6.6 REPLACEMENT PAGES

INTRODUCTION

This volume contains the replacement pages associated with the Final EIR. To reduce the cost in preparing the Final EIR, only those pages of the Draft EIR/EIS which have been modified have been reproduced. These replacement pages are presented in a manner which allows the reader to easily use in conjunction with the Draft EIR/EIS.

Textual edits associated with the replacement pages are primarily related to specific agency and public comments made on the Draft EIR/EIS. In addition, there are edits that were made as a result of section author review.

ORGANIZATION

The replacement pages are presented by section, as they would appear in the Draft EIR/EIS. Text that has been added to the document is indicated in **bold underline** font, while text that has been deleted is indicated with ~~**bold strikethrough**~~ font. The headers and footers are in the same format as the Draft EIR/EIS, but have been modified to indicate the new date which reflects the release of the Final EIR. If the addition of new text resulted in additional pages, these new pages are numbered with a lower case letter (i.e., Page 4.9-15a, Page 4.9-15b, Page 4.9-16). Changes to text within a table have been lightly-shaded to highlight the edits. There is a Table of Contents which follows this introduction which indicates which sections have replacement pages and where they appear in this volume.

TABLE OF CONTENTS

VOLUME XXII REPLACEMENT PAGES

		Draft EIR/EIS Volume
Appendix G-2	Potential Streambank Erosion - Laguna de Santa Rosa and Russian River	Volume VII
Appendix H-2	Reclaimed Water Quality	Volume VII
Appendix I-1	Estimation of Nitrogen, Salt and Herbicide/Pesticide Concentrations in Surface Water	Volume VIII
Appendix I-2	Evaluation of Metals in Irrigation - Affected Percolate	Volume VIII
Appendix I-3	Environmental Conditions in West County Waterways	Volume VIII
Appendix I-7	Russian River Algae and Macrophytes Assessment Technical Report	Volume VIII
Appendix 1-8	Russian River Water Quality Model	Volume VIII
Appendix I-12	Development of Evaluation Criteria for Potential Water Quality Impacts	Volume IX
Appendix I-16	Water Quality Impact Analysis Report Volume I - Text	Volume IX
Appendix K-1	Biological Resources, Volume I	Volume X
Appendix K-3	Biological Resources, Volume III	Volume XI
Appendix L-1	Anadromous Fish Migration Study Program, 1991-1994	Volume XIII
Appendix L-6	Evaluation of Bioaccumulation in Organisms Exposed to Reclaimed Water from the Santa Rosa Subregional System	Volume XIII
Appendix L-7	Aquatic Biological Resources Impacts Analysis Report	Volume XIII

REPLACEMENT PAGES

CHAPTER 1

INTRODUCTION AND SUMMARY

1 INTRODUCTION AND SUMMARY

LIST OF TABLES

LIST OF FIGURES

Description of Alternatives

(Refer to Chapter ~~3.4~~ 3.1 in the Draft EIR/EIS.)

Alternative 1—No Action (No Project) Alternative

The No Action Alternative evaluates impacts which would occur if no project were implemented. The No Action Alternative consists of the existing Subregional System, plus various upgrades at the treatment plant and improvements to be constructed under the Interim Period Reclamation System Master Plan. *(Refer to Chapter 3.2 in the Draft EIR/EIS for further discussion of interim improvements.)*

Treatment capacity will remain at 18 million gallons per day (average dry weather flow), limited by capacity of the influent pumps. This Alternative assumes continuation of existing water conservation practices by member entities.

Alternative 1 is based on the assumption that projected growth as indicated in the currently adopted General Plans of each of the Subregional entities will continue through December, 1997. At that time, it is expected that the North Coast Regional Water Quality Control Board will no longer allow new sewer hookups, effectively creating a building moratorium throughout the Subregional System. This Alternative does not meet the Regional Board reliability requirement.

Alternative 2—South County Reclamation Alternative

The South County Reclamation Alternative uses reclaimed water for agricultural irrigation in areas south and east of Santa Rosa (see Figure 1-6). The monthly average discharge rate will be less than one-half percent and the design discharge rate will be one percent of river flow.

Within Alternative 2, four subalternatives have been defined. These alternatives differ in the location of the storage facilities for reclaimed water. The alternatives are:

- Alternative 2A—Reservoir Site: Tolay Extended
- Alternative 2B—Reservoir Site: Adobe Road and Lakeville Hillside

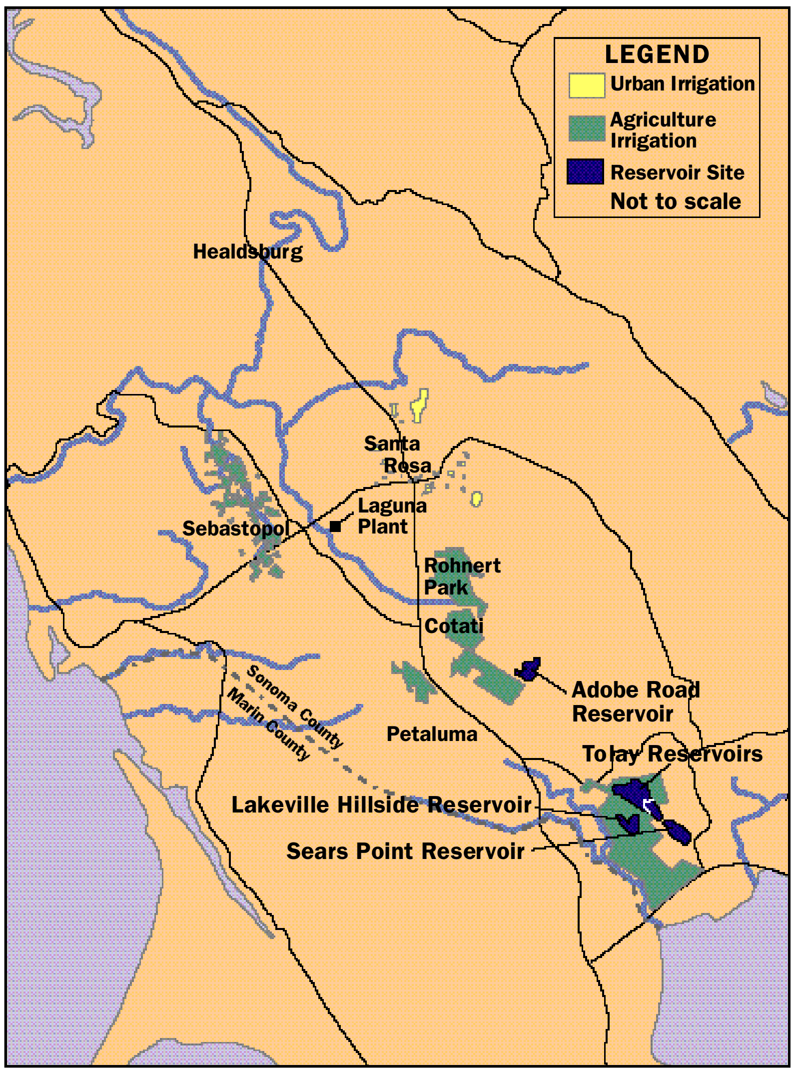


Figure 1-6. *Alternative 2, South County Reclamation with four subalternatives*

Description of Components

(Refer to Chapter ~~3.5~~ 3.3 in the Draft EIR/EIS.)

The alternatives evaluated in this EIR/EIS are comprised of various combinations of components such as pipelines and storage reservoirs. All elements of the Project alternatives are included in one of the components described below.

Headworks Expansion

The headworks pumps move sewage from the plant intake to the treatment facilities. The capacity of these pumps currently determines the treatment capacity of the Laguna Plant.

Expansion will be accomplished by replacing existing pumps with new pumps, providing a maximum capacity of 80 million gallons per day for peak wet weather flows, with one pump held in reserve should another need repair.

Urban Irrigation

Two urban irrigation systems will deliver reclaimed water to replace groundwater and/or potable City water now used:

- The Fountaingrove Urban Irrigation System is an extension of the existing reclaimed water 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 reclaimed water irrigation system into the east Santa Rosa area, providing year-round irrigation of 350 acres, including parks, schools, and the Bennett Valley Golf Course.

The urban irrigation component will dispose of 380 million gallons of reclaimed water annually, or about 4.5 percent of total disposal needs.

Pipelines

Pipelines will transport reclaimed water from the Laguna Plant to storage reservoirs and distribute stored water from reservoirs to agricultural irrigation areas in Alternatives 2 and 3. Transmission pipelines (i.e., from Laguna Plant to reservoir) are typically 48 inches in diameter and may function as distribution pipelines (i.e., from reservoir to agricultural irrigation areas) during irrigation season. Distribution pipelines range from 6 to 24 inches in diameter. Pipelines are proposed for the Fountaingrove and Bennett Valley Urban Irrigation Systems, conveying reclaimed water from the West College Ponds to various urban irrigation sites.

Pipelines are required in Alternative 4 (Geysers Recharge) to transport reclaimed

Urban Irrigation. *Year-round irrigation of 610 acres will dispose of about 380 million gallons of reclaimed water annually.*

To distribute stored water from reservoirs to agricultural irrigation areas, one pump station will be required near the foot of each reservoir dam. In addition to these pump stations, reservoirs at Tolay Extended, Tolay Confined, and Adobe Road also require stormwater pump stations to divert runoff around and downstream of the reservoir.

For Alternative 4, the Geysers Recharge Alternative, a series of four high-pressure pump stations will be required to transport the water about 35 miles from Delta Pond to the Geysers area northeast of Healdsburg.

No additional pumping capacity will be required for either Discharge Alternative.

Agricultural Irrigation

The South County and West County alternatives provide an increase in acreage of agricultural irrigation.

For the South County, an additional 3,800 acres of agricultural irrigation will be required. For the West County, an additional 6,200 acres of agricultural irrigation is required. If agricultural irrigation in the Sebastopol area is utilized (2,200 acres) the agricultural irrigation requirements will be reduced to 2,600 acres for the South County and 4,300 acres for the West County.

Reclaimed water delivered to these areas will be distributed by additional local pipelines to irrigation systems operated by individual users.

Geysers Steamfield

This component will supply reclaimed water to the Geysers for injection into the geothermal steamfield. The intent is to reduce decline in steam production, prolonging the life and economic production of the steamfield and geothermal power plants it supplies.

This component includes two ~~1,000,000~~ <u>500,000</u> gallon storage tanks at the end of the transmission pipeline, distribution pipelines to convey water from the storage tanks to the Geysers injection wells, and conversion of 10 ~~to 15~~ existing geothermal wells to injection wells.

Agricultural Irrigation. *The acreage required for each alternative takes into account the water consumption rate for the climate and soils of the area.*

Geysers Steamfield. *Existing geothermal production wells will be converted for use as reclaimed water injection wells.*

Discharge.
The existing discharge outfalls, one of which is pictured here, would be used for Alternatives 1, 2, 3, 4, and 5B.

Discharge

Two discharge options are considered: new discharge at the Russian River and continued discharge into the Laguna de Santa Rosa from the existing storage ponds. A new outfall structure will be located on the east bank of the Russian River for the Russian River Discharge Alternative. No new construction will be required for Laguna discharge.

Cost Estimates

(Refer to Chapter ~~3.6~~ 3.4 in the Draft EIR/EIS.)

An estimate of major capital, operation, and maintenance costs for project alternatives (in 1995 dollars) was prepared at a planning level of detail, to allow a relative cost comparison among alternatives (see Table 1-2).

Cumulative Projects

(Refer to Chapter ~~3.7~~ 3.5 in the Draft EIR/EIS.)

Cumulative impacts were evaluated based on a cumulative project list. Cumulative projects are defined as those

Table 1-2.

Cost Estimates

	Alternative	Capital Cost[1] (1,000s)	Additional Annual Operation & Maintenance Cost (1,000s)
1	No Action (No Project)	0	0
2A	Tolay Extended	$312,300	$2,500
2B	Adobe Road and Lakeville Hillside	352,200	2,400
2C	Tolay Confined	353,300	2,600
2D	Sears Point and Lakeville Hillside	376,700	3,200
3A	Two Rock	246,400	1,600
3B	Bloomfield	282,700	1,700
3C	Carroll Road	243,500	1,800
3D	Valley Ford	251,500	1,800
3E	Huntley	253,900	1,700
4	Geyser, Recharge	208,300	6,700
5A	Discharge to Russian River	64,000	100
5B	Discharge to Laguna	46,400	0

[1]Capital costs include construction, engineering, and land costs.

past, present or reasonably foreseeable future projects with environmental impacts related to Project impacts. The cumulative Project study area is defined as the watersheds of water bodies potentially affected by one or more Project components: namely the Russian River, Petaluma River, Americano Creek, Stemple Creek, and Tolay Creek.

One potentially cumulative project is the City of Santa Rosa's 1996 update of its General Plan. Refer to Section 3.5 in Description of Existing System and Alternatives, for a discussion of this project.

Required Permits and Approvals

(Refer to Chapter ~~3.8~~ 3.6 in the Draft EIR/EIS.)

There are numerous potentially applicable federal, state, regional, county, and city permits required for the construction, maintenance, and operation of the Project. The Permitting Report (HBA November 1995) identifies permits and approvals to be obtained and timing of permit acquisition. *(Refer to Appendix D-5, Volume IV.)*

~~1.7 Areas of Controversy and Index of Key Issues to Be Resolved~~

1.7 Index—Including Areas of Controversy and Key Issues to Be Resolved

(Refer to the Scoping Report, Appendix U of the Draft EIR/EIS. This Appendix is not contained on the CD ROM.)

