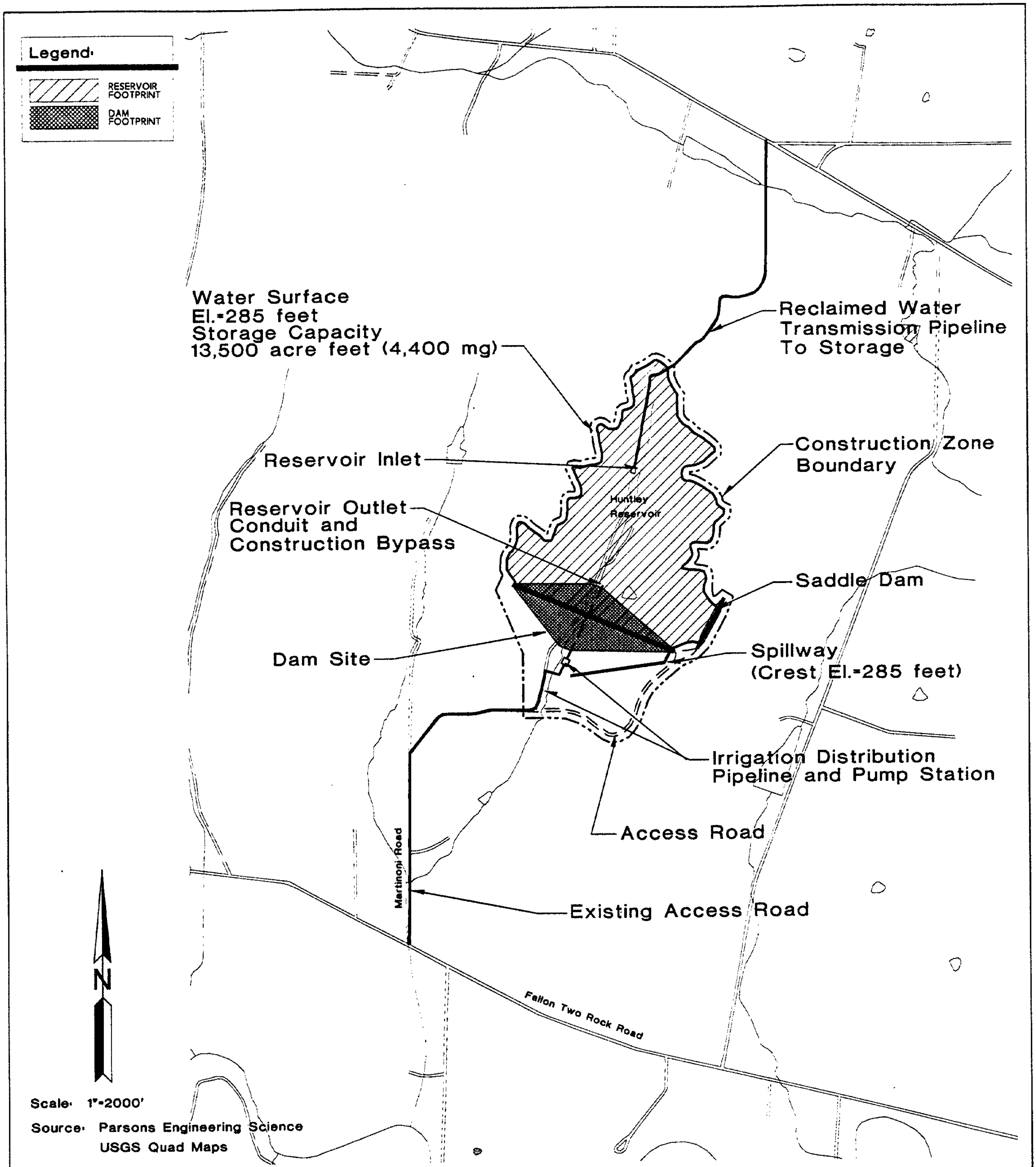

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Figure 3.3-10

HUNTLEY RESERVOIR

for Subalternatives 2B and 2D to meet the maximum expected storage requirement. Two configurations of Tolay reservoirs are presented. The Tolay Confined configuration is smaller than the Tolay Extended configuration because of a large backdam across the middle of the valley.

General Reservoir Characteristics

All reservoirs would be constructed by damming a natural drainage or valley by means of an earth filled embankment dam. In addition to the main dam, some of the reservoirs would include a smaller back dam which would isolate a portion of the drainage area from the reservoir. This would be done to prevent flooding of a portion of the drainage area so that the current land use could be maintained. In addition, some of the reservoirs would include one or more saddle dams which would prevent the full reservoir from spilling out into an adjacent watershed. The purpose of the saddle dams is to maximize storage capacity at the reservoir site while limiting impact on adjacent property.

Portions of the Adobe Road, Lakeville Hillside, Two Rock, and Huntley reservoirs would require a 3-inch thick clay lining to reduce reservoir leakage into pervious soils which occur in portions of these sites.

Acquisition of property would be required for the reservoirs and appurtenant facilities, including inlet and outlet pipelines and access roads. The anticipated construction zones for the reservoirs are shown on Figures 3.3-1 through 3.3-10. Parcels which are located within these construction zones are listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel necessary for the actual construction of the Project coincident with the designated construction zone. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is prepared by the City If necessary, the City would use its powers of condemnation to acquire property necessary to construct Project facilities.

Additional information about the storage reservoirs is contained in *Reservoir Stormwater Runoff Diversion Structures* Technical Memorandum (Parsons Engineering Science, Inc. 1995c).

Main Dam (Alternatives 2 and 3 - All Subalternatives)

All reservoirs will have an earthen embankment main dam, with a clay core and rock facing for slope protection (see Figures 3.3-1 through 3.3-10). Characteristics of these dams, including height and volume, are provided in Table 3.3-2. There are borrow areas, which provide the basic fill material for construction of the dam, located within the reservoir envelope. However, all reservoirs would require some volume of imported specialized materials including gravel for filter zone adjacent to the core (which controls water seepage) and rock for embankment slope protection.

Back Dam (Subalternatives 2A and 2C)

Tolay Extended and Tolay Confined reservoirs would require a back dam upstream of the main dam to prevent flooding of a portion of the watershed. As shown in Figures 3.3-1 and 3.3-3, back dams would include vehicular access to the top of the dam and a storm water pump station to remove runoff collecting behind the dam. Characteristics of these back dams, including height, length and volume, are provided in Table 3.3-3.

Saddle Dam (Subalternatives 2A, 2B, 2D, and 3E)

Tolay Extended, Adobe Road, Sears Point, and Huntley reservoirs would require saddle dams to prevent spilling of water out of the reservoir into an adjacent watershed (see Figures 3.3-1, 3.3-2, 3.3-5 and 3.3-10). These dams are located at high points around the reservoir watershed. A spillway, outlet works, and pump station would not be required for these dams; however, vehicular access to the top of saddle dams would be required. Characteristics of these dams, including height, length, and volume, are provided in Table 3.3-3.

Spillway (Alternatives 2 and 3 - All Subalternatives)

For all main dams, a concrete-lined, chute-type spillway would be constructed, as shown in Figures 3.3-1 through 3.3-10. The spillway would extend from the embankment downslope to discharge through an energy dissipation structure into a channel below the dam. The energy dissipation structure would consist of a rock lining for the natural creek channel up to 25 feet wide for up to 300 feet downstream from the spillway. The spillway is intended to provide for emergency release of water only in the event of upstream flow from a severe storm entering the reservoir when it is full. The capacity of the spillway would be designed to pass the probable maximum flood from such a storm event in accordance with requirements of the State Department of Water Resources, Division of Safety of Dams.

Reservoir Inlet and Outlet (Alternatives 2 and 3 - All Subalternatives)

For Tolay Extended, Tolay Confined, Sears Point, Two Rock, Bloomfield, and Huntley reservoirs, the inlet pipeline would enter the reservoir watershed from over a ridge. For the other reservoirs, the outlet conduit through the dam embankment would also serve as the inlet pipeline. The outlet conduit would have two outlets: a discharge into the natural creek channel for emergency use only and a pipeline leading to the irrigation pump station at the base of the dam. The conduit would be sized to allow emergency drawdown of the reservoir level at a rate of half the reservoir capacity in seven days in accordance with requirements of the Division of Safety of Dams.

Table 3.3-2

Storage Reservoir Characteristics (With Stormwater Runoff Diversion)

Reservoir	Water Surface Area (acres)	Gross Capacity (MG) [1]	Total Storage (Acre-Ft)	Dam Height (Feet) [2]	Spillway Crest Elevation (Feet)	Watershed Area (Acres) [3]	Captured Runoff Volume (MG) [45]	Dead Storage (MG) [6]	Net Reclaimed Water Storage (MG) [4]
Tolay Extended	800	5,600	17,200	90	245	3,400	85	750	4,000
Adobe Road	170	3700	11,300	205	340	1,050	10	200	3,400
Tolay Confined	390	5,000	15,300	115	270	1,300	600	400	4,000
Lakeville	155	1500	4,600	135	200	500	30	200	1,000
Sears Point	270	3800	11,600	115	140	6,080	60	200	3,000
Two Rock	230	4,600	14,100	225	360	700	40	200	4,000
Bloomfield	195	4,500	13,800	190	255	600	40	100	4,000
Carroll Road	235	4,700	14,400	195	255	850	60	100	4,000
Valley Ford	260	5,100	15,600	140	160	880	60	500	4,000
Huntley	175	4,400	13,500	210	285	360	30	100	4,000

Source: Parsons Engineering Science, Inc., September 1995

Notes:
1 Gross Capacity (w/ runoff diversion) = Dead Storage + Captured Runoff Volume + Net Reclaimed Water Storage
2 Measured from creek channel at downstream toe of dam.
3 Includes water surface area; excludes watershed area upstream of backdams for Tolay Extended and Confined reservoirs.
4 Assumes runoff captured upstream of Tolay Extended and Confined backdams is diverted around reservoir; therefore, this volume not included.
5 Estimated as 50% of 10 year return period annual precipitation to account for losses by percolation and evaporation.
6 Active water level at approx. 20 ft above reservoir floor.

Table 3.3-3

Reservoir Back Dams and Saddle Dams

Reservoir	Backdam	Saddle Dam	Height (Feet)	Length (Feet)
Tolay Extended	BD-A		53	1,000
		R1	20	700
Tolay Confined	BD-C		80	5,300
Sears Point		L1	20	800
		L2	20	450
Adobe Road		L1	20	500
		R1	20	500
		R2	20	800
Huntley		L1	20	900

Source: Parsons Engineering Science, October 1995

Access Road and Fencing (Alternatives 2 and 3 - All Subalternatives)

An access road would be provided at each reservoir site for dam construction and maintenance, as shown in Figures 3.3-1 through 3.3-10. The road would run to the outlet works and irrigation pump station at the base of dam; to the top of main, back and saddle dams; and to the storm water runoff pump station at the base of backdams. An access road would not be required around the entire perimeter of the reservoir. The roads would have a 12-foot wide roadbed, with 3-foot graded shoulders. The roads would have a gravel surface for grades up to 5%, with asphalt pavement for grades over 5% (for all weather access). Cattle fencing would be installed around the entire reservoir site.