During the Scoping Phase described herein, environmental issues were identified for discussion in this EIR/EIS. The issues are listed below with the chapter or section reference.

Table 1-3.

Issues	Chapter/Section
Agricultural production value	4.18. Socio-economics
Air emissions	4.12. Air Quality
Archaeological resources	4.15. Cultural Resources and Paleontology
Area of Special Biological Significance	4.6. Surface Water Quality
Biological resources	4.8 Terrestrial Biological Resources, 4.9 Aquatic Biological Resources, and 4.10 Jurisdictional Wetlands Resources
Community Separators	4.1. Land Use and 4.14. Visual Resources
Earthquake-induced groundshaking and liquefaction	4.3. Geology, Soils, and Seismicity
Energy requirements	4.17. Energy
Erosion, regarding loss of soil productivity	4.2. Agriculture
Erosion, due to construction	4.3. Geology, Soils, and Seismicity,
Erosion, regarding streambank erosion due to discharge	4.4. Surface Water Hydrology
Fish and wildlife	4.8 Terrestrial Biological Resources and 4.9 Aquatic Biological Resources
Flooding due to dam failure	4.19. Inundation due to Dam Failure and 4.7. Public Health and Safety
Flooding due to discharge	4.4. Surface Water Hydrology
General Plan consistency	Each section
Groundwater	4.5 Groundwater
Growth inducing impacts	Chapter 5
Gulf of the Farallones National Marine Sanctuary	4.6. Surface Water Quality and 4.9. Aquatic Biological Resources
Hazardous waste sites	4.7. Public Health and Safety
Historical resources	4.15. Cultural Resources and Paleontology

(Continues)

of Williamson Act contracts (see Table 1-4). There is no mitigation available to reduce impacts from cancellation of Williamson Act lands to less than significant. At the same time, provision of reclaimed water for irrigation will have a beneficial impact on the amount of prime farmland in the study area, by raising the status of land to a more productive category as measured by the State Farmlands Mapping Program. However, the increase in acres qualifying as Prime Farmland cannot be estimated, because it is unknown which landowners may contract with the City for reclaimed water.

Construction of the Bloomfield and Huntley reservoirs (Alternatives 3B and 3E) will result in the cancellation of Williamson Act contracts for two adjoining properties remaining in private ownership after acquisition of the reservoir site, as the remainder of these parcels would be less than the minimum for such contracts. There is no mitigation available to reduce these impacts to less than significant.

Construction of pump stations will result in loss of prime farmland under Alternatives 2, 3, and 4. There is no mitigation available to reduce impacts from loss of prime farmland ~~or cancellation of Williamson Act contracts~~ to less than significant.

Agricultural irrigation will have a significant adverse impact on soil productivity due to erosion of topsoil; however, mitigation is available to reduce this impact to less than significant. The Project will not have a significant effect on soil productivity due to build up of trace elements or salts.

Geology, Soils, and Seismicity

(Refer to Chapter 4.3 of the Draft EIR/EIS.)

The Geology section analyzes issues related to slope stability, earthquakes (including ground rupture, shaking, liquefaction, and induced seismicity at the Geysers), and soil limitations such as corrosiveness and expansiveness. Unstable slope conditions present problems for some South County reservoirs, which will experience accelerated siltation. Unstable slopes will also affect the Geysers pipeline. Although all of the alternatives are potentially subject to strong ground shaking in an earthquake, these impacts can be avoided by constructing facilities according to requirements of the Division of Safety of Dams and building codes, and impacts are, therefore, less than significant. Liquefaction is a concern for the Russian River outfall and four pump stations common to both the South County and West County Reclamation alternatives, and the hazard can be mitigated to a level below significance.

The Geysers and urban irrigation pipelines cross an active fault. As a result, the Discharge Alternative is the only option not subject to the significant impacts associated with ground rupture. Geysers injection will cause a modest increase in induced seismicity, but impacts will be less than significant due to the small magnitude of the seismic events and the small increase in frequency of such events.

Some South County Alternative facilities will be subject to damage from expansive and corrosive soils, but these impacts can be mitigated. Erosion during construction will not be significant for any of the alternatives with implementation of appropriate erosion control plans.

Loss of Native Plant Communities at Reservoir Sites (acres)	Oak Woodland	Riparian Woodland	Native Grassland
Tolay Extended	0	7	25
Adobe Road	17	60	0
Tolay Confined	0	7	~~25~~ 24
Lakeville Hillside	0	11	0.6
Sears Point	~~0.6~~ 6.2	59	0
Two Rock	58	16	1
Bloomfield	0.6	10	0
Carroll Road	0	17	1
Valley Ford	1	9	0
Huntley	0	5	2

Table 1-5. *Sensitive native plant communities have undergone substantial reductions throughout California. Further loss due to the Project must be fully mitigated.*

would be constructed in accordance with requirements of the Division of Safety of Dams, and will therefore be expected to pose an insignificant risk to public safety from dam failure and resultant flooding.

Terrestrial Biological Resources

(Refer to Chapter 4.8 of the Draft EIR/EIS.)

The evaluation indicates that no endangered, rare, or threatened terrestrial species or their habitat will be affected by the Project. Many impacts will be avoided by measures adopted as part of the Project which require relocation of pipeline alignments, pump stations, and other facilities in response to sensitive biological resources. Also, measures included in the Project will require sensitive resources, such as oak woodlands and riparian woodlands in the agricultural irrigation areas, to be avoided.

The primary significant impact of the Project is loss of sensitive plant communities such as oak woodland, native grassland, and riparian woodland, through construction of storage reservoirs (see Table 1-5). These impacts will be mitigated through compensatory measures in the Sensitive Biological Resources Conservation Program and Revegetation Program.

A significant but mitigable impact is the loss of sensitive native plant communities due to the outfall structure required for the Russian River Discharge Alternative.

The combined impact of the Project and cumulative projects results in three new significant impacts: loss of hayfield tarplant and bristly linanthus populations at Two Rock and Huntley; loss of annual grassland for all the reclamation alternatives; and, increased ecological risk to fish-eating birds for alternatives discharging to the Laguna. Mitigation is provided for the plant population and ecological risk, but no feasible mitigation has been identified for the loss of annual grassland.

Aquatic Biological Resources

(Refer to Chapter 4.9 of the Draft EIR/EIS.)

The evaluation indicates that the only endangered, rare, or threatened aquatic species or habitat affected by the Project is the red-legged frog. There are two closely related subspecies of red-legged frog in the Project area. Northern red-legged frogs are a California Department of Fish and Game species of special concern. The California red-legged frog is federally-threatened.

The recent federal ruling establishing the status of California red-legged frog as federally-threatened provided the

Loss of Wetlands at Reservoir Sites
(acres)

Tolay Extended	248
Adobe Road	30
Tolay Confined	87
Lakeville Hillside	~~22~~ 24
Sears Point	53
Two Rock	~~62~~ 64
Bloomfield	57
Carroll Road	69
Valley Ford	102
Huntley	48

Table 1-6. *To meet the state and federal policies of no net loss of wetlands, all loss of wetlands will be fully mitigated.*

stream environment, resulting in significant impact. This impact will be mitigated through limitations on the timing of construction, careful revegetation, and restoration of the streambed.

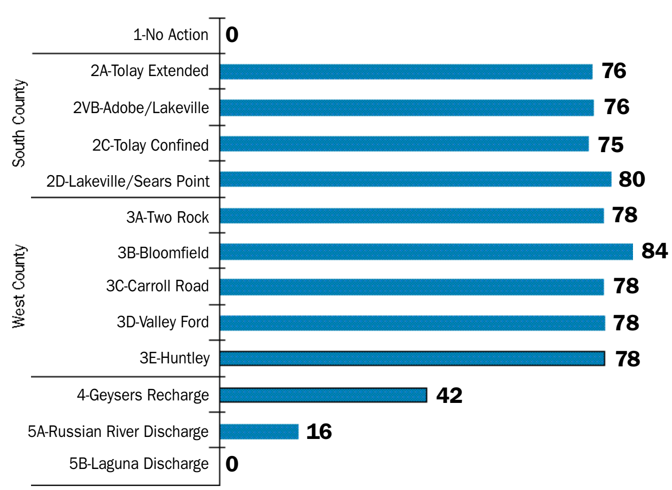
Transportation

(Refer to Chapter 4.11 of the Draft EIR/EIS.)

The Project will not generate significant traffic in the post-construction phase, and there are no permanent changes planned for the existing transportation network. Therefore, the transportation evaluation focuses on construction-related impacts. Many construction-related impacts have been avoided through Standard Traffic Control Procedures adopted as part of the Project. *(Refer to Measures 19–23 in Chapter 2.2 of the Draft EIR/EIS.)* These Procedures provide for notification and rerouting of emergency vehicles, management of lane closures and access, jack and bore construction for pipelines under high volume roadways and railroads, parking and road repair requirements, limitations on construction and delivery hours, transportation and encroachment permit requirements, and safety procedures.

Table 1-7. *If sensitive biological or visual resources or private improvements are located within the public right-of-way, pipeline construction may be moved into one lane of traffic to avoid impacts.*

Roadway Miles Affected by Pipeline Construction



Remaining significant traffic impacts will occur during the construction phase of all alternatives (except the Laguna Discharge Alternative, which involves no construction). Table 1-7 indicates how many miles of pipeline would need to be built within the public right-of-way for each alternative.

Lane closures for pipeline construction will delay traffic, delay transit services, restrict access, increase safety hazards, and reroute traffic, including emergency vehicles. Also, construction traffic will add vehicles and trucks to local roads, causing significant congestion.

Air Quality

(Refer to Chapter 4.12 of the Draft EIR/EIS.)

Construction of reservoirs associated with the West County and South County alternatives will generate emissions exceeding the point of significance for particulates (dust), nitrogen oxides, and carbon monoxide. Construction of the Geysers steamfield component will also cause short-term emissions of nitrogen oxides exceeding threshold levels. Although mitigation will reduce emissions, the impact would still be significant.

Operational emissions will not be significant for any of the alternatives. Increased emissions from the expansion of the headworks were determined to exceed trigger levels, but a screening-level risk analysis performed as part of a previous environmental analysis showed that toxic emissions will not exceed a cancer risk of one in one million, and will therefore not be significant. None of the Project components is expected to have significant odor impacts, but previous analysis of sludge handling facilities has shown that there may be significant odor problems associated with increased sludge production.

Noise

(Refer to Chapter 4.13 of the Draft EIR/EIS.)

All of the alternatives except the Laguna Discharge option will have significant temporary noise impacts associated with construction of pipelines, pump stations, and/or reservoirs. Noise from construction traffic, although temporary, will also be significant for the South County, West County, Geysers, and Russian River Discharge alternatives. Pump stations associated with the South County, West County, and Geysers alternatives will all have significant long-term operational impacts. Although mitigation will reduce noise levels, the increase in noise levels in rural areas will still be perceptible, and will be an unavoidable adverse impact.

Visual Resources

(Refer to Chapter 4.14 of the Draft EIR/EIS.)

Project impacts on visual resources were evaluated based upon the changes in views from public viewpoints (such as scenic corridors, designated scenic landscape units, roadways, parks, or recreation areas) up to three miles away, and from private residences up to 2,000 feet away. Significant impacts will occur along pipeline routes because of the strong visual contrast resulting from the disturbance of the landscape edge from grading and removal of vegetation.

Significant impacts occur at the reservoir sites due to one or more of the following: 1) strong contrast of the dam face with the surrounding landscape; 2) obstruction by the dam face of focal views of ridgelines and valleys; and 3) displacement of mature stands of trees. The pump stations will also have potential visual impacts due to their contrast with surrounding agricultural and rural environments, particularly in foreground views. These impacts will affect both public viewpoints and private residences.

Mitigation reduces the impacts related to visual contrast. However, there is no mitigation available for permanent view obstruction or displacement of mature stands of trees. Facilities at the Geysers, steamfield irrigation, and the discharge outfall on the Russian River will not result in significant visual impacts.

Table 1-13

Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
6.5.1. Dissolved oxygen. The storage reservoir component may cause numeric-based criteria to be exceeded.		⦿		⦿	⦿	⦿	⦿	⦿	⦿	⦿				2.5.3 Control program for hydrogen sulfide, ammonia, and dissolved oxygen.
6.5.1. Hydrogen sulfide. The storage reservoir component may cause numeric-based criteria to be exceeded.		⦿		⦿	⦿	⦿	⦿	⦿	⦿	⦿				2.5.3 Control program for hydrogen sulfide, ammonia, and dissolved oxygen.
6.5.3. Salinity, ammonia, dissolved oxygen, planktonic algae, benthic algae, and metals. The storage reservoir component may cause special-site criteria to be exceeded.						●	●	●	●	●				2.5.3 Control program for hydrogen sulfide, ammonia, and dissolved oxygen.~~No feasible mitigation has been identified.~~
6.7.1. Dissolved copper. Agricultural irrigation may cause numeric-based criteria to be exceeded.						⦿	⦿	⦿	⦿	⦿				2.5.2 Control ~~Pp~~program for D~~d~~issolved C~~c~~opper L~~l~~evels~~ in West County creeks~~.
6.7.3. Salinity, ammonia, dissolved oxygen, planktonic algae, benthic algae, and metals. The agricultural irrigation may cause the special site criterion to be exceeded.						●	●	●	●	●				2.5.1 Pesticide Control Program 2.5.2 Control Program for Dissolved Copper Levels.~~No feasible mitigation has been identified.~~
6.9.1. Conductivity. Discharge component may cause numeric-based criteria to be exceeded.												●		No feasible mitigation has been identified.
6.9.1. Cyanide. Discharge component may cause numeric-based criteria to be exceeded.	●												⦿	2.5.5. Cyanide Monitoring and Source Control Program
6.9.1. Dissolved oxygen. Discharge component may cause numeric-based criteria to be exceeded.													●	No feasible mitigation has been identified.
6.9.2. Algal growth. Design discharge component may cause narrative-based criteria to be exceeded.	●	●	●	●	●	●	●	●	●	●	●	●	●	2.5.4 Discharge Operations
6.9.2. Algal growth (beneficial) Discharge scenarios may cause narrative-based criteria to be exceeded.	+	+	+	+	+	+	+	+	+	+	+	+	+	None required.

Table 1-13

Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
7.8.2. The geysers steamfield component may expose workers or the public to hazards from a known hazardous waste site.											⦿			2.3.15. Construction Management Program
Terrestrial Biological Resources														
8.5.3. Storage reservoir component may cause loss of active raptor nest sites.		⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿				2.4.5. Active Raptor Nest Location and Monitoring Program
8.5.5. Storage reservoir component may cause loss of sensitive native terrestrial plant communities.		⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿				2.3.11. Sensitive Resource Conservation Program
8.9.5. Discharge component may cause permanent loss of sensitive native terrestrial plant communities												⦿		2.3.11. Sensitive Resource Conservation Program
8.2C. The Project plus cumulative projects may cause a loss of individuals of CNSPS List 2, 3, or 4 terrestrial plant species.						⦿				⦿				2.4.15. Sensitive Plant Translocation Program
8.4C. The Project plus cumulative projects may cause permanent loss of sensitive terrestrial wildlife habitat.		●	●	●	●	●	●	●	●	●				No feasible mitigation has been identified.
8.7C. The Project plus cumulative projects may result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation).	●	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿		⦿	2.4.16. Ecological Risk Monitoring and Source Control Program
Aquatic Biological Resources														
9.5.1. The storage reservoir component may cause loss of individuals or occupied habitat of endangered, threatened, or rare aquatic wildlife or plant species.		⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿				2.3.11. Sensitive Resource Conservation Program 2.4.4. California Red-legged Frog Capture and Relocation Program
9.5.3. The storage reservoir component may cause loss of potential or occupied habitat of aquatic species of concern.		⦿		⦿										2.3.11. Sensitive Resource Conservation Program

Table 1-13

Summary of Significant Impacts and Mitigation

	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		
Impact	**1**	**2A**	**2B**	**2C**	**2D**	**3A**	**3B**	**3C**	**3D**	**3E**	**4**	**5A**	**5B**	**Mitigation Measures**
Visual Resources														
14.4.1. The pipeline component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Community Separator Areas.		⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿			2.3.10. Limit construction disturbance.
14.4.2. The pipeline component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Scenic Landscape Units.		⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿		2.3.9. Adjust pipeline alignments. 2.3.10. Limit construction disturbance.
14.4.3. The pipeline component may be inconsistent with the Sonoma County or city General Plans regarding designated Scenic Corridors.		⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿		2.3.9. Adjust pipeline alignments. 2.3.10. Limit construction disturbance.
14.4.5. The pipeline component may cause adverse effects on foreground or middleground views from a high volume travelway, recreation use area, or other public use area.		⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	●	⦿		2.3.9. Adjust pipeline alignments. 2.3.10. Limit construction disturbance.
14.4.6. The pipeline component may cause an adverse effect on foreground or middleground views from one or more private residence.		⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿		2.3.9. Adjust pipeline alignments. 2.3.10. Limit construction disturbance.
14.5.2. The storage reservoir component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Scenic Landscape Units.			⦿											2.4.6. Screen concrete diversion channels, pump stations, and other facilities. 2.4.7. Establish tree screening. 2.4.8. Revegetate face of reservoir dam.
14.5.3. The storage reservoir component may be inconsistent with the County Open Space Element regarding Scenic Corridors.		●	●	●	●		●	●	●					2.4.6. Screen concrete diversion channels, pump stations, and other facilities. 2.4.7. Establish tree screening. 2.4.8. Revegetate face of reservoir dam.

Table 1-13

Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
14.5.5. The storage reservoir component may cause adverse effects on foreground or middleground views from a high volume travelway, recreation use area, or other public use area.			⊙		●		⊙			⊙				2.4.6. Screen concrete diversion channels, pump stations, and other facilities. 2.4.7. Establish tree screening. 2.4.8. Revegetate face of reservoir dam.
14.5.6. The Storage reservoir component may cause an adverse effect on foreground or middleground views from one or more private residences.		●	●	●	●	●	●	●	●	⊙				2.4.6. Screen concrete diversion channels, pump stations, and other facilities. 2.4.7. Establish tree screening. 2.4.8. Revegetate face of reservoir dam.
14.6.2. The pump station component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Scenic Landscape Units.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.
14.6.3. The pump station component may be inconsistent with the County Open Space Element regarding Scenic Corridors.		●	●	●	●	●	●	●	●	●	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.
14.6.4. The pump station component may be inconsistent with minimum building setbacks for structures along Sonoma County designated scenic corridors.		●	●	●	●	●	●	●	●	●	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.
14.6.5. The pump station component may cause adverse effects on foreground or middleground views from a high volume travelway, recreation use area, or other public use area.		●	●	●	●	●	●	●	●	●	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.
14.6.6. The pump station component may cause an adverse effect on foreground or middleground views from one or more private residences.		●	●	●	●	●	●	●	●	●	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.

Table 1-13

Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
15.7.1. The agricultural irrigation component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.18. Identification, evaluation, and avoidance of cultural resources.
15.7.2. The agricultural irrigation component may disturb unknown archaeological resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.12. Protect undiscovered cultural resource sites.
15.7.3. The agricultural irrigation component may disturb unknown vertebrate paleontologic resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.13. Protect vertebrate paleontologic resources.
15.8.1. The geysers steamfield component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.											⊙			2.3.18. Identification, evaluation and avoidance of cultural resources.
15.8.2. The geysers steamfield component may disturb unknown archaeological resources.											⊙			2.4.12. Protect undiscovered cultural resource sites.
15.9.2. The discharge component may disturb unknown archaeological resources.												⊙		2.4.12. Protect undiscovered cultural resource sites.
15.9.3. The discharge component construction may disturb unknown vertebrate paleontologic resources.												⊙		2.4.13. Protect vertebrate paleontologic resources.
Public Services, Utilities and Recreation														
16.1.1. The No Action Alternative may increase demand for public services such that accepted service standards are not maintained.	●													None.
16.4.2. The pipeline component may disrupt public services such that accepted service standards are not maintained.		⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~	⊙ ~~●~~		2.4.9. Construction Noise Control. 2.4.14. Coordinate fire response service.

Table 1-13

Summary of Significant Impacts and Mitigation

	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		
Impact	**1**	**2A**	**2B**	**2C**	**2D**	**3A**	**3B**	**3C**	**3D**	**3E**	**4**	**5A**	**5B**	**Mitigation Measures**
Energy														
17.8.1. The Geysers Steamfield ~~c~~Component may require more energy than providers can deliver.~~There are no significant impacts.~~											+			None Required.

REPLACEMENT PAGES

CHAPTER 2

MITIGATION AND MONITORING PROGRAM

2.1 COMPLIANCE WITH EXISTING PROGRAMS

This section presents the applicable federal, state, regional, county, and local policies and regulations that the Project components are required to comply with. Procedures for compliance with these policies and regulations are presented in the *Permitting Report* (Harland Bartholomew & Associates, Inc. 1995). Compliance with these policies and regulations, and future modifications thereof, is required, and will result in avoidance and/or minimization of adverse environmental impacts.

2.1.2 State

California Environmental Quality Act

California Endangered Species Act

California Clean Air Act

California Occupational Safety and Health Administration (Cal-OSHA)

California Department of Fish and Game Stream Bed Alteration Agreement (Fish and Game Code Section 1601-1603)

California Department of Fish and Game Wildlife/Hardwood Management Guidelines (Revised 1994)

California Division of Safety of Dams Permit

California Health and Safety Code, Section 25500 et seq. - Hazardous Materials Release Response Plans and Inventory

Native Plant Protection Act (Fish and Game Code Section 1900-1913)

Public Resources Code, Sections 5097.5 and 30244

Public Resources Code, Sections 5020-5024 (California Register of Historic Places)

Public Resources Code, Section 6301 et seq.

Public Resources Code, Section 6501 et seq.

Title 8, California Code of Regulations, Section 1539 - 1541.1 - Excavations

Title 8, California Code of Regulations, Sections 1539 - 1541.1 - Excavations

Title 8, California Code of Regulations, Sections 1509 & 3203 - Injury and Illness Prevention Program

Title 8, California Code of Regulations, Sections 1597 - 1599 - Vehicles, Traffic Control, Flaggers, Barricades, and Warning Signs

Title 8, California Code of Regulations, Section 5194 - Hazard Communication

Title 22, California Code of Regulations, Section 60301 et seq. - Reclaimed Water

Title 22, California Code of Regulations, Section 66260.1 et seq. - California Hazardous Waste Regulations

2.2.1 Irrigation Conservation and Management Programs

Description: The City of Santa Rosa will control the application of reclaimed water for agricultural uses and the types of agricultural lands eligible to receive reclaimed water through individual Irrigation Conservation and Management Programs (ICMPs). ICMPs will be prepared and implemented for every new agricultural irrigation site. The reclaimed water contracts between the City and the landowners shall require a commitment from the landowners to implement the ICMPs.

Each ICMP will contain measures which control the application of irrigation water and integrate irrigation with other resource management needs. At a minimum, the individual Irrigation Conservation and Management Programs prepared by the City of Santa Rosa will incorporate procedures and restrictions presented in Mitigation Measures 2.2.2 through 2.2.7. <u>The appropriate resource agencies will be allowed adequate time to review and comment on each ICMP prepared by the City of Santa Rosa.</u> Other guidelines for the development of individual Irrigation Conservation and Management Programs are provided in *the Irrigation Management Guidelines* Technical Memorandum (Questa 1996).

Alternative/Component: All Agricultural Irrigation Components

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** ICMPs will be developed prior to the delivery of reclaimed water to any parcel.

Complete: ICMPs will be updated annually, until the landowner no longer utilizes reclaimed water.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: Contracts between landowners and the City will require conformance to the ICMP. The City will maintain a copy of the current ICMP in their files. ICMPs will be reviewed annually for determination of compliance with the Long-term Wastewater Project Mitigation and Monitoring Program.

Water levels in fields may be closely monitored by the irrigator and irrigation scheduling adjusted accordingly.

Where monitoring indicates that drainage problems are developing, occasional summer fallowing (growing a dry-land hay crop, or crop with greatly reduced irrigation application) of problem parcels may be implemented.

Small scale drainage improvements (ditches and the drain systems) may be considered for portions of fields where the above management practices are insufficient to preclude localized development of drainage problems (wetlands are excluded).

Landowners with parcels comprised of Reyes soils may over-irrigate to maintain a high water content and anoxic conditions in the subsoils. However, no contingency (winter) irrigation will be allowed on Reyes Soils parcels. Landowners would ensure that surface ponding is avoided for purposes of mosquito control. Drainage ditches will also be closely monitored for mosquito control.

Drainage ditch water soils shall not be discharged until fall rainfall occurs in the Petaluma River watershed, because the rainfall runoff reduces salinity in the Petaluma River.

Landowners with parcels comprised of Reyes soils may apply lime to the soil to increase the pH. The lime application frequency would be established in the Irrigation Conservation and Management Program.

Alternative/Component: All Agricultural Irrigation Components

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Individual Irrigators/City of Santa Rosa Utilities Department

Timing: **Start:** During design of the agricultural irrigation system.

Complete: Throughout the life of the Project or until the landowner no longer utilizes reclaimed water for irrigation.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: To ensure that the listed Best Management Practices are successful in restricting surface runoff and subsurface flow, as stated in the performance criteria, the City will continuously monitor and record the volume of water delivered to each reclaimed water user and calculate the application rate. The City of Santa Rosa will also monitor evaporation and calculate evapotranspiration in each irrigation region. By monitoring these factors the City will be able to compare irrigation application rates and evapotranspiration to verify that the application of reclaimed water is being managed in accordance with the Irrigation Conservation and Management Program for each irrigation site. In addition, the City will establish continuous streamflow recording gauges at key watershed locations to characterize flow.

The City of Santa Rosa will develop a standard monitoring form/checklist for use by individual irrigators and the City will require that irrigators monitor all locations of potential runoff from sites daily to determine if surface runoff is resulting in overflow of the control facilities. The City will conduct spot checks of irrigators on at least a weekly basis to ensure that daily monitoring is occurring.