Runoff Diversion Structures (Subalternatives 2A, 2B, 2C, and 2D)

Runoff diversion structures are needed for Tolay Extended, Adobe Road, Tolay Confined, and Sears Point reservoirs, as shown in Figures 3.3-1, 3.3-2, 3.3-3 and 3.3-5. The purpose of these structures is to limit consumption of storage volume by watershed runoff and/or to remove runoff collecting behind back dams. Specific facilities proposed for runoff diversion at each of the four reservoirs are described below.

Tolay Extended Reservoir (Subalternatives 2A)

- A stormwater detention basin, upstream of the reservoir back dam, to capture Tolay Creek flow upstream of the reservoir, excavated 10 feet deep over about 6 acres;

- A storm water pump station (TASW) at the detention basin with two 25,000-gpm pumps;
- A 48-inch pressurized pipeline from the pump station, discharging into the gravity flow box conduit; and
- A gravity flow, cast-in-place reinforced concrete box conduit, 15,300 feet long, along the east side of reservoir. The size of the conduit would range from 8' x 9' at the northern end to 10' x 12' at the southern end. It is located above the waterline and extends from near the reservoir backdam to Tolay main dam, discharging into Tolay Creek. The conduit also collects runoff from drainage gullies along the east side of the reservoir.

Adobe Road Reservoir (Subalternative 2B)

- A storm water detention basin and dam in area of existing stock pond to capture creek flow upstream of the reservoir;
- A runoff collection gravity pipeline, above the northeast end of reservoir, discharging into the detention basin;
- A storm water pump station (ARSW) at the detention basin, with two 28,400-gpm pumps;
- A 48-inch pressurized pipeline from the pump station, which lifts flow up 150 feet to discharge into gravity pipeline; and
- A 60-inch reinforced concrete gravity-flow pipeline, 5,800 feet long, along the west side of the reservoir from the pump station to below the main dam, discharging into Adobe Creek.

Tolay Confined Reservoir (Subalternative 2C)

- A storm water detention basin, upstream of the reservoir back dam, to capture Tolay Creek flow upstream of the reservoir, excavated 18 feet deep over about 7 acres;
- A storm water pump station (TASW) at the detention basin with five 46,500-gpm pumps;
- A pressurized pipeline, 900 feet long, from the pump station to the gravity flow box conduit; and

- A gravity flow, reinforced concrete box conduit, 9,500 feet long, along west side of reservoir from back dam to the main dam, discharging into Tolay Creek. The conduit would be 7' x 8' in size.

Sears Point Reservoir (Subalternative 2D)

- A 30-foot high storm water diversion dam, located upstream of the reservoir at the Tolay dam site, to capture Tolay Creek flow upstream of the reservoir; and

- A gravity flow rectangular concrete open channel, 25 feet wide, 15 feet deep, and 12,650 feet long, along west side of reservoir, from the diversion dam to Sears Point dam, discharging into Tolay Creek downstream of dam.

Reservoir Storage Volumes and the Water Balance

Reclaimed water generated by the Laguna Plant must be stored, used for irrigation, or discharged in a reliable manner. The water balance between supply, storage, irrigation needs, and river discharge was determined by a computer model constructed for this purpose.

Monthly operation of the reclamation system is based primarily upon the allocation priorities of the water balance model, which allocates reclaimed water to storage, irrigation, and river discharge based on priorities programmed into equations. The first priority is irrigation, and the model attempts to fulfill irrigation requirements using reclaimed water flows and storage. After irrigation, storage is the next priority, and the model attempts to achieve target storage, a predetermined storage level for each month, collectively referred to as the target storage curve. After irrigation and storage requirements are considered, any reclaimed water that remains for disposal is discharged to the Russian River.

On a monthly or seasonal basis the reclamation system should be operated as follows:

- October. The irrigation season is ending and irrigation requirements are small. The storage system is empty and begins to fill according to target storage curve. Discharge season begins but river flows and discharge volumes are relatively low.
- November through March. Essentially, there is no irrigation (except for winter irrigation, strictly as part of the contingency plan discussed at the end of this section). Reclaimed water is stored according to target storage guidelines. The remainder of the reclaimed water is discharged to the Russian River, within the design limits. Any reclaimed water in excess of that to be stored or discharged falls into the contingency volume category. Contingency volumes are disposed of through winter irrigation, emergency water conservation, contingency storage, or contingency discharge.

- April and May. River flows and discharges gradually decline as the irrigation season begins. Storage volume approaches maximum capacity.
- June through September. Irrigation season is fully underway, and there is no river discharge. Storage declines as the stored water is used to meet the peak irrigation requirements.

Actual operations may vary slightly from the water balance model allocation priorities. The model places a higher priority on achieving target storage than on discharging to the river. Actual operations may be modified so that these priorities are reversed in the early discharge season (October-December). Utilizing river discharge potential at the expense of target storage early in the discharge season would increase available storage capacity and reduce the incidence of contingency events later in the discharge season.

The Technical Memorandum, *Water Balance Model Summary and Results* (Parsons Engineering Science, Inc. 1995h), describes the water balance model in greater detail.

Pump Stations (Alternatives 2, 3, and 4)

New pump stations would be required as part of the Project for Alternatives 2, 3, and 4. The capacity and features of these stations are listed in Table 3.3-4.

General Characteristics

Pump stations at the Meadowlane Ponds, Delta Pond, and West College Ponds, as well as the storm water pump stations at the Adobe Road, Tolay Extended, and Tolay Confined reservoirs would have vertical turbine pumps located outside. All other pump stations, as described in Table 3.3-4, would have centrifugal pumps located aboveground within enclosed structures ranging in size from 100 to 1,200 square feet. These buildings would be masonry construction, single story, with peaked metal roofing panels. The buildings would house pump control panels, instrumentation, and pumps and would include noise attenuation insulation and features. There would be two to five pumps at each pump station, and the pump motors would range between 5 and 1,000 horsepower each, depending upon the required pumping capacity for each station.

Acquisition of property would be required for construction of 27 of the proposed pump stations. The remaining pump stations would be constructed on City owned sites or sites to be acquired for reservoirs. The anticipated area of the site to be acquired for each pump station would not exceed one acre. Parcels which contain a pump station site to be acquired are listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel required. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is

Table 3.3-4

Pump Stations Characteristics

Pump Station	Alternative or Subalternative	Location	Number of Pumps[1]	Pump Capacity (gpm, each)	Motor HP (each pump)	Pump Type[2]	Building Size [3]
S	2, 3	Meadowlane Ponds	4	6,000	750	VT	20' X 60'
TASW	2A	Tolay A Stormwater	3, Inside	25,000	400	VT	20' X 60'
TCSW	2C	Tolay C Stormwater	3, Inside	46,000	1000	VT	20' X 60'
ARSW	2B	Adobe Road Stormwater	3, Inside	28,400	550	VT	20' X 60'
T	2A	Tolay Dam	5, Inside	5,600	750	CENT	20' X 60'
	2C		5, Inside	9,300	650		
SP	2D	Sears Point Dam	5, Inside	10,000	900	CENT	20' X 40'
L	2B, 2D	Lakeville Dam	4, Inside	4,200	215	CENT	20' X 40'
AR	2B	Adobe Road Dam	5, Inside	9,100	325	CENT	20' X 60'
TR	3A	Two Rock Dam	4, Inside	5,900	160	CENT	20' X 40'
B	3B	Bloomfield Dam	4, Inside	5,800	340	CENT	20' X 40'
CR	3C	Carroll Rd Dam	4, Inside	5,900	340	CENT	20' X 40'
VF	3D	Valley Ford Dam	4, Inside	5,900	400	CENT	20' X 40'
H	3E	Huntley Dam	4, Inside	5,800	300	CENT	20' X 40'
SEB	2,3	Delta Pond	4, Outside	3,200	400	VT	20' X 20'
FGS	2,3	West College Ponds	2, Outside	1,600	150	VT	20' X 20'
FGB	2,3	Redwood Hwy N. Of Fountaingrove Pkwy	2, Inside	1,600	125	CENT	20' X 20'
BVS	2,3	West College Ponds	2, Outside	2,800	350	VT	20' X 20'

Table 3.3-4

Pump Stations Characteristics

Pump Station	Alternative or Subalternative	Location	Number of Pumps[1]	Pump Capacity (gpm, each)	Motor HP (each pump)	Pump Type[2]	Building Size [3]
BVB	2,3	Sonoma County Fairgrounds	2, Inside	1,600	75	CENT	20' X 20'
G1	4	Delta Pond	4, Outside	5,100	900	VT	20' X 40'
G2	4	Hwy 128 @ Pine Flat Road	5, Inside	3,800	1,500	CENT	30' X 60'
G3	4	Pine Flat Road	5, Inside	3,800	1,250	CENT	30' X 60'
G4	4	Pine Flat	5, Inside	3,800	1,750	CENT	30' X 60'
SBPS-2	2C	Petaluma Hill Rd.	2, Inside	2,500	40	CENT	10' X 10'
SBPS-3	2A,B,C,D	Petaluma Hill Rd.	2, Inside	1,300	60	CENT	10' X 10'
SBPS-7	2D	Petaluma Hill Rd.	5, Inside	9,400	225	CENT	20' X 60'
SBPS-8	2A,B,C,D	Petaluma Hill Rd.	2, Inside	2,350	130	CENT	20' X 20'
SBPS-9	2D	E. Railroad Ave.	2, Inside	2,600	25	CENT	10' X 10'
SBPS-10	2A,B,C,D	Adobe Rd.	6, Inside	18,400	900	CENT	20' X 60'
SBPS-11	2B,C,D	Adobe Rd.	3, Inside	3,200	40	CENT	20' X 20'
SBPS-12	2D	Lakeville Rd.	4, Inside	7,600	500	CENT	20' X 60'
WBPS-1	3E	Martinoni Rd.	2, Inside	225	5	CENT	10' X 10'
WBPS-3	3E	Seavey Rd.	2, Inside	300	15	CENT	10' X 10'
WBPS-4	3E	Spring Hill Rd.	2, Inside	1,560	110	CENT	20' X 20'
WBPS-5	3E	Pepper Rd.	4, Inside	7,560	475	CENT	20' X 60'
WBPS-6	3E	Valley Ford Rd.	2, Inside	680	20	CENT	20' X 20'

Table 3.3-4

Pump Stations Characteristics

Pump Station	Alternative or Subalternative	Location	Number of Pumps[1]	Pump Capacity (gpm, each)	Motor HP (each pump)	Pump Type[2]	Building Size [3]
WBPS-7	3	Canfield Rd.	2, Inside	665	40	CENT	20' X 20'
WBPS-8	3C,D	Valley Ford Rd.	2, Inside	820	10	CENT	20' X 20'
LBPS-1	2,3	Green Valley Rd.	2, Inside	220	5	CENT	10' X 10'
LBPS-2	2,3	Graton Rd.	3, Inside	5,060	175	CENT	20' X 60'
LBPS-3	2,3	Bodega Hwy.	2, Inside	750	35	CENT	20' X 20'
LBPS-4	2,3	Burnside Rd.	2, Inside	420	35	CENT	20' X 20'

Source: Parsons Engineering Science, Inc. August 1995

Notes:

1 Includes one stand-by pump; i.e., number of pumps which could be operating at any one time totals one less than number listed. Pumps located inside or outside building, as indicated.

2 vt = vertical turbine, cent = centrifugal, sub = submersible

3 All buildings would be masonry construction, single story, with peaked metal roofing panels. The buildings would house pump control panels, instrumentation, and pumps and will include noise attenuation insulation and features

prepared by the City. If necessary, the City would use its powers of condemnation to acquire property necessary to construct Project facilities.