2.2.4 Restrict Soil Erosion and Sediment Movement (Irrigation Sites)

Description:

The City of Santa Rosa will require lands irrigated with reclaimed water be managed so that no net increase in sediment movement or soil erosion occurs over existing conditions. To ensure the sediment movement and soil erosion performance criteria are met, the City will implement the following Best Management Practices (unless expert opinion and studies indicate probable compliance with the performance criteria):

The City of Santa Rosa will place restrictions on the kinds of crops that can be grown using project reclaimed water, based on slope, to minimize the potential for soil erosion and sediment movement. These restrictions are:

> Slopes 0-5%: Eligible for reclaimed water with no crop choice restrictions or restrictions on urban irrigation application.
>
> Slopes 6-9%: Eligible for reclaimed water to grow irrigated hay, forage, and silage crops; orchards and vineyards (with cover crops); and permanent pasture. No restrictions on urban irrigation application.
>
> Slopes 10-15%: Eligible for reclaimed water to grow permanent irrigated pasture and orchards and vineyards (sprinkler irrigation and establishment and maintenance of a permanent cover crop required). No restrictions on urban irrigation application.
>
> Slopes 16%+: Ineligible for reclaimed water except for small areas within an existing area of flatter slopes.

Where sediment has the potential to reach a stream or other water body, the City of Santa Rosa will implement filter strips in accordance with design criteria and procedures outlined in US Department of Agriculture Conservation Reserve Program (CRP). Filter strips consist of strips of land located along stream courses or water bodies that are designed to passively filter sediment, nutrients and pesticides from runoff water. Where sediment has the potential to reach a stream or other water body and the riparian corridor associated with the site is unsuitable for filter strips according to CRP guidance, the City of Santa

Rosa shall impose additional land management restrictions as necessary to avoid increased sediment transport to the creek. Such additional restrictions could include but are not limited to crop selection, cover crop requirements, and pasture management (stocking rates, plant residue requirements, cross-fencing, and rest-rotation schedule).

For irrigated pastures on slopes ranging from 10 % to 15 %, the Irrigation Conservation and Management Program will include a pasture management plan that may provide for, but not be limited to, cross-fencing to provide for post-irrigation dry-down period, proper stocking rates and grazing periods, maintenance of correct amount of plant residue, and rest-rotation or other similar management. Rest-rotation management requires that animals are regularly rotated through fields allowing a period when pastures are irrigated, dried down and regrown (rested) between grazing.

Alternative/Component: All Agricultural Irrigation Components

Lead Agency: City of Santa Rosa Utilities Department

Irrigation Areas

The City will meet the following irrigation-related setbacks and buffer objectives. These objectives may be altered if future studies conducted by the City should verify that lesser buffer widths are adequate to avoid impacts:

> A minimum 50-foot setback from irrigation application and a minimum 30-foot setback from new cultivation and construction around any identified sensitive plant species habitat.
>
> No activity within the dripline of protected trees.
>
> A minimum 30-foot setback from construction, new cultivation or irrigation application from jurisdictional wetland boundaries or the top of the bank of linear waterways (including isolated wetlands, excluding irrigation ditches and excavated drainages).
>
> A minimum 50-foot setback from irrigation application ~~and new cultivation~~ around the upland riparian corridor (outer most dripline) of all linear waterways, including streams, creeks, and rivers. All linear waterways passing through irrigated pasture lands will be fenced to prevent livestock from accessing the stream corridor.
>
> A minimum 100-foot setback from the edge of upland riparian corridors and jurisdictional wetlands from construction (including staging areas) and cultivation.
>
> A minimum 500-foot setback from irrigation application, new cultivation, or construction around all known breeding sites of state or ~~of~~ federally-listed, proposed or candidate avian or amphibian species, including any active raptor nest-sites.
>
> A minimum 500-foot setback from irrigation application, new cultivation, or construction around all known dens of state or ~~of~~ federally-listed, proposed or candidate mammalian species (none are currently identified in the Project area).

Restoration procedures for gullied lands, irrigation ditches, and excavated drainages. These procedures may include, but not be limited to: fencing (10-foot setback fence) and stabilization/restoration, such as installing check dams and willow cuttings.

Pipelines, Pump Stations, Geysers Storage Tanks, and Staging Areas Design

The pipelines, pump stations, geysers storage tanks, and staging areas will be sighted to avoid impacts to sensitive resources. The following siting criteria will be employed to ensure avoidance of these resources:

The designated construction zone for pipelines, pump stations, geysers storage tanks, and staging areas will be designed to provide an exclusionary buffer from sensitive plant resources (recommend a minimum 30-foot).

The City of Santa Rosa will design pipeline stream crossings that are oriented as close to perpendicular (90 degree angle) as practicable.

Pipeline construction corridors shall be limited to 30 feet from the roadway centerline. Pipeline alignments will be designed to minimize damage to roadside trees by placing pipes within the disturbed area of the road (i.e., pavement, shoulder, or ditch) when practical.

The City of Santa Rosa shall consult with the appropriate resource agencies to determine the suitable setbacks necessary to avoid impacts to sensitive species identified on page 2-28 of this document.

Where potential jurisdictional wetlands and waters of the United States or riparian areas parallel existing roadways and no bridge or culvert structure is crossed, pipeline construction activities shall be confined to ~~within 10 feet of the roadway centerline or the existing road right-of-way~~ the disturbed areas within the right-of-way (i.e., the pavement, shoulder, or ditch) or nearby suitable upland location, and shall not be located within wetlands or other sensitive biological resource areas. Furthermore, all reasonable effort shall be made to locate the pipeline so as to minimize the impact on traffic flow and pavement.

Postpone grading of the right-of-way through riparian zones or wetlands until in-stream work is ready to commence.

Limit grading to the minimum area necessary to allow for movement of construction machinery and subsequent ditching and pipe installation operations.

Cut vegetation off at ground level, leaving existing root systems intact.

The City of Santa Rosa will design pipelines that cross perennial streams to be constructed using jack and bore. Additional staging areas would be required for bore and jack crossings. Additional temporary workspace for staging or pad area for bore and jack crossings shall be limited to a maximum 5,000 square foot pipeline construction staging area, typically 50' by 100'. Pads for bore and jack operations and construction staging areas for pump stations and geysers storage tanks shall be located outside of the limits of potential jurisdictional wetlands and other waters of the United States and riparian or native vegetation.

The following stream and estero crossings will use jack and bore (crossings are identified by stream or estero name and approximate location of pipeline crossing):

Big Sulphur Creek - Geysers property
Cobb Creek - Geysers property
Squaw Creek - Geysers property
Anna Belcher Creek (or tributary) - Pine Flat Road
Anna Belcher Creek - Pine Flat Road
Hurley Creek - Pine Flat Road

a construction area with a clear-cut "swath" appearance. Cleared vegetation, tree trimmings, and other plant material are either chipped and composted on-site or taken to a compost processing facility. Plant material will not be: buried, pushed into a creek or stream; left in the roadway; disposed of in trash dumpsters; or mixed with other wastes (except as authorized by an approved compost facility).

Construction specifications will prohibit stockpiling materials or parking equipment on undisturbed ground within the driplines of trees within the right-of-way.

Where pipeline construction crosses a seasonal stream, the City of Santa Rosa will regulate timing of construction to ensure that no construction occurs in a live stream. See *Wetland Determination and Mitigation for Proposed Pipeline Alignments* Technical Memorandum (Parsons Engineering Science, Inc. 1996) for additional detail on identified sites. Construction in a seasonal stream will be scheduled during the low flow period generally from June 1 through October 15.

For streams crossed by pipelines using open trench construction, the top layer of the streambed will be stockpiled and preserved during construction. After the pipeline has been installed, the stockpiled material will be placed back in the streambed to minimize the potential for sediment to be suspended when rainfall creates streamflow, and to return the streambed substrate to its original composition.

Construction of a Russian River outfall will be restricted to the low flow period when the water level is below the construction area (generally between June 1 and October 15).

Construction around or involving protected trees will follow standards adopted by the Sonoma County (Tree Protection and Replacement Ordinance), Marin County (Draft Tree Preservation Plan) and the City of Santa Rosa. These ordinances establish standards for "protected" (oaks, madrone, redwood, and California bay) and "protected trees of special significance" (valley oak). These standards are as follows:

Protected trees, their protected perimeters and whether they are to be retained or removed are to be clearly shown on all improvement plans. A note will be placed on the construction plans that 'Construction is subject to requirements established to protect certain trees'.

Before the start of any clearing, excavation, construction or other work on the site, every tree designated for protection on the approved site plan will be clearly delineated with a substantial barrier (steel posts and barbed wire or chain link fencing) at the protected perimeter, or limits established during the permit process. The delineation markers will remain in place for the duration of all work.

When it is necessary to limb trees, prune branches, or prune roots within the right-of-way, work will be conducted by a certified arborist in accordance with accepted aboricultural practices, including the pruning standards published by the California Department of Forestry (Coast Region). This work shall occur only as a means of protecting trees from damage or removal.~~Limbing of trees is to be conducted by a certified arborist and only when necessary as a means of protecting the tree from damage or removal.~~

All trees to be removed will be clearly marked. Where feasible, trees and shrubs will be salvaged for replanting in temporarily disturbed areas. Where proposed development or other site work must encroach upon the protected perimeter of a protected tree, special measures will be incorporated to avoid compaction and allow the roots to obtain oxygen, water, and nutrients. Tree wells or other techniques may be used where advisable. No changes in existing ground level will occur within the protected perimeter unless a drainage and aeration scheme approved by a certified arborist is utilized. No burning or use of equipment with an open flame will occur near or within the protected perimeter (except for authorized controlled burns).

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** Design measures. During component design. Construction Measures. At the start of construction. Irrigation buffers will be maintained until the landowner no longer utilizes reclaimed water for irrigation.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: Irrigation setbacks and buffers will be incorporated into each ICMP during the preparation of each ICMP. The City will review Final Engineering Drawings and ICMPs to verify that appropriate setbacks and buffers have been established to protect sensitive biological resources.

2.2.6 Agrochemical and Fertilizer Best Management Practices

Description: The City of Santa Rosa will require that individual Irrigation Conservation and Management Programs incorporate State Water Resources Control Board Technical Advisory Committee management recommendations for Irrigated Agriculture and Pesticides to minimize offsite movement of pesticides. These include, but are not limited to, the following:

> Control pollutants at their source through the verification of the need and amount of pesticides and fertilizer through soil and plant tissue testing, utilization of Integrated Pest Management procedures, utilization of the least toxic, least soluble, least persistent agrochemical, and careful evaluation and application of the lowest amount of agrochemical that will achieve the management goal.
>
> Reduce the mobilization of pollutants through control of soil erosion, irrigation runoff, and subflow.
>
> Capture pollutants that are mobilized through the utilization of vegetated filter strips and grassed waterways and the utilization of on-farm sediment detention structures where necessary. Detention structures will be placed outside of buffers for sensitive biological resources.
>
> Utilize, dilute, detoxify, or dispose of excess pollutants correctly through proper handling (mixing and storage) and disposal practices.

The City of Santa Rosa will require that all individual Irrigation Conservation and Management Programs for irrigated pasture lands will have a nutrient and manure management component that takes into account the individual problems and needs for disposal of solids and liquid wastes. This component of the Irrigation Conservation and Management Program will be based on the knowledge and experience gained by the Resource Conservation Districts in part from their 319H Manure Management Implementation Grant from the State Water Resources Control Board.

Alternative/Component: All Agricultural Irrigation Components

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** During development of the ICMPs. The City will conduct spot-checks at least once a month to ensure that landowners are implementing the nutrient and manure management component of the ICMP and using State Water Resources Control Board Technical Advisory Committee management recommendations for Irrigated Agriculture and Pesticides.

Complete: Throughout the life of the Project or until the landowner no longer utilizes reclaimed water for irrigation.

2.2.8 Revegetate Temporarily Disturbed Sites

Description:

The City will implement a Revegetation Program that will revegetate all sites disturbed or scarred by construction activities. The Revegetation Program will require the following:

Streams and other Waters of the U.S.

1. Remove any sediments deposited in stream channels due to construction activities.

2. Restore original contours and drainage patterns.

3. Implement immediate stream bank stabilization measures such as revegetation with willow wattles at woody crossings and covering disturbed herbaceous stream banks with a biodegradable fiber (jute) cloth or coconut fiber rolls or another similar erosion control fabric.

4. Collect <u>native</u> seed stock or cuttings for any riparian revegetation as near to the stream crossing as possible (taking into consideration microclimate and time of year for propagation) and preferable from vegetation removed at the stream crossing.

5. Limit artificial seeding and avoid use of soil amendments such as lime or fertilizers.

6. Encourage natural regeneration of native herbaceous vegetation from surrounding areas/wetlands.

7. Spread a cover of straw, rice straw if available, over all areas of disturbed soils and use a straw punch to work into soil.

8. Apply an organically based tackifier on disturbed areas to reduce air and water erosion of soils.

Upland Sites

1. Upon completion of construction of a Project component, the construction manager shall restore the site to pre-existing topographic features. In those cases where full restoration is not possible, graded contours shall be rounded to emulate the natural landforms of the adjacent area.

2. The Revegetation Plan shall provide measures to ensure that trenching scars associated with pipeline construction are revegetated with drought tolerant plant species common to the disturbed area. <u>The specifics of the Revegetation Plan (i.e., species, sizes, planting locations, and maintenance) shall be determined when the construction plans are submitted to the County as part of the encroachment permit application process.</u>

3. Seed material of woody and herbaceous plants shall be collected from the construction corridor and/or adjacent undisturbed vegetation during a suitable season for each group of plants.

Potted plant materials will be used to replace woody vegetation (i.e., trees and shrubs).

4. Dried seed material collected as specified earlier shall be applied evenly to the finish-graded topsoil surface. Seed material shall be used on the construction site from which it was collected.

Monitoring

1. Revegetated areas shall be monitored annually for a minimum of five years following construction.

2. Performance and monitoring criteria will specify a minimum of 80% survival rate that must be reached at the end of the first five-year period for the mitigation to be considered successful. Eighty-percent survival ensures that no net loss of habitat function and value occur due to the mitigated project. Annual reports will include measures to be implemented to remediate the previous year's failures including replacement planting. These measures shall be implemented in accordance to the direction provided in the annual reports.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa/U.S. Army Corps of Engineers

Implementing Agency: City of Santa Rosa and construction manager

Timing: **Start:** During construction of Project components. Revegetation along pipeline segments will commence immediately after backfilling and compacting of trenches.

Complete: Revegetation will be completed within one year of completion of a Project component. Monitoring reports should be submitted annually to the Corps, the California Department of Fish and Game, and any other responsible agency for at least five years or until it is demonstrated that success criteria have been met.

Monitoring Agency: City of Santa Rosa

Validation: Review annual reports beginning with end of first growing season following construction. Conduct field monitoring on yearly basis or as deemed appropriate. Review annual reports and conduct monitoring annually for five years.

2.2.15 Standard Traffic Control Procedures

Description:	Prior to construction of a Project component, the City of Santa Rosa will implement standard traffic control measures to avoid potential impacts to roads and traffic congestion. The City of Santa Rosa will also obtain all necessary Encroachment and Transportation Permits from the appropriate agencies. At a minimum, the procedures to be implemented by the City of Santa Rosa will contain Measures 2.2.16 through 2.2.24, discussed below.
Alternative/Component:	Alternatives 2, 3, 4, and 5a
Lead Agency:	City of Santa Rosa Utilities Department
Implementing Agency:	City of Santa Rosa Utilities Department
Timing:	**Start:** During construction of each Project component.
	Complete: Implementation will continue throughout construction.
Monitoring Agency:	City of Santa Rosa Utilities Department
Validation:	The City will comply with this measure prior to starting construction of a Project component.

2.2.17 Maintain Maximum Number of Open Lanes on Roadways

Description: Where Project construction occurs in or along roadways, the maximum number of through traffic lanes will be kept open. A minimum of one lane of through traffic will be maintained at all times.

Where single-lane, one-way operation is required, the construction manager will mark construction zones and provide traffic control in accordance with Caltrans "Manual of Traffic Controls for Construction and Maintenance of Work Zones" (Caltrans 1990). This will include, but not be limited to, appropriate signage marking all construction zones and flag persons or electronic signal control at each end of the restricted lanes.

Where construction of an open trench requires closure of the road, temporary bypass roads may be built within the construction right-of-way allowing temporary access.

Where temporary road closure is necessary, a temporary road closure plan will be developed by the construction manager and submitted to, and approved by, the Traffic Engineer of the affected jurisdiction, at least four weeks prior to scheduled road closure. The temporary road closure plan will include:

Road name and closure location
Duration of road closure
Length of road to be closed
Alternate detour routing
Notification of local fire and police departments

Prior to construction of a Project component, the City of Santa Rosa will implement standard traffic control measures to avoid potential impacts to roads and traffic congestion. The City of Santa Rosa will consult with the County of Sonoma Department of Transportation and Public Works (DTPW) staff and other affected agencies regarding site-specific details of the alternative selected prior to the preliminary design stage including construction drawings. The City of Santa Rosa will identify feasible alternative routes and minimize secondary congestion or hazards on roads on the alternative routes.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department and Construction Manager

Timing: **Start:** Road closure plans will be submitted at least four weeks prior to scheduled closure.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will comply with this measure prior to starting construction of a Project component.

2.2.21 Repair Road Damage

Prior to construction, the City of Santa Rosa will consult with the County of Sonoma Department of Transportation and Public Works (DTPW) staff and other affected agencies regarding site-specific details of the alternative selected prior to the preliminary design stage including construction drawings.~~Prior to construction, the City of Santa Rosa will survey and videotape the condition of all roads scheduled to have construction on or adjacent to them.~~ The survey will identify road name, length, and width; surface type and condition; and shoulder surface type and condition.

Within one year of completion of construction, roads damaged by construction traffic or pipeline construction will be repaired to a condition equal to or better than that which existed prior to the construction activity.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** Prior to construction of a Project component. The City of Santa Rosa will review the road survey prior to authorizing construction along roads.

Complete: Within one year after completion of construction of a Project component.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will complete road repairs within one year of completion of construction of a Project component. The City will demonstrate compliance with this measure by videotaping the conditions of all roads where construction activities occurred.

2.2.28 Control of Light and Glare at Pump Stations

Description: The City will specify installation of shielded low-intensity outdoor lighting at all pump stations, and will also install controls which will provide for non-continuous operation of the lighting.

Lighting at the pump stations will be turned on only on an "as needed" basis while monitoring and maintenance is being performed and when access to the building is necessary. Operational criteria for the pump stations will include instructions which limit the use of lighting to the conditions specified above.

Lead Agency: City of Santa Rosa Public Utilities Department

Implementing Agency: City of Santa Rosa Public Utilities Department

Timing: **Start:** Design Phase of the Project.

Complete: Throughout the life of the Project or until operation of the pump station ceases.

Monitoring Agency: City of Santa Rosa Public Utilities Department

Validation: The design of the lighting will be verified during the review and certification of Final Engineering Drawings. The City will check compliance with installation of the specified lighting and controls during regular inspections of construction. The City will monitor conformance with the operational criteria as part of regular reviews of operation procedures.

2.3.1 Replacement of Open Space Easements

Description: The City shall contribute funds to the Sonoma County Agricultural Preservation and Open Space District as compensation for land acquired for Pump Station G3. The City's cash contribution shall be equal to the value of the land acquired for the pump station based upon the open space character and natural resource value of the land. All moneys contributed by the City shall be utilized in accordance with the Sonoma County Open Space Expenditure Plan.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
1.6.2. The pump station component may convert public open space for Project facilities.	Alt 4 - Less than Significant

Alternative/Component: Alternative 4

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Upon certification of EIR.

Complete: Prior to the beginning of construction.

Monitoring Agency: City of Santa Rosa and Sonoma County Agricultural Preservation and Open Space District

Validation: A Memorandum of Agreement shall be signed between the City and the District prior to the beginning of pump station construction consequent losses) on jurisdictional wetlands and other waters of the U.S.; with the following exceptions:

- Restoration of cropland to natural wetland habitat conditions, coupled with permanent protection under a conservation easement, will be regarded as habitat creation.

- Where substantial and verifiable lateral expansion of existing wetland habitat along drainage systems can be demonstrated to result from mitigation actions, credit for habitat creation may be deemed to have occurred.

Mitigation Opportunities

There are a variety of opportunities for habitat and community creation, restoration and preservation in Sonoma and Marin counties. Each of the 10 reservoir sites evaluated in this EIR/EIS provide opportunities to implement this measure. Other opportunities are identified in the *Mitigation for Wetlands and Waters of the U.S. for Proposed Reservoir Site* and include:

- Santa Rosa Plain;
- Vernal Pool Preservation Plan;
- Laguna de Santa Rosa;
- Stemple Creek Enhancement Plan; and
- Sonoma Baylands Enhancement Plan~~Sonoma Bay Trust Preservation Plan~~.

Table 2.3-1

Protected or Sensitive Biological Resources Potentially Impacted through Reservoir Construction and Maintenance

Protected or Sensitive Resource	Mitigation Ratios[1]			Target Habitat/Community
	Creation	Restoration	Preservation	
Oak Woodland/ Oak-Bay-Madrone Woodland[2]	1:1	1.5:1	2:1	Oak Woodland/ Oak-Bay Madrone Woodland[2]
Native Grassland[2]	1:1	2:1	3:1	Native Grassland[2]
Riparian Woodland/Coolwater B Stream[2]	1:1	2:1	3:1	Riparian Woodland/Coolwater A or B Stream/Red-legged Frog Habitat, Steelhead Trout Habitat, And NW Pond Turtle Habitat[2]
Riparian Woodland/Warmwater A Stream/Red-legged Frog Habitat And NW Pond Turtle Habitat[2]	1:1	2:1	3:1	Riparian Woodland/Warmwater A Stream/Red-legged Frog Habitat And NW Pond Turtle Habitat[2]
Non-wooded Riparian/Warmwater B Stream[2]	-	2:1	-	Riparian Woodland/Warmwater A Stream/Red-legged Frog Habitat And NW Pond Turtle Habitat[2]
Fresh Water Marsh[2]	1:1	2:1	3:1	Fresh Water Marsh[2]
Freshwater Ponds/Red-legged Frog And NW Pond Turtle Habitat[2]	1:1	2:1	3:1	Fresh Water Marsh/Red-legged Frog And NW Pond Turtle Habitat[2]
Freshwater Seep Wetlands Or Other Waters Of The U.S.[2]	-	2:1	3:1	Fresh Water Marsh[2]
Seasonally Wet Vegetation Wetlands	1:1	2:1	3:1	Seasonally Wet Vegetation Wetlands
Cropped Wetlands Or Other Waters Of The U.S.[2]	-	2:1	-	Seasonally Wet Vegetation Wetlands
Drainage Wetlands Or Other Waters Of The U.S.[2]	-	2:1	-	Riparian Woodland/Warmwater A Stream
Annual Grassland Wetlands Or Other Waters Of The U.S.[2]	-	2:1	-	Seasonally Wet Vegetation Wetlands
All other Wetlands Or Other Waters Of The U.S.[2]	-	2:1	-	Riparian Woodland/Warmwater A Stream

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
1. Subject to change at the discretion of the U.S. Army Corps of Engineers.
2. Resource may contain Corps jurisdictional wetlands or other waters of the U.S.

Table 2.3-2

Sensitive Biological Resources and Managing Agency

Sensitive Resource	Managing/Responsible Agency
Oak woodland	CDFG, Sonoma and Marin Counties
Riparian woodland	CDFG
Native grassland	CDFG
Fresh water marsh	USFWS, CDFG, Corps
Aquatic stream and pond habitat	USFWS, CDFG, Corps
California red-legged frog habitat	USFWS, CDFG
Northern red-legged frog habitat	CDFG
Northwestern pond turtle habitat	CDFG
Steelhead trout habitat	NMFS
Other Corps jurisdictional wetlands and other waters of the U.S.	Corps, CDFG, USFWS

Source: Harland Bartholomew & Associates, 1996

Identification, Selection and Purchase of Mitigation Site(s)

The City of Santa Rosa shall compile a database of available mitigation opportunities and conduct feasibility studies to evaluate available properties for potential watershed enhancement and restoration. The following site attributes will be considered in the feasibility study:

1. High potential for long-term restoration success;
2. Biological resources of the mitigation site(s) currently or historically;
3. Adequate aerial extent; proximity to impact area;
4. Proximity to other restoration and/or preservation projects;

defined in the *Mitigation for Wetlands and Waters of the U.S. for Proposed Reservoir Sites* (Parsons Engineering Science, Inc. 1996b).

Impacts Mitigated and Mitigation Level:

Impacts Mitigated	Level of Significance After Mitigation
8.5.5 The storage reservoir component may cause loss of sensitive native terrestrial plant communities.	Alts 2 and 3 - Less than Significant
8.5.7 The discharge component may cause permanent loss of sensitive native terrestrial plant communities.	Alt 5a - Less than Significant
9.5.1 The storage reservoir component may cause loss of individuals or occupied habitat of federally listed, proposed, or candidate aquatic wildlife or plant species.	Alts 2a, 2b, 2c, 2d, and 3c ~~3a, 3b, 3d and 3e~~ - Less than Significant
9.5.3 The storage reservoir component may cause loss of potential or occupied habitat of aquatic species of concern.	Alts 2a, ~~and~~ 2c, 3a, 3b, 3d, and 3e - Less than Significant
9.5.4 The storage reservoir component may cause permanent loss of sensitive aquatic plant communities and associated wildlife habitats.	Alts 3a - Less than Significant
9.5.5 The storage reservoir component may result in loss of aquatic habitat.	Alts 2 and 3 c ~~a~~ - Less than Significant
9.5.8 The storage reservoir component may cause a change in streamflows, affecting aquatic habitat or aquatic life downstream from proposed dam sites.	Alts 2, 3b, 3c, and 3d - Less than Significant
10.5.1 The storage reservoir component may destroy wetlands or other waters of the U.S.	Alts 2 and 3 - Less than Significant
10.9.1 The discharge component may destroy wetlands or other waters of the U.S.	Alt 5a - Less than Significant

Alternatives/Component: Alternatives 2, 3, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Immediately following construction**.**

Complete: After five years or when performance criteria are met. Note that woodland habitat restoration may require up to 15 years of monitoring to ensure compliance with performance criteria.