Electrical Service to Pump Stations

Most of the pump stations can be served from existing electrical distribution lines running along public roads and, therefore, long new distribution lines would not be required. These pump stations, located along public roads, would be served with electrical power by a short overhead or buried run from a nearby existing electrical poleline (See Table 3.3-5).

However, some pump stations would be located too far from existing electrical service lines, and would therefore require installation of new service lines. Most of these new service lines would be about 100 feet long, although four pump stations would require new services between 200 and 250 feet long and eleven of the stations would require new high-voltage transmission lines (either 115kv or 12kv) from 2,200 feet to 45,000 feet long. These new high-voltage lines would be overhead, with short underground runs at either end. The 115kv lines would have wood poles 60 to 70 feet tall. The 12kv lines would be mounted on lower poles approximately 40 to 50 feet tall with a spacing of 300 to 500 feet. New conductors would also need to be installed along some existing polelines to reinforce facilities to serve some of the pump stations. Transformers associated with the overhead power lines would be bolt mounted on the poles. Underground lines would have pad mounted transformers. These pads, approximately 6 feet by 6 feet, would be concrete. In addition, new substations would be required for pump stations at the Meadowlane Ponds; at the Sears Point reservoir; on Adobe Road near East Railroad Avenue; and on Pine Flat Road along the geysers pipeline route.

Five of the pump stations would need to have electrical substations constructed at the sites. A new 230 kV substation would be required at pump station G-3, where the new 12 kV electrical line to pump stations G-2 and G-4 would begin. The other new substations, at pump stations G-2, G-4, S, SP and SBPS, would be smaller, occupying an area of approximately 200 square feet and approximately 6 to 8 feet high.

Urban Irrigation Pump Stations (Alternatives 2 and 3)

For the Fountaingrove urban irrigation system, two 150-horsepower pumps (one for standby operation) would be located at the source pump station adjacent to the West College Ponds. A booster pump station with two 125-horsepower booster pumps (one for standby operation) would be located adjacent to Fountaingrove Business Park, as shown in Figure 3.1-5. The source pump station would operate for 24 hours a day and the booster pump station at Fountaingrove Business Park would operate up to 12 hours a day. Each source and booster pump would have a capacity of up to 1,600 gallons per minute.

Table 3.3-5

Electrical Services for Pump Stations

	Service Information					
Pump Station	Service Voltage	Alternative Service Voltages	Transformer Type	Type of Service	New Service Length	Notes
AR	12 kV	277/480V or 4160V	PM	UG	100’	
ARSW	12kV	277/480V or 4160V	PM	OH/UG	1000’	Add 3rd phase to appx. 1500’ of existing line. Extend new OH line appx. 1000’ to service location.
B	12kV	277/480V or 4160V	PM	OH/UG	2500’	Extend new OH line appx. 2500’ to service location
BVB	277/480V		PB	OH	100’	
BVS	277/480V		PM	UG	100’	
CR	12kV	277/480V or 4160V	PM	UG	100’	
FGB	277/480V		PM	UG	250’	
FGS	277/480V		PM	UG	100’	
G1	12kV	277/480V or 4160V	PM	UG	200’	
G2	12kV		N/A	OH	45000’	See G32
G3	12kV					Add 230kV PG&E Substation with appx. 45000’ OH line extension to stations G2, G3, & G4.
G4	12kV					See G3
H	12kV	277/480V or	PM	UG	100’	Add 3rd phase to appx. 6000’ of existing line.

Table 3.3-5

Electrical Services for Pump Stations

	Service Information					
Pump Station	**Service Voltage**	**Alternative Service Voltages**	**Transformer Type**	**Type of Service**	**New Service Length**	**Notes**
		4160V				
L	12kV	277/480V or 4160V	PM	UG	100’	Add 3rd phase to appx. 2700’ of existing line.
LBPS-1	120/240v		PB	OH	100’	
LBPS-2	277/480V		PM	UG	100’	
LBPS-3	277/480V		PB	OH	100’	
LBPS-4	277/480V		PB	OH	100’	
S	115kV	12kV	N/A	OH	15400’	15400’ 115kV OH Transmission Extension from Stony Point Road to Customer Substation or PG&E Unit Sub at Laguna Plant.
SBPS-10	115kV		N/A	OH	4600’	4600’; 115kV OH Transmission Extension to Customer Substation or PG&E Unit Substation, along Railroad Ave./Petaluma Hill Road.
SBPS-11	277/480V		PB	OH	100’	Add 3rd phase to appx. 900’ of existing line.
SBPS-12	12kV	277/480V or 4160V	PM	UG	100’	
SBPS-2	277/480V		PB	OH	100’	
SBPS-3	277/480V		PB	OH	100’	
SBPS-7	12kV	277/480V or	PM	UG	100’	

Table 3.3-5

Electrical Services for Pump Stations

	Service Information					
Pump Station	**Service Voltage**	**Alternative Service Voltages**	**Transformer Type**	**Type of Service**	**New Service Length**	**Notes**
		4160V				
SBPS-8	277/480V		PB	OH	100’	
SBPS-9	120/240v		PB	OH	100’	
SEB	12kV	277/480V or 4160V	PM	UG	200’	
SP	115kV	12V	N/A	OH	16000’	9500’ 115kV OH Transmission Extension to Customer Substation or PG&E Unit Sub.
T	12kV	277/480V or 4160V	PM	OH/UG	7000’	Extend new OH line appx. 7000’ to service location.
TASW	12kV	277/480V or 4160V	PM	OH/UG	2200’	Add 3rd phase to appx. 1500’ of existing line. Extend new OH line appx. 2200’ to service location.
TCWS	12kV	277/480V or 4160V	PM	UG	100’	
TR	277/480V		PM	OH/UG	3000’	Extend new OH line appx. 3000’ to service location.
VF	12kV	277/480V or 4160V	PM	UG	200’	Add 3rd phase to appx. 500’ of existing line.
WBPS-1	120/240v		PB	OH	100’	Add 3rd phase to appx. 1000’ of existing line.
WBPS-3	120/240v		PB	OH	100’	
WBPS-4	277/480V		PB	OH	100’	

Table 3.3-5

Electrical Services for Pump Stations

	Service Information					
Pump Station	**Service Voltage**	**Alternative Service Voltages**	**Transformer Type**	**Type of Service**	**New Service Length**	**Notes**
WBPS-5	12kV	277/480V or 4160V	PM	UG	100’	
WBPS-6	120/240v		PB	OH	100’	
WBPS-7	277/480V		PB	OH	100’	
WBPS-8	120/240v		PB	OH	100’	

Source: Pacific Gas & Electric, October 1995

Abbreviations:
UG = Underground
OH = Overhead
PB = Pole Bolt Mounted
PM = Pad Mounted

Source pumps for the Bennett Valley/East Santa Rosa system would be located in the same source pump station as for the Fountaingrove system. Two 325-horsepower pumps (one for standby operation) with a capacity of 2,800 gallons per minute each would be required at the source pump station. Two 75-horsepower booster pumps (one for standby operation) with a capacity of 1,550 gallons per minute each would be required at the booster pump station. Both sets of pumps would operate at night for direct deliveries to the night-time irrigation sites and during the day to fill the storage ponds at the Bennett Valley Golf Course.

Pumps would be automatically controlled to maintain mainline pressure, with high pressure override shutoff, and a new electrical service would be provided to the pump stations.

Meadowlane Pump Station (S) (Alternatives 2 and 3 - All Subalternatives)

To deliver reclaimed water to the storage reservoir sites, a new pump station would be located adjacent to the existing reclamation system pump station at the Meadowlane Ponds across from the Laguna Plant. The station would contain four 750-horsepower pumps mounted outdoors. It would have a peak capacity of 26 MGD and would operate primarily during the months of December to May to fill storage reservoirs, but may operate during summer months for irrigation distribution purposes (at a lower rate to maintain line pressure). Pumps would be manually controlled, with high pressure override shutoff. A new electrical service would be provided to this pump station because the demand load would exceed the existing service to the Laguna Plant.

Distribution, Booster, and Stormwater Pump Stations (Alternatives 2 and 3 - All Subalternatives)

To distribute stored water from the reservoirs to the agricultural irrigation areas one pump station would be required near the foot of each reservoir dam. In addition to these pump stations, Tolay Extended, Tolay Confined, and Adobe Road reservoirs also require a storm water pump station to divert runoff around and downstream of the reservoir. Booster pump stations would also be required to lift water up to the higher elevation zones of the irrigation distribution system. Characteristics of these pump stations are identified in Table 3.3-4.

To irrigate many of the private parcels in the West County or South County would require installation of a small booster pump station on private property to boost the pressure coming off the distribution mains installed within the public right-of-way. The locations of these pump stations have not been determined; however they would be located on private agricultural parcels. These pumps are typically under 3 feet tall and 3 feet in diameter, with motors up to 50 horsepower in size.

Geysers Pump Stations (Alternative 4)

To deliver reclaimed water to the geysers steamfield area a series of four high pressure pump stations would be required to transport the water about 35 miles from Delta Pond to the geysers area northeast of Healdsburg. The first station would be located at Delta Pond and the second near the junction of Pine Flat Road and State Highway 128. From there two more pump stations would lift the water 3,300 feet to two, 1 million gallon storage tanks proposed to be built on a ridge above the Geysers Geothermal Reserve. From there, the water would be gravity fed to between 10 and 15 injection wells located throughout the northwest portion of the geysers area.

The pump stations were sited partially to facilitate electrical service to the sites. The first two stations would be located near existing electrical service easements, although a larger service would need to be strung. The last two stations were sited near existing high voltage transmission lines with the intent that a drop could be made to a new substation to transform power for the pumps.

The four pump stations would act to lift the water in steps up to the geysers. From the source pump station at the Delta Pond, the pipeline would discharge water into a tank at each successive pump station. The tank would serve as a supply to that station for the next lift. The tanks would be 500,000-gallon capacity, about 60 feet in diameter and 24 feet high. Isolation valves are proposed for the pipeline to allow sections to be isolated and drained into the 500,000-gallon tank, if necessary to facilitate pipeline maintenance.

Each pump station would have a surge arrestor tank system to protect the pumping system from hydraulic transients due to power failure. These tanks would be about 10 feet in diameter and 30 feet long, and require an air compressor which would be mounted in the pump station building.

Pumps would be automatically controlled, based on the delivery tank water level, with high pressure and low pressure override shutoff. A new telephone circuit for a telemetry alarm system and a new electrical service would be provided to each pump station.

Discharge Pump Stations (Alternative 5 - All Subalternatives)

No additional pumping capacity would be required for Alternative 5A, Discharge to the Russian River; two existing pump stations would be utilized. The existing Delta Pond pump station in conjunction with the North Pipeline Denner Ranch booster pump station would deliver water from Delta Pond or directly from the Laguna Plant to a proposed outfall structure on the east bank of the Russian River.

No additional pumping capacity would be required under Alternative 5B, which utilizes the existing discharge points in the Laguna de Santa Rosa.

AGRICULTURAL IRRIGATION (ALTERNATIVES 2 AND 3)

The South County and West County alternatives involve increased acreage of agricultural irrigation. For Alternative 2, an additional 3,800 acres of agricultural irrigation would be required in the South County. For Alternative 3, an additional 6,200 acres of agricultural irrigation would be required in the West County. If agricultural irrigation in the

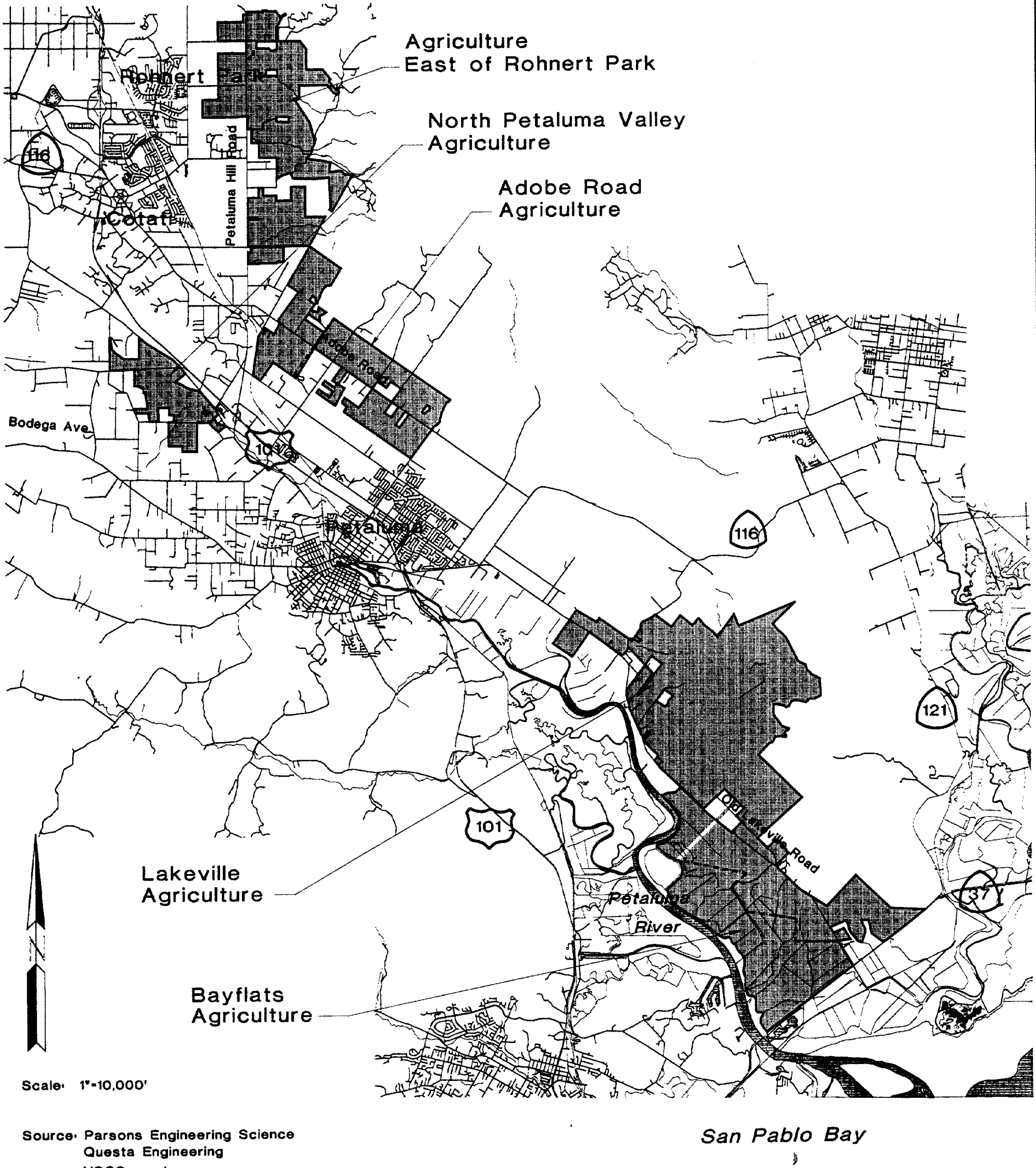
Sebastopol area is utilized (2,200 acres) the additional agricultural irrigation requirements are reduced to 2,600 acres for the South County and 4,300 acres for the West County. As these three major potential irrigation areas have different climatic and soil conditions, the potential water consumption rate is different for each area, and consequently, the acreage required to accommodate the projected volumes of reclaimed water will vary between the West County and South County. Annual average irrigation application rates are 2.9 acre feet for South County, 2.0 acre feet for West County, 1.7 acre feet for Sebastopol, and 3.0 acre feet for bay flats.

Not all property owners in these areas would be willing to use reclaimed water, and irrigation setbacks from residential areas and traffic corridors must be provided. Consequently, the proposed irrigation acreage must be larger than theoretically required. About 19,400 acres of privately owned potential agricultural irrigation property have been evaluated in the West County area, 2,800 acres in the Sebastopol area, and 16,500 acres in the South County area as part of this Draft EIR/EIS (see Figures 3.3-11 through 3.3-13).

Reclaimed water that is delivered to these areas would be distributed by additional local distribution pipelines to irrigation systems operated by individual users. The specific location and design of these local distribution system pipelines and the irrigation systems have not been determined.

A typical agricultural irrigation field layout would be based on a 40 acre parcel irrigated by means of a buried 6-inch plastic pipe mainline on the parcel, feeding either a single self-propelled irrigation machine (which consists of pipe segments mounted on wheels operating in a circular motion or in a line) or a network of hand-set surface-mounted aluminum pipe and sprayfield sprinklers.

The City of Santa Rosa would not be responsible for directly applying the reclaimed water, or managing the farming, dairy, or ranching operations. However, Irrigation Management Guidelines have been developed to identify the procedures and practices for proper management of agricultural lands for which it is furnishing reclaimed water. The objective of the guidelines is two-fold: first, that the system as a whole, and each irrigation system, is designed and managed to avoid or reduce environmental impacts to the maximum extent that current technology allows; and second, where monitoring indicates trends toward adverse impacts are occurring, that steps are taken to remedy the situation. The Irrigation Management Guidelines that are considered as part of the Project are included in Section 2.2 of this document and would be subject to monitoring as a part of the Mitigation and Monitoring Program.



Source: Parsons Engineering Science
Questa Engineering
USGS quad maps

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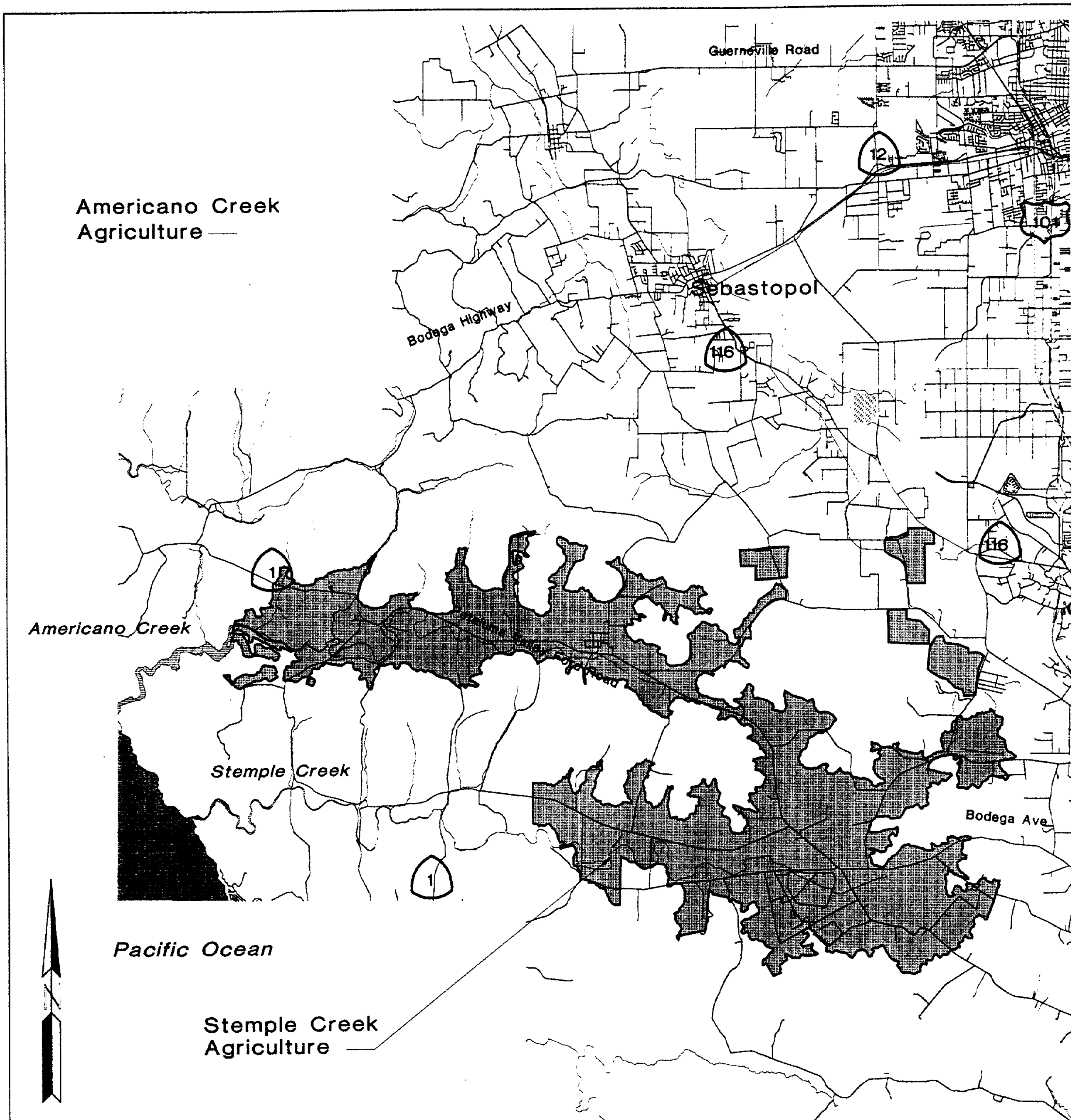
Santa Rosa

Subregional Long-Term
Wastewater Project

SOUTH COUNTY
AGRICULTURAL
IRRIGATION AREAS

Figure 3.3-11



Scale: 1"=10,000'