Monitoring Agency: City of Santa Rosa, California Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Army Corps of Engineers

Table 2.3-3

Sensitive Biological Resources Identified at Storage Reservoir Sites

Storage Reservoir Site	Oak Woodland Habitat (acres)	Native Grassland (acres)	Mixed Riparian (acres)	Willow Riparian (acres)	Non-wooded Riparian (acres)	Red-legged Frog Habitat[1] (acres)	Jurisdictional Wetlands (acres)	Cool-water Habitat (linear feet)	Warm-water Habitat A (linear feet)	Warm-water Habitat B (linear feet)	Pond (acres)
West County											
Bloomfield	0.6	0.0	1.0	8.7	13.6	2.7	57.4	0.0	0	14,500	1
Carroll Road	0.0	1.0	0.0	17.4	1.1	0.0	68.9	2700	3,400	6,900	3
Huntley	0.0	2.0	1.1	3.5	2.6	1.5	48.3	0	4,100	7,000	>1
Two Rock	58.3	1.3	8.3	7.4	3.0	8.7	61.8	350	6,000	7,700	3
Valley Ford	1.0	0.0	0.0	9.0	3.2	3.4	101.5	0	5,300	4,000	3
South County											
Adobe Road	16.9	0.0	60.2	0.0	3.9	0.0	30.3	0	0	7000	3
Lakeville Hillside	0.0	0.6	0.0	10.6	8.0	1.4	21.6	0	0	10,100	1
Sears Point	6.2	0.0	43.7	15.4	6.4	1.6	52.6	0	5,200	13,100	<1
Tolay Extended	0.0	25.0	4.4	2.4	19	4.8	247.6	0	1,850	27,300	1
Tolay Confined	0.0	23.9	4.4	2.6	18.9	4.8	86.9	0	1,850	12,500	1

Source: Harland Bartholomew & Associates, 1996

Notes:
1 = Either California red-legged frog or northern red-legged frog depending upon geographic location.

2.3.12 Provide Replacement Water Supply for Affected Wells

Description:

Prior to reservoir construction the City shall conduct a comprehensive well survey and hydrogeologic study at the selected reservoir site. This study shall include the following:

The City shall contact all property owners by mail and collect information about water sources and uses. A field check of all residential properties shall be conducted to accurately identify the location of all domestic wells. Detailed well location, well yield, and water source information shall be collected. All wells identified during the well survey that are located within the reservoir footprint should be properly abandoned under a permit issued by the Well and Septic Section of Sonoma County's Permit and Resource Management Department.

All wells identified during the well survey that are located within the reservoir footprint shall~~would~~ be properly abandoned under a permit issued by the Well and Septic Section of Sonoma County's Permit and Resource Management Department.

A qualified California Certified Hydrogeologist shall be retained to prepare a detailed, site-specific hydrogeologic investigation of the subbasin of the selected reservoir. This investigation shall serve to verify assumptions used in the groundwater impact evaluation, in Section 4.6 of this EIR/EIS, and to refine the location of the 20 percent or greater contribution zone.

The study shall include installation of an aquifer test well and a minimum of three observation wells located down gradient of the dam and upgradient of the nearest water supply well.

Upon completion of the aquifer tests, all wells shall be maintained as groundwater monitoring wells.

The City shall begin quarterly groundwater monitoring a minimum of one year prior to reservoir construction ~~filling~~ to establish baseline conditions. Nitrate concentrations shall be measured quarterly in all monitoring wells and compared with baseline measurements.

Should data from the monitoring wells indicate a substantial increase in nitrate levels or exceedance of the MCL of 10 mg/L (where background nitrate levels did not exceed MCLs) that would affect nearby private water supply wells, the City shall:

Develop and provide a replacement water supply for any affected drinking water uses within the 20 percent or greater contribution zone, and in any other areas where nitrate levels exceed the MCL. Replacement water would be provided by a water pipe that would originate at the Laguna Wastewater Treatment Plant. This pipe would be installed at the time of construction, and would occupy the same trench as the reclaimed water pipe from the treatment plant to the reservoir. Potable water pipelines from the reservoir to users would be installed in the same trench as the reclaimed water distribution lines serving irrigation areas. Pipes would be installed with adequate vertical and horizontal separation between potable water and reclaimed water lines to insure that the potable water would be protected. Except as permitted by Sonoma County, t~~T~~he City will limit the service to existing drinking water users in the affected area, and number of users served, the volume of water replaced, and the size of the pipes shall be based on projected water quality impacts at individual wells.

~~and approval of applicable zoning laws. Because the pipeline would be connected to the City's water supply, only City approval would be required for hook-ups~~ The City has an adequate water supply to ensure this measure is feasible.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
Impact 5.5.1 The storage reservoir component may degrade groundwater quality at existing wells, resulting in a public health hazard.	Alts 2 and 3 - Less than Significant
Impact 5.5.2 The storage reservoir component may degrade groundwater quality at future drinking water wells, resulting in a public health hazard.	Alts 2 and 3 - Less than Significant
Impact 7.5.1 The storage reservoir component may expose the public to chemicals, radionucliides, or pathogens at concentrations detrimental to human health..	Alts 2 and 3 - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** The City shall begin the well survey and hydrogeologic study at least one year prior to reservoir construction to establish baseline conditions. Quarterly groundwater sampling and nitrate analysis shall begin one year prior to construction ~~filling~~ of the reservoir.

Complete: Quarterly groundwater sampling and nitrate analysis shall continue throughout the life of the Project or until all drinking water supplies in affected area have been replaced.

Monitoring Agency: City of Santa Rosa

Validation: The City shall conduct an annual review of the groundwater monitoring program throughout the life of the Project unless all drinking water supplies in affected area have been replaced.

2.3.13 Monitor Groundwater Levels and Provide Replacement Water Supply

Description: The City shall monitor the water level of all groundwater wells screened in alluvium that are down gradient from the selected reservoir and within the subbasin. If access can not be obtained to monitor existing wells, then the City shall install several monitoring wells at the nearest upgradient location. Monitoring should begin one year prior to reservoir construction.

Should water level monitoring indicate that water supply wells may become unproductive as a result of reduced upgradient inflows (not because of seasonal drought conditions) the City shall provide a replacement water supply discussed under Measure 2.3.12.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Mitigation Level
Impact 5.5.1 The storage reservoir component may lower groundwater levels at existing wells.	Alts 2 and 3 - Less than Significant
Impact 5.5.2 The storage reservoir component may lower groundwater levels in areas that could have been developed for future water supply.	Alts 2 and 3 - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Monitoring shall begin one year prior to ~~filling the~~ reservoir construction.

Complete: Monitoring shall be conducted annually until data indicates that wells would not be affected or when a replacement water supply has been provided for all affected wells.

Monitoring Agency: City of Santa Rosa

Validation: The City shall conduct an annual review of the groundwater monitoring program throughout the life of the Project, unless all drinking water supplies in affected area have been replaced.

2.3.15 Construction Management Program

Description:

At the conclusion of the design phase, the City of Santa Rosa and the construction manager shall implement a Construction Management Program (Program). To avoid or minimize potential impacts to public health and safety, the Program shall include the following measures:

If treatment plant modifications constructed as part of the Laguna Treatment Plant Upgrade do not reduce nitrate levels below 10 mg/L, the City may consider additional treatment processes to lower nitrate concentrations. The possibility of more extensive reservoir lining could also be considered as a method to reduce nitrate inputs to groundwater.

The Program shall indicate that excavations will be guarded by readily visible barricades, rails or other effective means to prevent access by the public.

The Program shall incorporate Standard Transportation Procedures, Measures 2.2.16 and 2.2.20 which require that local police, public works and fire departments for each jurisdiction (city, county and state) where construction is expected to occur, receive advance notification of construction activities. Local residents and businesses shall also be notified and access shall be maintained. Additionally, where encroachment permits are required (e.g., Caltrans and the Sonoma County Department of Public Works require such permits for work on roadways) this information would be provided as part of the encroachment permit application process.

Prior to construction the City shall hire a Registered Environmental Assessor (REA) to perform an Initial Site Assessment following American Society of Testing Materials (ASTM) guidelines along pipeline corridors and near pump stations to identify potential hazardous waste sites that may affect Project construction activities. During~~Prior to~~ construction the City shall hire a Registered Geologist or Registered Environmental Assessor to survey all pipeline alignments for contaminated soil, recording the location, extent, and type of contamination.

In the vicinity of hazardous materials/waste release sites, construction activities related to the Project that require excavation or exposure of soil shall be monitored by the contractor for subsurface contamination. Monitoring shall include, at minimum, visual observation by personnel with appropriate hazardous materials training, including 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training.

In the vicinity of hazardous materials/waste release sites, groundwater brought to the surface as a result of construction dewatering shall be handled in a manner appropriate to the construction related permits for dewatering. If contamination is suspected or noted during the construction phase, then the groundwater shall be containerized and analyzed for contamination by a laboratory, certified by the California

Environmental Protection Agency (CalEPA) Environmental Laboratory Accreditation Program (ELAP), using United States Environmental Protection Agency (USEPA)-approved analytical methods. Where contaminated groundwater is encountered, precautions will be taken to assure that the installation of piping or other construction activities do not further disperse contamination.

All potentially contaminated materials encountered during Project construction activities shall be evaluated in the context of applicable local, state and federal regulations and/or guidelines governing hazardous waste. All materials deemed to be hazardous shall be remediated and/or disposed of following applicable regulatory agency regulations and/or guidelines. Disposal sites for both remediated and non-remediated soils shall be identified prior to beginning construction. All evaluation, remediation, treatment and/or disposal of hazardous waste shall be supervised and documented by qualified hazardous waste personnel.

2.3.17 Pump Station Noise Control

Description:

The City shall retain a qualified noise engineer to assist in the final design of the pump stations. The noise engineer shall be responsible for ensuring that the following noise reduction measures are properly incorporated into the design of the pump stations:

Outdoor pump stations that exceed the noise criteria listed in Section 4.13, Noise, shall be designed to include noise barriers to reduce the noise at nearby sensitive receptors. The noise engineer shall ensure that the height and location of these noise barriers are adequate to reduce the noise at nearby sensitive receptors to a level that is within noise criteria established in Section 4.13. Noise barriers may be made of concrete, masonry, noise control panel, or earthberm. Noise barriers provide approximately 10 - 20 dBA noise reduction.

Pump stations that exceed the noise criteria in Section 4.13 by more than 30 dBA shall be designed to be housed in a fully enclosed underground facility. Detailed ventilation noise controls for the underground facility, such as louvers and silencer, shall also be incorporated into the final engineering design. Underground facilities provide approximately 20 - 30 dBA noise reduction.

<u>Locations of the pump stations shall be carefully considered, and placed as far away from any sensitive receptors as is feasible, especially in rural areas.</u>

The design of all pump stations shall be such that all openings, such as for ventilation and doors, shall face away from the sensitive receptors. This provides approximately 10 - 15 dBA noise reduction.

All exterior doors for the pump stations shall be constructed of metal assemblies which are weather-stripped to form an airtight seal when closed. Weather-stripped steel doors provide approximately 3 - 5 dBA noise reduction.

Acoustical louvers shall be used for the pump station housing air ventilation openings. Acoustical louvers provide approximately 5 - 7 dBA noise reduction. As an alternative to the acoustical louvers, the City may utilize an air intake/exhaust plenum (“L” shaped structure) as part of the final engineering design of the Project. This option would provide approximately 7 - 10 dBA noise reduction.

All pump stations shall utilize “low noise motors” for the pump systems. Low noise motors provide approximately 3 - 5 dBA noise reduction.

<u>For pump stations located in the Graton area, ambient noise measurement and noise reflection tests shall be conducted during the design stage to determine the reflective characteristics between the proposed pump stations and sensitive receptors as well as the nighttime ambient noise level in the area.</u>

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
13.6.2 Operation of the pump station component may expose the public to high noise levels.	Alts 2, 3, and 4 - Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

2.4.4 California Red-legged Frog Capture and Relocation Program

Description: Preconstruction surveys by a qualified biologist (with current California Department of Fish and Game and United States Fish and Wildlife Service Scientific Collector's Permit) to locate and live-trap California red-legged frogs that may be destroyed due to construction of storage reservoirs and associated access roads and ancillary facilities.

A qualified biologist shall relocate and release the California red-legged frogs in suitable habitat established in the conservation plan.

A qualified biologist shall monitor the relocated population of California red-legged frogs on an annual basis for five years to determine the effectiveness of the mitigation program. The monitoring report should include data on extent and size of the population as well as some index of habitat quality. Annual reports shall be submitted to the City of Santa Rosa and the United States Fish and Wildlife Service (USFWS).

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
9.5.1 The storage reservoir component may cause loss of individuals or occupied habitat of endangered, threatened, or rare aquatic wildlife or plant species.	Alt 2~~, 3a, 3b, 3d, and 3e-~~ Less than Significant (with Measure 2.3.11)

Alternatives/Component: Alternative~~s~~ 2~~ and 3~~

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing

Start: California r~~R~~ed-legged frog capture and relocation should occur during the active season (i.e., March-May; Mark Jennings, herpetologist, personal communication) prior to storage reservoir construction in the year of construction. First annual report should be submitted at the end of the year of storage reservoir construction.

Complete: California r~~R~~ed-legged frog capture and relocation should be completed in March through May prior to storage reservoir construction in the year of construction. Measure will continue for a period of five years.

Monitoring Agency: City of Santa Rosa and U.S. Fish and Wildlife Service

Validation: Review annual reports beginning with end of first growing season following construction. Conduct field monitoring on yearly basis or as deemed appropriate. Review annual reports and conduct monitoring annually for five years.