Source: Parsons Engineering Science
Questa Engineering
USGS quad maps

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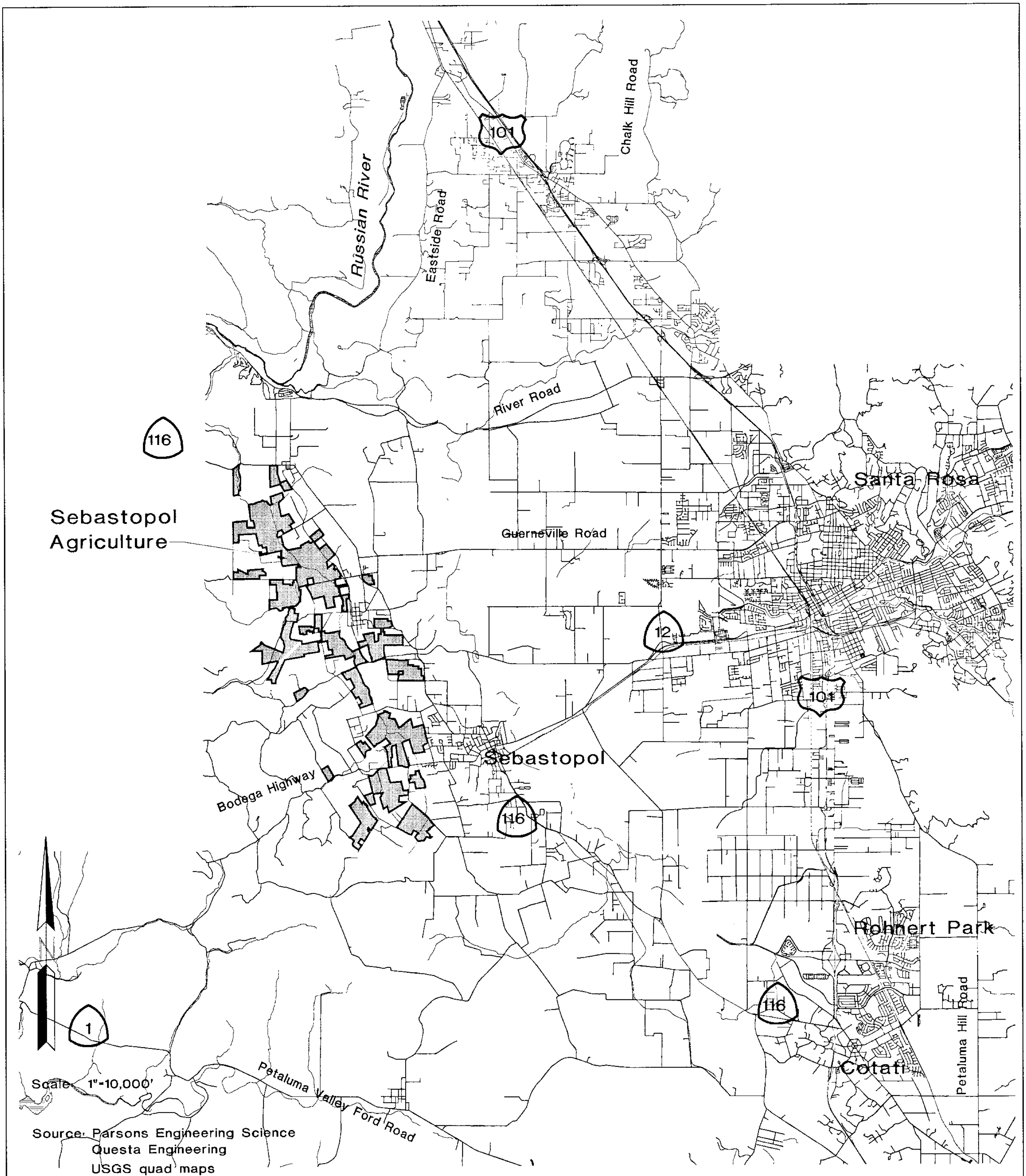
Wastewater Project

WEST COUNTY
AGRICULTURAL
IRRIGATION AREAS

Figure 3.3-12



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Subregional Long-Term Wastewater Project

SEBASTOPOL AGRICULTURAL IRRIGATION AREAS

Figure 3.3-13

Through implementation of the Irrigation Management Guidelines, the City controls management practices that are used on land receiving reclaimed water. The City would provide management oversight, monitoring and enforcement guidelines, and would require appropriate education of irrigation water users. The Irrigation Management Guidelines include procedures used to insure that only suitable land is brought into irrigation and that erosive and environmentally sensitive lands are avoided and protected. The proper use and management of applied irrigation water to avoid runoff and subsurface flows is described, and the required elements of individual or site specific Irrigation Conservation and Management Programs are outlined. The Irrigation Conservation and Management Programs would be required for all agricultural property owners who wish to receive reclaimed water for irrigation. These Programs would be prepared by City reclamation staff, working with Resource Conservation District technical staff. In addition to the Irrigation Conservation and Management Programs, the Irrigation Management Guidelines contain design guidelines and recommended Best Management Practices. On-going management by the City would include consultation on irrigation scheduling, soil erosion control, fertilizer and herbicide/pesticide recommendations, and crop and pasture management and problem solving. A monitoring network and required sampling and analysis would be coordinated with the Regional Water Quality Control Boards.

Although the Irrigation Management Guidelines are intended to avoid runoff and ponding, it is not likely that these events can be completely eliminated. Data from the 1993 and 1994 City of Santa Rosa Reclamation Annual Reports indicate the range of reported incidences of irrigation runoff and ponding due to faulty operation or pipeline leakage. During this two-year period there were a total of 162 incidences reported (114 in 1993 and 48 in 1994). Nineteen of the 1993 incidences and eight of the 1994 incidences involved runoff to waterways; the remainder involved ponding or contained runoff. The maximum volume of runoff reported was 34,000 gallons. The majority of incidences involved runoff or ponding of less than 1,000 gallons.

GEYSERS STEAMFIELD (ALTERNATIVE 4)

This component would supply reclaimed water to the geysers for injection into the geothermal steamfield. The intent is to reduce the decline in steam production, prolonging the life and economic production level of the steamfield and the geothermal power plants supplied by the steamfield. This would be a beneficial reuse of reclaimed water with an economic value. The geysers steamfield component includes the following elements, which in addition to the transmission pipeline, pump stations, and electrical service described in previous sections compromise the Geysers Alternative:

- Two 1,000,000 gallon storage tanks at the end of the transmission pipeline, to serve as a reservoir for gravity distribution to the injection wells. The tanks would be above grade, each about 80 feet in diameter and 30 feet high. They would be constructed on a high point along the ridge, which would be graded down to create a flat area of sufficient size for the tanks, and the existing dirt road from Pine Flat Road to the tank site would be regraded and graveled.

- Distribution pipelines would convey water from the two storage tanks to the geysers injection wells, primarily mounted above ground on pipe supports. Pipelines would range from 12 to 36 inches in diameter, and air/vacuum release valves, blowoff valves, and isolation valves would be provided.
- Ten to fifteen water injection wells distributed around the central and northwest portion of the geysers geothermal fields. These are existing steam extraction wells which would be converted to water injection wells.

Acquisition of property would be required for construction of the storage tanks as well as segments of pipeline leading from Pine Flat Road to the storage tanks, and from the tanks to the geysers steamfield area. The anticipated area of the site to be acquired for the storage tanks would be approximately seven acres. Parcels on which the storage tanks and associated pipelines are located are listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel that is needed. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is prepared by the City. If necessary, the City would use its powers of condemnation to acquire property necessary to construct Project facilities.

This alternative proposes the delivery of about 75 percent of the reclaimed water leaving the Laguna Plant to the geysers on an average annual basis and about 25 percent to the existing reclamation system (including existing Laguna irrigation fields and the existing storage ponds in the Laguna). Total average annual water delivery to the geysers would approach 6,350 million gallons at system design capacity, for an average daily delivery of about 17.4 mgd. The peak monthly delivery would occur December through February at about 20 mgd, and the minimum delivery in July through August at about 15 mgd. During peak wet weather events, releases to the Laguna would continue to be utilized for brief periods. The maximum rate of such discharge would be less than the 1 percent maximum discharge rate currently permitted.

DISCHARGE (ALTERNATIVE 5)

This Project component has two options, as shown in Figure 3.1-8: a new discharge at the Russian River and continued discharge into the Laguna creeks from the existing storage ponds.

The new discharge at the Russian River would have a design discharge rate of 20%. The existing Laguna discharge would have a design discharge rate of 1% for alternatives 2 and 3. Alternative 4 would discharge up to 1% of river flow during peak wet weather events. The Laguna Discharge Alternative has a design discharge rate of 20%. For alternatives 2 and 3, a range of discharge rates between 1% and 20% may be considered as described in the *Range of Discharge Evaluation* (Harland Bartholomew & Associates, Inc. 1996b).

Russian River Discharge (Alternative 5A)

A new outfall structure would be located on the east bank of the Russian River, approximately two miles upstream of the Sonoma County Water Authority water supply intakes (see Figure 3.1-8). The structure consists of a vault with a valve to maintain pressure in the pipeline; 40 feet of 54-inch pipe to stabilize flow downstream of the valve; a concrete baffle outlet structure to anchor the pipe and reduce foaming and turbulence prior to discharge to the river; a flap on the end of the discharge pipe; and concrete erosion control wings and ramp into the river channel. The discharge structure is located at an elevation above the summer flow elevation in the river.

Acquisition of property would be required for construction of the new outfall structure. The anticipated area of the site to be acquired for each pump station would not exceed one acre. The parcel on which the proposed outfall structure is located is listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel required. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is prepared by the City. If necessary, the City would use its powers of condemnation to acquire property necessary to construct Project facilities.

Laguna Discharge (Alternatives 3, 4, and 5B)

No new construction would be required. There are two outlets to Santa Rosa Creek at Delta Pond, a 48-inch diameter outlet and a 36-inch diameter outlet. Two additional outlets to the Laguna de Santa Rosa exist at Meadowlane Pond, a 36-inch diameter outlet and a 24-inch diameter outlet.

CONTINGENCY PLAN (ALTERNATIVES 2, 3, AND 5)

The Contingency Plan is designed to reduce the incidence of discharges to the Russian River above the design discharge rate for Alternatives 2, 3, and 5. The Project facilities are designed to have a 95 percent reliability, which means that "contingency volumes" are produced in 1 of every 20 discharge months (about once every two to three years). This reliability was determined in agreement with the North Coast Regional Water Quality Control Board. Temporary measures are needed during contingency events to manage such volumes. Contingency volumes are defined as monthly reclaimed water volumes in excess of that which may be stored, irrigated, or discharged to the Russian River under the design discharge rate. Contingency program measures were selected based on ease of implementation and low capital cost. All of the contingency measures under consideration use the same facilities that would be utilized under normal discharge conditions. There are no contingency volumes for Alternative 4, as the maximum discharge to the Russian River under this alternative would not exceed the 1% discharge rate.

Contingency program measures are prioritized for implementation as follows: 1) winter irrigation, 2) emergency conservation, 3) contingency storage, and 4) contingency discharge. The measures are prioritized based on ease of implementation and environmental acceptability. Contingency discharge via the Laguna is the least acceptable of the four alternative measures because the primary purpose of the contingency program is to avoid discharge to the River in excess of the design rate, except under the most extreme circumstances. Emergency conservation would require considerable public information and support. Public information campaigns during normal operating conditions should be communicated judiciously; otherwise emergency water conservation may not be perceived as an “emergency” by the public, diminishing its effectiveness over time. Winter irrigation facilities are in place and, therefore, should be the first measure utilized during a contingency event. Contingency storage adds 5 percent to the design storage volume in the reservoirs and would be the second measure to be utilized as required. Contingency storage will be available during dry periods (when contingency storage is needed), because reclaimed water production is reduced during dry periods (less inflow and infiltration).

When contingency discharge occurs, the maximum monthly Russian River discharge rates are estimated to be 7.3%, 13.4%, and 28.3% for the 5%, 10%, and 20% design discharge rates respectively. There would be no contingency discharge for the 1% design discharge project and contingency discharge would occur in 4 months or less in 70 discharge seasons for each of the 5%, 10%, and 20% discharge options. Contingency discharge events occur rarely; the monthly water balance model showed a maximum of four contingency discharges over the 70-year period of record for the 20% design discharge Project. Other discharge rates would require contingency discharge of even less frequency. The contingency discharge rate associated with each “design” discharge rate would be approved and contained in the permit issued by the North Coast Regional Water Quality Control Board. Additional information about the Contingency Plan may be found in Technical Memorandum *Water Balance Contingency Plan*, (Parsons Engineering Science, Inc. 1995s).

3.4 COST OF ALTERNATIVES

An estimate of construction costs and costs of operation and maintenance for the Project alternatives was prepared at a planning level of detail to identify the major costs and allow a relative cost comparison between alternatives. Due to the uncertainty at this time about the final design of any of the alternatives, the cost estimates should be considered preliminary and subject to revision once an alternative is selected and Project design is completed.

Table 3.4-1 provides an overall summary of the construction cost and the annual cost for operation and maintenance for each of the alternatives, along with the projected land purchase costs, engineering and administrative costs, and a total equivalent present worth cost. Also, the non-recurring operation costs associated with Contingency Plan implementation are shown in this table.

The cost estimate is based on the following assumptions:

- Costs for development and management (including the services of agricultural specialists), over a five-year startup period, for the agricultural irrigation areas are included. Otherwise, labor costs for current and additional City personnel who will regularly operate and maintain the Project facilities are not included.
- The cost estimate is based on unit costs for construction labor and materials as of the third quarter of 1995.
- The addition of nitrogen removal water treatment facilities is included in the cost estimate for both discharge subalternatives.
- The cost estimate includes no off-setting revenue from sale of reclaimed water for irrigation or from the value of electrical power produced at the geysers due to injections of reclaimed water. No incentive payments to land owners to take reclaimed water are included in the cost estimate, except for Contingency Plan winter irrigation.

Additional information about the estimated Project cost may be found in *Alternative Projects Construction Cost Estimate*, November 1995 (Parsons Engineering Science, Inc. 1995a).

- In addition to these estimates of Project cost for the five alternatives, additional estimates of cost were prepared for alternatives 2 and 3 to identify costs differences for a Project under these alternatives with design discharge rates between a 1% rate (which is the basis for alternatives 2 and 3) and a 20% rate (which is the basis for Alternative 5). These cost estimates have been prepared at design discharge rates of 5%, 10%, and 15% for each of the subalternatives under Alternative 2 and 3. The several assumptions and criteria listed above were also used in preparation of the cost estimates for the 5%, 10% and 15% discharge rates.

Table 3.4-1

Cost Estimate by Alternative

(thousands)

Alternative	Capital Costs: Land Purchase	Capital Costs: Engineering, Administration Legal	Capital Costs: Construction	Capital Costs: Total	Annual Operation and Maintenance Costs	Total Present Worth [1] [2] [3]	Contingency Plan Operation and Maintenance Costs (Non-Recurring)
1 - No Action/No Project	$0	$0	$0	$0	$0	$0	$0
2A - Tolay Extended	$8,487	$39,631	$264,208	$312,326	$2,513	$340,014	$433
2B - Adobe Road and Lakeville Hillside	$4,734	$45,324	$302,158	$352,216	$2,411	$378,780	$437
2C - Tolay Confined	$4,242	$45,528	$303,517	$353,287	$2,627	$382,231	$438
2D - Sears Point and Lakeville Hillside	$3,883	$48,631	$324,206	$376,720	$3,153	$411,460	$558
3A - Two Rock	$1,973	$31,883	$212,554	$246,410	$1,648	$264,568	$297
3B - Bloomfield	$1,858	$36,626	$244,175	$282,659	$1,745	$301,886	$297
3C - Carroll Road	$1,907	$31,506	$210,043	$243,456	$1,753	$262,771	$297
3D - Valley Ford	$2,057	$32,533	$216,888	$251,478	$1,785	$271,145	$297
3E - Huntley	$2,354	$32,811	$218,739	$253,904	$1,713	$272,778	$298
4 - Geysers Recharge	$209	$27,136	$180,907	$208,252	$6,683	$281,885	$0
5A - Discharge to Russian River	$33	$8,337	$55,583	$63,953	$97	$65,022	$0
5B - Discharge to Laguna	$0	$6,046	$40,306	$46,352	$0	$46,352	$0

Source: Parsons Engineering Science, Inc., November 1995

Notes:

1. Includes annual O&M capitalized at 6.5% interest over 20 years; present worth factor = 11.018
2. Does not include credit for annual revenue income from sale of reclaimed water or value of crops produced under Alternatives 2A through 3E, or value of significant electrical energy produced due to Alternative 4.
3. Assumes stable pumping energy consumption (at design year value) and energy cost for 20 years.

In addition, several new assumptions and criteria were used in the cost estimates for the 5%, 10%, and 15% discharge rate options under alternatives 2 and 3 projects because the storage requirements, piping and pumping requirements, and irrigation acreage requirements will be reduced from the 1% projects. Based upon the storage requirements for the 5%, 10%, and 15% discharge rates, two alternatives will be modified or eliminated from consideration under one or more of the options.

- Alternative 2A, the expanded Tolay reservoir, will be eliminated from consideration under the 10% or 15% options because the reduced storage requirement will result in a relatively large and shallow impoundment with a relatively large area of shallow and turbid water which will not be available to the outlet works and irrigation pump, and will aggravate the growth of algae.
- Alternatives 2B and 2D: Under the 5%, 10%, and 15% option, the reduced storage requirements mean that either Lakeville Hillside reservoir or the Adobe Road reservoir alone will be sufficient these alternatives. Also, under the 15% option, the Lakeville Hillside reservoir by itself could be used.

In addition to modification of these alternatives, components considered under 5%, 10%, and 15% options will be affected as follows:

- Pipelines. Pipeline sizes to the reservoirs will be reduced to account for the reduced volume (and flow rate) to actually be delivered to the reservoirs and irrigation areas. For purposes of the cost estimates, it was also assumed that the length of pipelines necessary to carry water from the reservoirs to the agricultural irrigation areas will be less, reflecting the reduced acreage needed for agricultural irrigation.
- Storage Reservoirs. Under the 5%, 10%, and 15% options, the reduced reclaimed water storage requirement will result in a reduced reservoir size, including a lower water elevation, reduced water surface area, and a reduction in height of the main dams, as well as the back dams and saddle dams. (Under the 10% and 15% options, the saddle dam for the Adobe Road reservoir will be eliminated.) However, because these reservoirs are to be constructed in valleys, the reduction in volume does not result in a proportional reduction in the dam height, surface water elevation or surface area of the reservoir. These will change by only a few feet, even under the 15% option. The diversion channels and other facilities for storm water drainage will not be altered under any of the options because these facilities are sized to deal with the storm water flows within the watershed and will not change as a result of reduced storage requirements.
- Pump Stations. Because less volume of water must be delivered to the reservoirs and the reservoirs to the major irrigation areas, the capacity of the pump stations at the Laguna Plant and at the reservoirs will be reduced by about 30% for the 5% option, 50% for the 10% option, and 75% for the 15% option. Also, the number of pump stations required is assumed to be reduced for the purpose of estimating costs for these options, reflecting the decrease in area required for agricultural

irrigation. However, even though the total volume of reclaimed water delivered for irrigation will be less, the amount of water to a given irrigation area might not be reduced, and therefore, the booster pump stations serving the individual irrigation areas will not necessarily be reduced in size.

- Agricultural Irrigation. Because less water will be available for irrigation under the 5%, 10%, and 15% options, less acreage will be required than for the 1% Project (assuming the same rate of application of water). For the purposes of the cost estimates it was assumed that the areas to be irrigated will be those closer to the reservoir site under each alternative. (For example, under the 10% option for Alternative 3B, using the Adobe Road reservoir, it was assumed that the Lakeville and bay flats areas will not be irrigated.) This will allow the length of pipeline and the number of pump stations to be reduced as described above.

The headworks expansion and urban irrigation components will not be affected by any of the options.

Several observations and conclusions have been identified based upon the cost estimates.

- Except for Alternative 4, the relative position of the alternatives is nearly identical under any of the options, indicating that construction cost dominates the present worth value of the projects.
- Once the river discharge exceeds about 6%, Alternative 4 becomes the most expensive Project. Alternative 4 is more expensive than any 10% or 15% Project.
- The West County alternatives have consistently less cost than the South County alternatives.
- For the 15% option, the construction cost of Alternative 2B/D using only Lakeville Hillside reservoir, is the least costly South County alternative, and is nearly equivalent to the West County alternatives.
- The 5% South County alternatives 2A through 2D are nearly equivalent in cost to the 1% West County alternatives.
- The 10% South County alternatives 2A through 2D are nearly equivalent in cost to the 5% West County alternatives.
- Except for the option using only the Lakeville Hillside reservoir, the 15% South County alternatives 2A through 2D are nearly equivalent in cost to the 10% West County alternatives.
- Additional information about the estimated Project cost may be found in the Range of Discharge Evaluation, Appendix A, (Harland Bartholomew & Assocations, Inc. 1996b).

3.5 CUMULATIVE PROJECTS

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines Section 15355). NEPA defines cumulative impact as the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40CFR 1508.7).