2.4.5 Active Raptor Nest Location and Monitoring Program

Description:

Construction of reservoir sites shall not result in the loss of active raptor nests. Preconstruction surveys (April or May) by a qualified wildlife biologist shall be conducted to locate and map all active raptor nests that are within or adjacent (i.e., within 0.25 miles) to proposed storage reservoir construction zone boundaries.

If active raptor nests are located within storage reservoir construction zone boundaries, then construction shall be delayed until the end of the nesting season (April-July) or until the young have fledged (i.e., have attained the power of flight). A qualified wildlife biologist shall monitor the nest to determine when the young have fledged and submit weekly reports to California Department of Fish and Game and the City of Santa Rosa throughout the nesting season.

If active raptor nests are located in the vicinity (i.e., within 0.25 miles) of storage reservoir sites, then a buffer zone shall be established by California Department of Fish and Game around the nest tree to minimize disturbance of the breeding birds. A qualified wildlife biologist shall monitor disturbance of the nesting raptors during construction of the storage reservoir and associated access roads and ancillary facilities. <u>The monitoring biologist shall propose and the City shall implement additional measures (as necessary) to minimize impacts to nesting raptors due to construction activities.</u>

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
8.5.3 The storage reservoir component may cause loss of active raptor nest sites.	Alts 2 and 3 - Less than Significant

Alternatives/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing

Start: During the raptor nesting season (i.e., April-July) of the year of construction. Prior to the onset of construction, active raptor nest surveys shall be conducted during April or May of the nesting season during the year of construction.

Complete: When all raptor young have fledged (usually by the end of July). If nests are located within or adjacent to the construction zone for proposed storage reservoirs, then monitoring will be complete when the last young raptor has fledged.

Monitoring Agency: City of Santa Rosa and California Department of Fish and Game

Validation: Weekly reports will be submitted to California Department of Fish and Game and the City of Santa Rosa. If nest abandonment or early fledging of young is deemed likely, the biologist will contact the

2.4.9 Construction Noise Control Measures

Description:

The Construction Manager shall ensure that the following construction noise control measures are implemented in order to minimize noise disturbances at sensitive receptors during construction activities:

Newer equipment with improved noise muffling shall be used and all equipment items shall have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational.

All construction equipment shall be inspected weekly to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.).

Wherever possible hydraulic tools shall be used instead of pneumatic impact tools.

Construction activities after 7:00 p.m. or before 7:00 a.m. shall not be allowed within 2,000 feet of residential units, hotels, hospitals, or convalescent homes. Noise generating construction shall also be restricted within 1,600 feet of these facilities on Saturdays, Sundays, and holidays.

Heavy truck trips shall be routed over streets that will cause the least noise disturbance to residences or businesses in the vicinity of the Project site.

Construction staging areas, maintenance yards, and other construction oriented operations shall not be located within 1,600 feet of a sensitive receptor.

Sensitive noise receptors would be specifically identified and notified in advance to keep windows and doors closed during peak construction activity.

Sensitive noise receptors should be notified when blasting will be conducted and instructed as to actions necessary to reduce noise impacts.

Where construction would occur within 1,600 feet of schools, the construction manager shall implement measures to insure that construction noise does not interfere with the learning activity of the students. The following noise control measures may be implemented:

Limit construction to non-school hours or weekends.

Utilize temporary noise barriers, as needed, to protect schools from excessive noise levels from construction activities. Noise barriers may be made of heavy plywood, loaded vinyl acoustical curtain (Sound Transmission Coefficient rating of 25 or better)~~vinyl curtain material~~, or natural and temporary earthberms.

A qualified noise control engineer shall design the temporary construction barriers used.

A qualified noise control engineer shall monitor the temporary construction barriers used, to ensure that any gaps or inadequate materials do not increase noise impact by channeling, or fail to result in any noise mitigation.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
13.4.1. Construction of pipeline component may expose the public to high noise levels.	Alts 2, 3, 4, and 5a - Significant
13.4.3. Construction of pipeline component may cause high noise levels from construction traffic.	Alts 2, 3, 4, and 5a - Significant
13.5.1. Construction of storage reservoir component may expose the public to high noise levels.	Alts 2b, 2d, and 3e - Significant Alts 2a and 2c - Less than Significant
13.5.3. Construction of storage reservoir component may cause high noise levels from construction traffic.	Alts 2 and 3 - Significant
13.6.1. Construction of pump station component may expose the public to high noise levels.	Alts 2, 3, and 4 - Significant
13.7.1. Construction of the agricultural irrigation component may expose the public to high noise levels.	Alts 2 and 3 - Significant
16.4.2. The pipeline component may disrupt police, fire, schools, parks and recreation facilities, water, sewage treatment and disposal, or solid waste to such a degree that accepted service standards are not maintained..	Alts 2, 3, and 4 - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: Construction Manager/City of Santa Rosa

Timing: **Start:** During Construction.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa

Validation: The City will perform daily checks to ensure compliance with this measure. The City will respond to complaints from private citizens regarding construction noise within 24 hours.

<u>Construction noise shall be monitored at the nearest noise-sensitive receptor locations(s) outside the Project boundaries, during high noise generating activity to determine compliance with local noise criteria.</u>

<u>Blasting noise shall be monitored for all blasts. Efforts would be made to restrict the peak overpressures to 100dB at any occupied property line and 130 dB at all building structures.</u>

<u>In the event that the noise criteria are exceeded, the construction activities shall be reviewed to determine additional mitigation measures</u>

to further reduce the construction noise. The telephone number of the contractor's construction engineer would be made available to the residents around the Project site so that annoyed residents would be able to report their complaints.

2.4.13 Protect Important ~~Vertebrate~~ Paleontologic Resources

Description:

The City of Santa Rosa shall retain~~identify~~ a qualified professional paleontologist who will assist the project design engineers in locating facilities to minimize impacts , to the extent feasible, to important paleontologic resources. This action may require additional study of paleontologic resources on the specific selected sites. The paleontologist shall prepare a map indicating potential areas of high sensitivity for paleontologic resources, and this map shall be provided to the construction contractor.

The construction contractor's on site managers shall attend a workshop presented by the City's paleontologist that provides an overview of the paleontologic resources which might occur in the project area and the steps to take when fossils are unearthed during construction.~~be on call during all phases of construction occurring in areas with a high potential for containing significant fossils.~~ If fossils are unearthed in the course of construction excavation, the contractor shall cease all activity in the area and contact the City who will contact~~and~~ the project paleontologist. The paleontologist will salvage the resource(s) and assess the necessity for further mitigation. In addition, at the City's discretion, the professional paleontologist may monitor during construction specific areas of high sensitivity for paleontologic resources.

~~All~~ Recovered specimens shall be prepared and stabilized for preservation and shall be identified and cataloged into the retrievable collections of an established institution. Arrangements for adequate storage of specimens recovered during monitoring shall be made at a recognized, non-profit paleontologic specimen repository with a permanent curator. A complete set of field notes, geologic maps, and stratigraphic sections shall accompany the fossil collections. A report summarizing the monitoring and salvage programs shall be prepared by the project paleontologist and submitted to the lead agency and filed at the repository institution.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
15.4.3 The pipeline component may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alts 2, 3, 4, and 5a - Less than Significant
15.5.3 The storage reservoir component may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alts 2 and 3 - Less than Significant
15.6.3 The pump station component may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alts 2 and 3 - Less than Significant

15.7.3 The agricultural irrigation component may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alts 2 and 3 - Less than Significant
15.9.3 The discharge component may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alt 5a - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: Project Paleontologist

Timing: **Start:** Commencement of Project construction.

Complete: Completion of Project construction.

Monitoring Agency: City of Santa Rosa

Validation: Completion of Project construction.

2.4.15 Sensitive Plant Relocation Program

Description: Seeds of hayfield tarplant or bristly linanthus, and Lobb's aquatic buttercup populations shall be collected and reestablished in mitigation sites developed as a result of the Sensitive Resource Conservation Program. These mitigation sites shall be chosen based on their ability to sustain displaced species over the long term.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
8.2C. Cumulative projects impacts may cause loss of individuals of CNPS List 2, 3, or 4 plant species.	Alt 3 - Less than Significant

Alternative/Component: Alternative 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** During construction.

Complete: Completion of construction.

Monitoring Agency: City of Santa Rosa

Validation: This measure will be completed in conjunction with Measure 2.3.11, Sensitive Resource Conservation Program.

2.5.8 Monitor Seismic Events and Adjust Injection Rates

Description:

Before injection of reclaimed water to the geysers steamfield begins, the local seismographic station network maintained by the geysers operators (Unocal-NEC-Thermal) shall be upgraded to focus instrumental coverage around the wells proposed for injection. Accelerograph stations shall be added in Cobb and Anderson Springs to allow operators to determine relationships between seismic events within the geysers steamfield and felt effects in nearby communities. Software shall be improved to enable routine automated locating and mapping of epicenters of seismic events and analysis of data.

The geysers operators shall analyze this data and determine which injection wells are more susceptible to felt induced seismicity. Injection shall be decreased at wells that produced higher levels of felt induced seismicity and more water shall be shunted to other well sites that produce fewer seismic events. The total volume of water injected shall remain the same.

Quarterly reports shall be prepared by the geysers operators and submitted to the City. Reports shall include plots of daily volumes of injection at each well, tables and plots of seismicity located within an agreed control radius of the well (e.g. 1 km), and planned operational responses. Success of redistribution of water and any other modifications in operations in reducing felt seismic events shall be continually evaluated so that the program can be fine tuned.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.8.4 The geysers steamfield component may induce seismicity.	Alt 4 - Less than Significant.

Alternative/Component: Alternative 4

Lead Agency: City of Santa Rosa

Implementing Agency: Geysers Operators

Timing:

Start: The improvements to the monitoring network and the implementation of reporting forms for local residents shall be implemented before injection of reclaimed water begins.

Complete: Monitoring and adjustment of operations shall continue throughout the life of the Project

Monitoring Agency: The City of Santa Rosa will monitor operations. The City may retain an independent expert to evaluate the significance of the reported effects in the community and compare them to the findings of the quarterly injections operations and seismological monitoring reports.

2.5.11 Discharge to the Laguna During Very Dry Years

Description: The City shall revise contingency discharge to the Russian River under Alternative 5A during very dry years to insure adequate flow to the Laguna. During very dry years such as occurred in 1977, if reclaimed water is discharged to the Russian River, the flow in the Laguna is inadequate to prevent cause of phytoplankton. This results in minimum dissolved oxygen concentrations below the point of significance. Design discharge plus contingency discharge to the Laguna prevents this impact. Therefore, during very dry years, the City shall cease direct discharge to the Russian River (Alternative 5A) and discharge instead to the Laguna de Santa Rosa.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
6.9.1. Minimum dissolved oxygen. Contingency discharge with design discharge to the River may cause numeric-based criteria to be exceeded.	Alternative 5A - Less than Significant

Alternative/Component: Alternative 5A

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Prior to Project-related reclaimed water discharges during very dry years.

Complete: Ongoing.

Monitoring Agency: City of Santa Rosa and Regional Water Quality Control Board

Validation: Compliance with this measure shall be required prior to Project-related reclaimed water discharges during very dry years.

Table 2.6-1

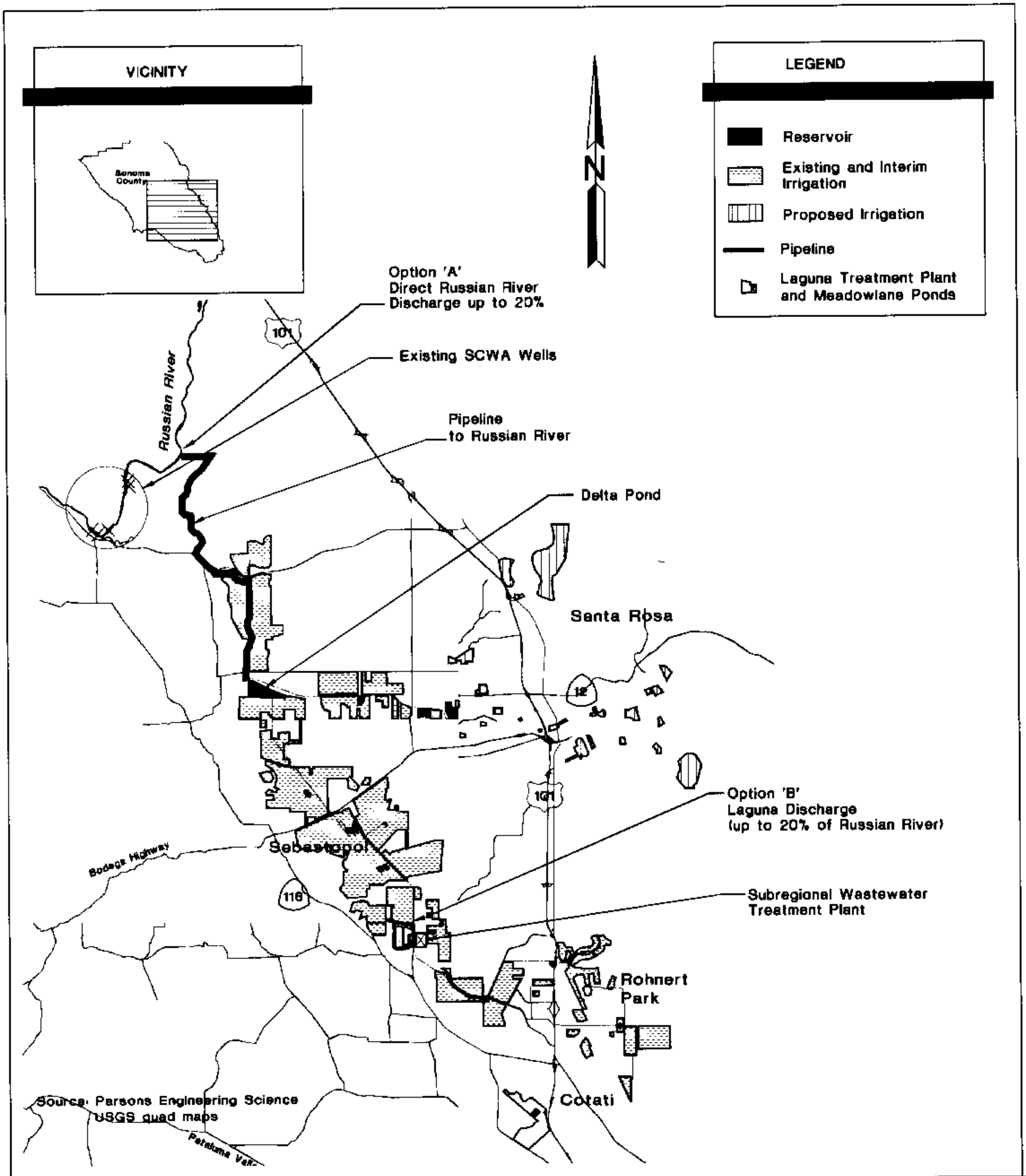
Summary of Mitigation Measures by Alternative