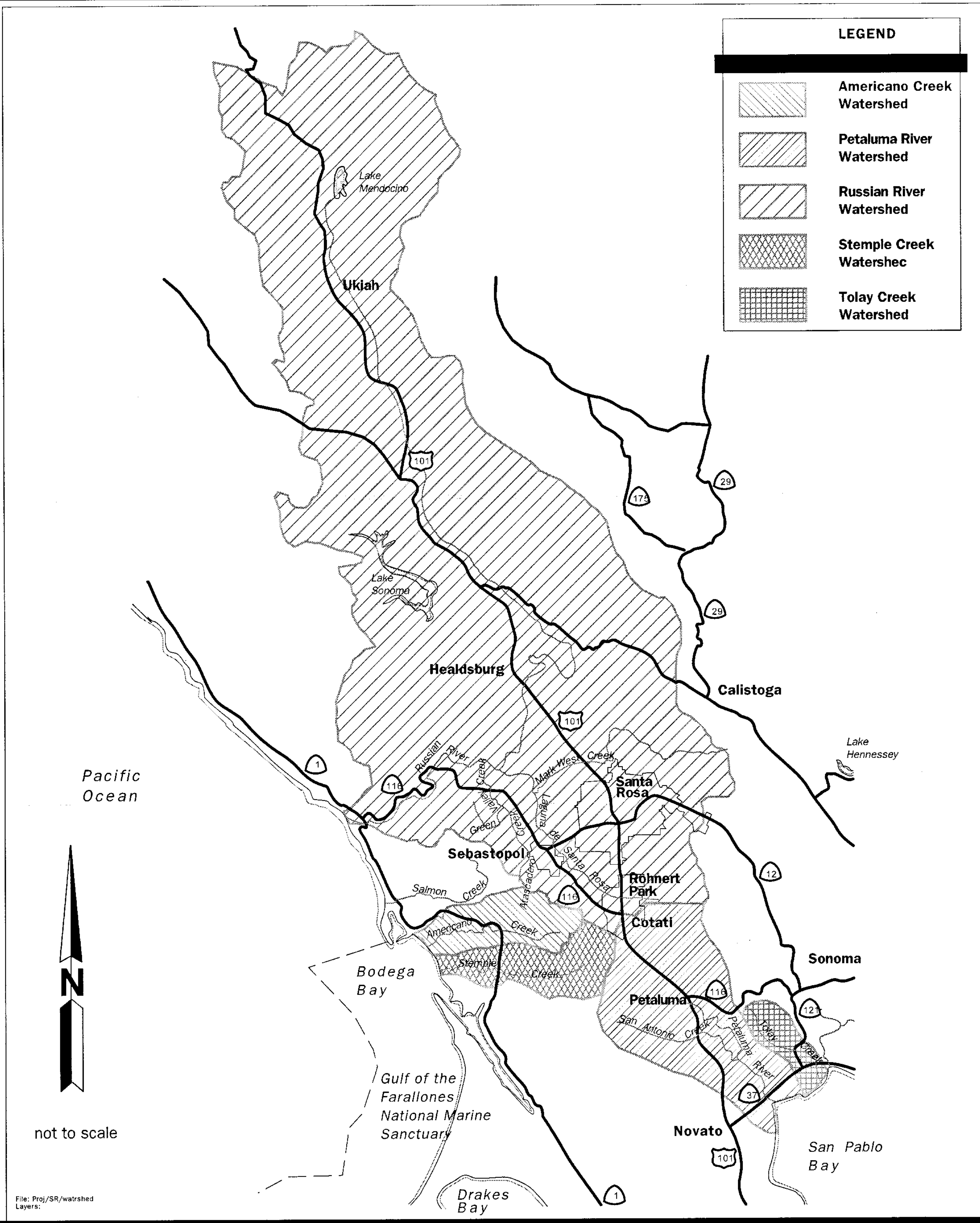
IDENTIFICATION OF PROJECTS WITH POTENTIAL FOR CUMULATIVE IMPACTS

Cumulative projects have been identified using two methods (as defined under Section 15130 of the CEQA Guidelines): General Plan projections and the list approach. Projections from the general plans and individual projects are listed in Appendix D-31. Projects were identified relative to the requirements of both CEQA and NEPA:

- Cumulative Project Study Area. Although many resources are affected only by nearby projects, the water quality of a stream or river is affected by all projects within its watershed. We therefore defined the cumulative Project study area as the watershed of all waterbodies potentially affected by the Project alternatives (see Figure 3.5-1).
- General Plan Projections. General plans and general plan EIRs within the cumulative Project study area were obtained. Using these documents, projections of residential, commercial, and industrial projects have been prepared.

  One potentially cumulative project is the City of Santa Rosa's 1996 update of its General Plan. In July of 1996, a few days prior to release of the Draft EIR/EIS, the City may adopt that update. Depending upon what is decided by the City Council, the ultimate population could be as much as 30,000 higher than that projected at buildout of the current General Plan. Any such growth, however, is expected to occur after the year 2010, after the horizon time frame of Santa Rosa's current General Plan, which is used in the EIR/EIS as the basis for analysis of the Project.

  As of the time of writing of the Draft EIR/EIS, it is unknown which General Plan update alternative, if any, will be adopted by the City Council. The calculations of flows for the purpose of sizing the Long-Term Project were completed based on April 1994 projections of the General Plan buildout of each Subregional member. The sizing of the Long-Term Project is therefore based on flows resulting from the buildout of the current General Plan, and if the population increases beyond that projected in the current General Plan, a new proposal for



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Subregional Long-Term Wastewater Project

Figure 3.5-1

CUMULATIVE PROJECTS STUDY AREA

sewage treatment and disposal will be required, as well as compliance with all applicable laws. The potential increase in flows, if any, created by the update will occur after the date used in defining and analyzing the Project and is, therefore, not part of the Project evaluated in the EIR/EIS.

Full evaluation of the update as a cumulative project is not possible for at least three reasons: (1) it is unknown what the City's action regarding the update will be or what conditions might be imposed and therefore what increase in flows might result; (2) it is unknown how sewage treatment for any increase will be accomplished; and (3) any increase is expected to occur after the year 2010, the horizon time frame used in the EIR/EIS as the basis for analysis of the Project.

- The List Approach. The projections included in the general plans were considered the primary tool for identification of cumulative projects. However, individual cumulative projects were identified for two reasons: 1) a number of general plan amendments or updates are in process within the cumulative Project study area; and 2) the general plans and general plan EIRs do not adequately cover projects with impacts on water quality, a primary issue in analysis of the Project alternatives. A list of wastewater projects with a potential for cumulative impacts is included in Section 4.6, Surface Water Quality.
- Past, Present, or Reasonably Foreseeable Projects. The impacts of past and present projects are evaluated in the baseline environmental data presented in the Affected Environment section of the EIR/EIS. Reasonably foreseeable future projects were identified as suggested in the CEQA Guidelines in the discussion following Section 15130: "...the Lead Agency is required to discuss not only approved projects under construction and approved related projects not yet under construction, but also unapproved projects currently under environmental review...". When local agencies were contacted, all projects in their jurisdictions which met these criteria were requested. Projects were included on the cumulative list without limitation in regard to type of environmental documentation available.
- Actions, Regardless of Who Undertakes Them. All municipal, regional, state, and federal agencies with jurisdiction over lands within the cumulative Project study area were contacted, and a list of their public and private projects solicited. All agencies contacted responded, although it was evident that some agencies had more complete lists than others.
- Related Projects. The following types of projects were considered related to the Project alternatives:

  - Actions in or near a waterbody;
  - Actions requiring an Army Corps of Engineers permit for fill;
  - Work along a roadway to be used for a pipeline alignment;
  - Residential, commercial, and industrial projects; and
  - General plan amendments and updates.

The following types of projects were considered not related to the Project alternatives:

- Public projects under $5,000;
- Landfill closures;
- Acquisition of property;
- Work along a roadway not planned for a pipeline alignment;
- Actions which do not increase the area of impermeable surface or affect water quality, for example improvements to existing pump stations or repavement of existing airport runways;
- Studies and plans; and
- Parks.

EVALUATION OF IMPACTS OF CUMULATIVE PROJECTS

The analysis of cumulative impacts is presented in Chapter 4, Affected Environment and Environmental Consequences, under each discipline. If significant cumulative impacts are identified, mitigation is recommended. Impacts of the individual cumulative projects as they relate to the Project alternatives are evaluated and presented as well. A cumulative impact is identified as significant only if there are new significant impacts not previously discussed in the Project analysis.

3.6 REQUIRED PERMITS AND APPROVALS

There are numerous potentially applicable federal, state, regional, county, and city permits required for the construction, maintenance, and operation of the Santa Rosa Subregional Long-Term Wastewater Project. The *Permitting Report* (Harland Bartholomew & Associates, Inc. 1995) identifies permits and approvals to be obtained and the timing for permit acquisition. Those agencies which have direct permitting authority and will be expected to use this EIR/EIS in granting approval for the Project are:

FEDERAL AGENCY PERMITS AND APPROVALS

U.S. Army Corps of Engineers
U.S. Bureau of Land Management (BLM)

STATE AGENCY PERMITS AND APPROVALS

California Department of Transportation (Caltrans)
State Lands Commission
State Water Resources Control Board
California Department of Water Resources, Division of Safety of Dams (DSOD)
California Occupational Safety and Health Administration (CalOSHA)
California Coastal Commission
California Department of Fish and Game
State Office of Historic Preservation

REGIONAL AGENCY PERMITS AND APPROVALS

Bay Conservation and Development Commission (BCDC)
North Coast and San Francisco Bay Regional Water Quality Control Boards
Bay Area Air Quality Management District (BAAQMD)

COUNTY AND CITY AGENCY PERMITS AND APPROVALS

Sonoma County Permit and Resource Management Department
Sonoma County Public Works Department
Sonoma County Airport Land Use Commission
Marin County Public Works Department
City of Santa Rosa Public Works Department
City of Santa Rosa Fire Department

City of Cotati Public Works Department
City of Sebastopol Public Works Department
City of Sebastopol Building Department
City of Rohnert Park Public Works Department

A list of permits and approvals for which this EIR/EIS will be utilized is provided in Table 3.6-1. There are many other agencies that have review authority over the Project, EIR/EIS, or permits, but do not directly issue permits or approvals for the Project.

The review period will vary greatly depending upon the regulated activity, type of permit or review involved, and established procedures of the reviewing agency. The time required to complete the review and/or obtain a permit could range from one day to over one year. Agencies for which the review period could be six months or more are:

U.S. Army Corps of Engineers	Department of the Army Permit (Section 404)
U.S. Army Corps of Engineers	Department of the Army Permit (Section 10)
Advisory Council on Historic Preservation/State Office of Historic Preservation	Section 106 Review and Compliance
National Oceanic and Atmospheric Administration (NOAA) U.S. Fish and Wildlife Service/ National Marine Fisheries Service	Review Section 7 Consultation
California Coastal Commission	Coastal Development Permit, Coastal Zone Development Permit, Consistency Determination
State Lands Commission	Land Use Lease
State Water Resources Control Board	Water Rights Permit
State Water Resources Control Board	Petition for Change
California Department of Water Resources, Division of Safety of Dams (DSOD)	Approval of plans and specifications for the construction or enlargement of a dam or reservoir
California Department of Fish and Game	Section 2081 Management Agreement
Bay Area Air Quality Management District (BAAQMD)	Authority to Construct and Permit to Operate
North Coast and San Francisco Bay Regional Water Quality Control Boards	Point Source National Pollutant Discharge Elimination System (NPDES) Permit for discharge from a Publicly Owned Treatment Works (POTW)
North Coast and San Francisco Bay Regional Water Quality Control Boards	Waste Discharge Requirements
Sonoma County Permit and Resource Management Department	Subdivision or merger of parcels

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Federal Agency Permits and Approvals					
U.S. Army Corps of Engineers	Department of the Army Permit (Section 404)	2, 3 (Must apply for an Individual Permit)	Discharge of dredged or fill material into waters of the U.S., (including wetlands).	Six to eight months after certification of the Final EIR/EIS	Section 404 Clean Water Act (33 USC 1344)
U.S. Army Corps of Engineers	Department of the Army Permit (Section 10)	2, 3, (Must apply for an Individual Permit)	Structures or work in or affecting navigable waters of the U.S.	Up to seven months after certification of Final EIR/EIS	Section 10 of Rivers and Harbors Act of 1899 (33 USC 403)
Advisory Council on Historic Preservation/State Office of Historic Preservation	Section 106 Review and Compliance	2, 3, 4, 5	Consideration of a Section 404/10 permit by the Corps.	Up to six months after certification of Final EIR/EIS.	National Historic Preservation Act 36 CFR 800
National Oceanic and Atmospheric Administration (NOAA)	Review	3, 5	Consideration of a Section 404/10 permit by the Corps (NOAA has other authority to prevent violation of the Marine Sanctuaries Act, but only permit-related review authority is listed here).		Clean Water Act; Marine Sanctuaries Act

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
U.S. Fish and Wildlife Service/ National Marine Fisheries Service	Section 7 Consultation	2, 3, 4, 5	Consideration of a Section 404/10 permit by the Corps.	Four to six months after certification of Final EIR/EIS	16 USCA 1531 et seq: 50 CFR Part 17, Sections 17.94-17.96 Endangered Species
U.S. Bureau of Land Management (BLM)	Geothermal Sundry Permit	4	Conversion of a geothermal well to an injection well.	One week	Geothermal Steam Act of 1970
U.S. Bureau of Land Management (BLM)	Geothermal Drilling Permit	4	Drilling a new geothermal well for use as an injection well.	One week	Geothermal Steam Act of 1970
U.S. Bureau of Land Management (BLM)	Right-of-Way	4	Crossing land owned or leased by BLM with a pipeline, road, or other facility.	Two weeks	Federal Land Policy and Management Act of 1976
U.S. Environmental Protection Agency (EPA)	UIC Group V Well Injection Permit	2, 3, 4	Injection of treated wastewater into wells. EPA generally defers to the Regional Water Quality Control Boards for enforcement of the Well Injection Permitting Program.	Refer to North Coast Regional Water Control Board Waste Discharge Requirements	Safe Drinking Water Act

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
State Agency Permits and Approvals					
California Department of Transportation (Caltrans)	Encroachment Permits	2, 3, 4	Use of State rights-of-way for installation of pipelines along state freeways and roads.	Two months after certification of Final EIR/EIS	21 CCR14.11.1-14.11.6
California Department of Transportation (Caltrans)	Transportation Permit	2, 3, 4	Transport of heavy or oversized loads on state roads during construction.	Same day as applied for	California Vehicle Code Section 35780; California Streets and Highway Code 117, 660-711
State Lands Commission	Land Use Lease	4	Placement of fill or structures in navigable waterways or Section 16 or 36 lands.	Six months	California Public Resources Code Section 6000 et. seq.
State Water Resources Control Board	Water Rights Permit	2, 3	Reservoirs without diversion structures for existing streamflow.	Six to twelve months	
State Water Resources Control Board	Petition for Change	2, 3, 4, 5	Change in location or amount of current wastewater discharge	One to twelve months	

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
California Department of Water Resources, Division of Safety of Dams (DSOD)	Approval of plans and specifications for the construction or enlargement of a dam or reservoir	2, 3	Dam or reservoir construction or enlargement.	Six months	California Water Code Division 3, Dams and Reservoirs Parts 1 and 2
California Occupational Safety and Health Administration (CalOSHA)	Permits for construction, trench excavations, and demolition	2, 3, 4, 5	Construction of trenches or excavations five feet or deeper and into which a person is required to descend. Construction or demolition of any building, structure, scaffolding or falsework more than three stories high. The underground use of diesel engines in working mines and tunnels.	One week	California Labor Code Section 6500
California Coastal Commission	Coastal Development Permit, Coastal Zone Development Permit, Consistency Determination	3	Any activity within the designated areas.	Three months after certification of Final EIR/EIS.	California Coastal Act; Coastal Zone Management Act
California Department of Fish and Game	Streambed Alteration Agreement	2, 3, 4, 5	Crossing of streams, rivers, or lakes (also for reservoirs which interrupt streams).	One month after certification of Final EIR/EIS.	Sections 1601-1603 of the California Fish and Game Code

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
California Department of Fish and Game	Section 2081 Management Agreement	2, 3, 4, 5	Potential adverse effects to state endangered or threatened species or species proposed for state listing. Incidental "take" of state protected species by a non-state entity.	Seven months after Final EIR/EIS certification	Section 2081 California Fish and Game Code
State Office of Historic Preservation	See Advisory Council on Historic Preservation under U.S. Army Corps of Engineers				
Regional Agency Permits and Approvals					
Bay Conservation and Development Commission (BCDC)	Development Permit, Consistency Determination	2	Any structures built in or near San Francisco Bay up to five feet above mean sea level.	Three months after Final EIR certification	San Francisco Bay Plan and McAteer Petris Act (California Government Code Sections 666000 et seq.); 14 CCR Division 5; Suisun Marsh Preservation Act of 1977 (Public Resources Code Section 2900 et seq.); Coastal Zone Management Act

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
North Coast and San Francisco Bay Regional Water Quality Control Boards	Point Source National Pollutant Discharge Elimination System (NPDES) Permit for discharge from a Publicly Owned Treatment Works (POTW)	All	Discharge of treated municipal wastewater from a publicly owned treatment works to waters of the U.S.	Six to seven months	Federal Clean Water Act; Porter-Cologne Water Quality Control Act
North Coast and San Francisco Bay Regional Water Quality Control Boards	General Construction Stormwater National Pollution Discharge Elimination System (NPDES) Permit	2, 3, 4, 5	All stormwater discharges when clearing, grading, and excavation result in a land disturbance of five or more acres.	Prior to construction	Clean Water Act
North Coast and San Francisco Bay Regional Water Quality Control Boards	Waste Discharge Requirements	2, 3, 4, 5	Discharge of reclaimed water on land and to groundwater.	Six months to one year	Porter-Cologne Water Quality Act
North Coast and San Francisco Bay Regional Water Quality Control Boards	Section 401 Water Quality Certification	2, 3, 4, 5	Discharge of fill materials to waters of the U.S.	Two months	Clean Water Act

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Bay Area Air Quality Management District (BAAQMD)	Authority to Construct and Permit to Operate	2, 3, 4, 5	Any Project that emits criteria pollutants. Project also subject to reporting under Toxic Hot Spots legislation (AB 2588). District oversees criteria pollutant emissions and odor control.	One year or longer	New Source Review regulations; Clean Air Act; BAAQMD Regulation 2, Rule 2, Sections 301.2 and 302
County and City Agency Permits and Approvals					
Sonoma County Permit and Resource Management Department	Coastal Zone Development Permit	3	Any activity or structures built within the Coastal Zone designated by Local Coastal Plan (LCP).	Four months after certification of Final EIR/EIS	California Coastal Act; Coastal Zone Management Act
Sonoma County Permit and Resource Management Department	Subdivision or merger of parcels	2, 3, 4, 5	If City purchases property it may need to merge or subdivide parcels.	Two weeks to six months	County Codes
Sonoma County Permit and Resource Management Department	Use Permit	2, 3, 4, 5	Development of proposed facilities on leased land.	Three to four months	County Codes

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Sonoma County Permit and Resource Management Department	Well Drilling Permit	2, 3, 4	Construction or destruction of all wells.	One to two weeks	County Codes
Sonoma County Permit and Resource Management Department	General Plan Consistency Review	2,3,4,5	Acquisition of land and easements for Project facilities.	Two to three months	California Government Code Sec. 65402
Sonoma County Permit and Resource Management Department	Cancellation of Williamson Act Contract	2,3	The non-renewal of any Williamson Act Contract.	Two to three months	California Lands Conservation Act (commonly known as Williamson Act)
Sonoma County Permit and Resource Management Department	Road Encroachment Permit	2, 3, 4, 5	New transmission, water, or gas line crossings, or construction on or across county roads.	One to two months	County Codes
Sonoma County Public Works Department	Grading Permit	2, 3, 4, 5	Certain grading activities if conducted prior to obtaining a building permit.	Two months	County Codes
Sonoma County Public Works Department	Transportation Permit	2, 3, 4, 5	Transport of heavy or oversized loads on county roads.	One day	County Codes

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Sonoma County Airport Land Use Commission	Land Use Approval	2, 4, 5	Proposed land uses on airport property and in "referral area" around airports.	One month	County Codes
Marin County Public Works Department	Road Encroachment Permit	3	New transmission, water, or gas line crossings, or construction on or across county roads.	One to two months	County Codes
Marin County Public Works Department	Transportation Permit	3	Transport of heavy or oversized loads on county roads.	1 day	County Codes
City of Santa Rosa Public Works Department	Encroachment Permit	2, 3, 4, 5	Use of local jurisdictions right-of-way for installation of pipeline across roadways.	1 to 2 months	City ordinances
City of Santa Rosa Public Works Department	Transportation Permit	2, 3, 4, 5	Transport of heavy or oversized loads on city streets.	One day	City ordinances
City of Santa Rosa Public Works Department	Building Permit, Street Improvement Permit, Grading Permit	2, 3, 4, 5	Construction activities within the City of Santa Rosa.	Approximately one month after final design	Uniform Building Codes, as adopted
City of Santa Rosa Fire Department	Hazardous Materials Management Plan, Hazardous Materials Storage Permit, Hazardous Materials Inventory	2, 3, 4, 5	All facilities where hazardous materials are stored above or below ground in amounts greater than threshold quantities.	Approval on completion of construction phase	California Health and Safety Code Section 25580 et seq.
City of Cotati Public Works Department	Encroachment Permit	2	Use of local jurisdictions right-of-way for installation of pipeline along roadways.	One to two months	City Ordinances

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
City of Cotati Public Works Department	Transportation Permit	2	Transport of heavy or oversized loads on city streets.	One day	City Ordinances
City of Sebastopol Public Works Department	Encroachment Permit	3	Use of local jurisdictions right-of-way for installation of pipeline along roadways.	One to two months	City Ordinances
City of Sebastopol Public Works Department	Transportation Permit	3	Transport of heavy or oversized loads on city streets.	One day	City Ordinances
City of Sebastopol Building Department	Building Permit	3	Construction and installation of pipelines within city limits.	Two months	City Ordinances
City of Rohnert Park Public Works Department	Encroachment Permit	2, 3, 4	Use of local jurisdictions right-of-way for installation of pipeline along roadways.	One to two months	City Ordinances
City of Rohnert Park Public Works Department	Transportation Permit	2, 3, 4	Transport of heavy or oversized loads on city streets.	One day	City Ordinances

Source: Harland Bartholomew & Associates, Inc. 1995

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REFERENCES

HBA Team Documents

Dames & Moore. 1996. *Dam Break Inundation Analysis*. January.(Appendix J-1)

Harland Bartholomew & Associates, Inc. 1995a. *Santa Rosa Subregional Long-Term Wastewater Screening Report.* March.(Available at Santa Rosa Library as an exhibit)

Harland Bartholomew & Associates, Inc. 1995b. *Permitting Report.*(Appendix D-5)

Harland Bartholomew & Associates, Inc. 1996. *Range of Discharge Evaluation*.(Appendix A)

Parsons Engineering Science, Inc. 1996a. *Documentation in Support of the Elimination of Alternatives*. April.(Appendix D-6)

Parsons Engineering Science, Inc. 1996b. *Analysis of Results from Daily and Monthly Water Balance Models*. (Appendix D-9)

Parsons Engineering Science, Inc. 1995a. *Alternative Projects Construction Cost Estimate.* November. (Appendix D-30)

Parsons Engineering Science, Inc. 1995b. *Geysers Recharge Water Balance and Operation Considerations*. December. (Appendix D-18)

Parsons Engineering Science, Inc. 1995c. *Reservoir Stormwater Runoff Diversion Structures*. December. (Appendix D-17)

Parsons Engineering Science, Inc. 1995d. *Transmission Pipeline to Storage, Tunnel Length Optimization Analysis TM-P-4.* April. (Appendix D-26)

Parsons Engineering Science, Inc. 1995e. *Transmission Pipeline Routes to All Reservoir Sites.*. (Appendix D-25)

Parsons Engineering Science, Inc. 1995f. *Urban Irrigation Component of the Alternative Projects, Tech Memo TM-UI-1.* December. (Appendix D-22)

Parsons Engineering Science, Inc. 1995g. *Water Balance Contingency Plan*. November. (Appendix D-10)

Parsons Engineering Science, Inc. 1995h. *Water Balance Model Summary and Results. TN.* June. (Appendix D-8)

West Yost Associates. 1996. *Wastewater Flow Projections.* July. (Appendix D-4)

Other References

LSA Associates. 1991. *Santa Rosa Subregional Sludge Beneficial Use Project Profit Environmental Impact Report.*