Mitigation Measure	Alternative											
	2a	2b	2c	2d	3a	3b	3c	3d	3e	4	5a	5b
2.4.2 Remove Weak Surficial Deposits from Reservoir Footprint	X	X	X	X								
2.4.3 Standard Engineering Methods for Expansive Soils	X	X	X	X	X	X	X	X	X	X		
2.4.4 California Red-legged Frog Capture and Relocation Program	X	X	X	X	~~X~~	~~X~~		~~X~~	~~X~~			
2.4.5 Active Raptor Nest Location and Monitoring Program	X	X	X	X	X	X	X	X	X			
2.4.6 Screen Concrete Diversion Channels, Pump Stations and Other Facilities	X	X	X	X	X	X	X	X	X	X		
2.4.7 Establish Tree Screening	X	X		X	X	X	X	X	X			
2.4.8 Revegetate Face of the Reservoir Dam	X	X		X	X	X	X	X	X			
2.4.9 Construction Noise Control Measures	X	X	X	X	X	X	X	X	X	X	X	
2.4.10 Vehicle and Equipment Exhaust Control Program	X	X	X	X	X	X	X	X	X	X		
2.4.11 Dust Control Program	X	X	X	X	X	X	X	X	X	X		
2.4.12 Protect Undiscovered Cultural Resource Sites	X	X	X	X	X	X	X	X	X	X	X	
2.4.13 Protect Vertebrate Paleontologic Resources	X	X	X	X	X	X	X	X	X	X	X	
2.4.14 Coordinate Alternative Fire Response Service	X	X	X	X	X	X	X	X	X	X		
2.4.15 Sensitive Plant Relocation Program					X	X	X	X	X			
2.4.16 Ecological Risk Monitoring and Source Control Program											X	X

REPLACEMENT PAGES

CHAPTER 3

DESCRIPTION OF EXISTING SYSTEM & ALTERNATIVES



HARLAND BARTHOLOMEW and ASSOCIATES, INC.

A UNIT OF PARSONS INFRASTRUCTURE and TECHNOLOGY GROUP INC.

PARSONS

Santa Rosa

Subregional Long-Term Wastewater Project

ALTERNATIVE 5
20% MAXIMUM
RUSSIAN RIVER DISCHARGE

Figure 3.1-8

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. The quantity of reclaimed water that is discharged each day is based on peak Russian River flow from the previous day. ~~However, d~~Due to limited storage and a combination of weather conditions that may occur during ~~this period~~the discharge season (October 1st through May 14), the Subregional System currently has the potential to exceed the legal maximum

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 (i.e., runoff that did not discharge to surface waters). The maximum volume of runoff reported was 34,000 gallons. The majority of incidences involved runoff or ponding of less than 1,000 gallons. The duration of the runoff event is not typically reported; however, good irrigation management practices generally involve daily inspection of irrigation facilities. A 12-hour irrigation equipment malfunction is considered appropriate in light of irrigation management practices required in the Mitigation Monitoring Plan which is adopted as part of the Project. (see Mitigation Measures 2.2.1 and 2.2.3 on pages 2-21 and 2-23).

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 500,000 ~~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 24 ~~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

REPLACEMENT PAGES

CHAPTER 4

EIR SECTIONS

(THERE ARE NO REPLACEMENT PAGES FOR THIS CHAPTER)

REPLACEMENT PAGES

SECTION 4.1

LAND USE

incompatible with future quarry development on designated sites shall not be permitted unless the public benefits of the proposed use outweigh the public benefits of the potential quarry development. The ARM Plan also identifies Potential Quarry Resource Areas. These Potential Quarry Resource Areas are for informational purposes only and do not restrict other uses allowed by zoning. The development review process need not consider potential quarry resources in these undesignated areas.

Sonoma County Geothermal Resources Management Plan

~~The Sonoma County Geothermal Resources Management Plan (1990) (GRMP) is intended to work in conjunction with the Resource Conservation Element of the Sonoma County General Plan and set policies and guidelines for the utilization and management of the County's geothermal resources, particularly the geysers Known Geothermal Resource Area (KGRA), while minimizing environmental and land use conflicts. Sonoma County's policy, reflected in the County's general plan, is to promote geothermal development within the primary resource area of the geysers, which consists of about 35,000 acres including the existing geysers operations. The Management Plan is based upon full-field development, which promotes development while protecting cultural and environmental values.~~

~~Under the Land Use section of the GRMP, lands within the GRMP area (which corresponds to the primary resource area of the geysers) are designated geothermal resources to protect and promote the management of resources. The Plan provides that the primary use of lands shall be geothermal management and production activities, including geothermal resource exploration activities, geothermal power generation facilities, and related transmission facilities.~~

Coastal Zone

The Sonoma County Coastal Zone includes portions of the Estero Americano extending east of Valley Ford, to a few hundred feet east of Highway 1 (see Figure 4.1-2). The Sonoma County Coastal Plan (1981) designates the portions of the Coastal Zone along the Estero for agricultural use, with the exceptions of residential and local commercial uses within the existing Valley Ford community. The Marin County Coastal Zone also includes portions of the Estero Americano and Estero de San Antonio extending east of Highway 1; however, none of the Project facilities are located within the Coastal Zone

Point Reyes National Seashore

Legislation has been introduced in the U.S. Congress to expand the boundaries of the Point Reyes National Seashore to include portions of the lands within the watersheds of the Estero Americano and Estero de San Antonio. Proposed acquisition of lands would be limited to purchase of 500 acres in fee simple ownership; remaining acquisition would be conservation easements. This legislation was introduced as a result of the Tomales Bay/Bodega Bay Watershed Boundary Study for the Point Reyes National Seashore completed in July, 1995. The proposed expansion would include lands along the Estero Americano and Estero de San Antonio which are proposed for agricultural irrigation as part of the Project. No Project facilities would be located within the remainder of the area proposed for the boundary expansion.

Land Use Goals, Objectives, and Policies

Table 4.1-1 identifies land use goals, objectives, and policies which provide guidance for future land use patterns. The table also indicates which Land Use evaluation criteria are responsive to each set of policies.

Table 4.1-2

Evaluation Criteria with Point of Significance - Land Use

Evaluation Criteria	As Measured by	Point of Significance	Justification
5. Will the Project increase potential for conflict as a result of incompatible land uses?	a. Lineal feet of incompatible uses b. Number of housing units of incompatible use	a. Greater than 0 lineal feet. b. Greater than 0 housing units.	General Plans of Sonoma and Marin counties; cities of Cotati, Petaluma, Rohnert Park, Sebastopol, and Santa Rosa; and Town of Windsor
6. Will the Project convert non-urban land to urban uses for Project facilities?	Acres of land converted	Greater than 0 acres of land	General Plans of Sonoma and Marin counties; cities of Cotati, Petaluma, Rohnert Park, Sebastopol, and Santa Rosa; and Town of Windsor
7. Will the Project convert public open space for Project facilities?	Acres of land converted	Greater than 0 acres of land	General Plans of Sonoma and Marin counties; cities of Cotati, Petaluma, Rohnert Park, Sebastopol, and Santa Rosa; and Town of Windsor

Source: Harland Bartholomew & Associates, Inc., 1995

METHODOLOGY

The adopted General Plan land use maps for the respective jurisdictions were used to determine planned land uses (other than uses in the Coastal Zone), mineral resources (other than aggregate resources), Community Separators, non-urban land, and public open space used as the basis for evaluation of impacts. Planned land uses in the Coastal Zone were determined from the adopted Coastal Plans of the respective counties. Existing land uses were determined from aerial photographs, supplemented by field observations in areas adjacent to Project facilities. Zoning regulations used as the basis of evaluation of consistency with existing zoning were obtained from the affected jurisdictions (as of June 1, 1995). Aggregate resources were defined in the Sonoma County Aggregate Resources Management Plan (1994). ~~Geothermal resources were defined by the Sonoma County Geothermal Resources Management Plan (1990).~~

Impact: 1.6.1-6. Will the pump station component impact land use based on evaluation criteria 1, 2, 3, 4, 5, and 6?

Analysis: *No Impact; All Alternatives.*

All pump station sites are located within compatible land use designations under the Sonoma County and Santa Rosa General Plans. Pump Station FGB, located in the Fountaingrove area, is within a Planned Development designation under the Santa Rosa General Plan. Pump Station BVB, located at the Sonoma County Fairground; Pump Station G-1, located adjacent to Delta Pond south of Guerneville Road; and Pump Stations FGS and BVS, located at the West College Ponds near Stony Point Road are within Public and Semi-Public land use designations under the Santa Rosa General Plan. Pump Stations G-3 and G-4, located on Pine Flat Road leading to the geysers recharge area, are within Resource and Rural Development land use designations under the Sonoma County General Plan. Other pump stations are located within agricultural designations under the Sonoma County General Plan.

One pump station sites (WBPS-06) is located within the Sonoma County Coastal Zone. These pump stations, as public service uses supporting agricultural irrigation, will be consistent with the designation in the Sonoma County Coastal Zone of agricultural use. No pump station sites are located within the Marin County Coastal Zone.

Pump stations located in unincorporated Sonoma County could require a conditional use permit as public service uses. These uses will not require a change in zoning district classification as public service uses are allowed in all districts.

None of the pump station sites are located on or adjacent to a designated quarry site, in an MRZ-2 area.

~~Pump Station G-4 is located within the geysers Known Geothermal Resources Area (KGRA) as defined in the Sonoma County Geothermal Resources Management Plan. The pump station, as a public service use supporting the production of geothermal energy will be consistent with the Land Use provisions of the Plan.~~

None of the pump station sites are within Community Separators as defined in the Sonoma County General Plan.

The use of land for public service facilities at the pump station sites will not be incompatible with surrounding uses. Pump stations and other similar public service facilities are considered compatible with and allowed in agricultural, residential, and commercial land use classifications under the Santa Rosa and Sonoma County General Plans and existing Santa Rosa and Sonoma County zoning. Existing facilities of this type are located adjacent to agricultural, residential, and commercial land uses within the Project area.

The use of land for public service facilities is allowed in agricultural and other non-urban land use classifications (e.g., Rural Residential) under the Sonoma County General Plan and Sonoma County zoning. Therefore such uses will not constitute a change from open space to urban use. Comparable existing public service facilities are located within non-urban land use classifications under the Sonoma County General Plan and Sonoma County zoning.

Alternatives 1 and 5 do not have a pump station component.

Mitigation: No mitigation is needed.

Impact: 1.6.7 Will the pump station component convert public open space for Project facilities?

Analysis: *Significant; Alternative 4.*

The site for Pump Station G-3 (Alternative 4) along Pine Flat Road is located on a property for which the Sonoma County Agricultural Preservation and Open Space District holds conservation easements (see Figure 4.1-6). Construction of a pump station on this site will potentially conflict with the status of the affected property as open space under the conservation easements and will result in a loss of open space. No other pumps stations for Alternative 4 are located on or adjacent to public open space.

No Impact; Alternatives 1, 2, 3, and 5.

None of the pump station sites for these alternatives are located on or adjacent to properties which are public open space or in which the Sonoma County Agricultural Preservation and Open Space District holds any interests.

Alternatives 1 and 5 do not have a pump station component.

Mitigation: *Alternative 4.*

2.3.1. Replacement of Open Space Easements.

Alternatives 1, 2 , 3 and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternative 4.*

Mitigation Measure 2.3.1 reduces this impact to a level below significance by providing funding to the Open Space District for the replacement on a one-for-one basis of existing acreage in open space easements. This will allow purchase of easements on new acreage in areas of comparable open space character and open space value ~~areas~~ identified by the Open Space District as a priority acquisition area.

REPLACEMENT PAGES

SECTION 4.2

AGRICULTURE

(THERE ARE NO REPLACEMENT PAGES FOR THIS SECTION)

REPLACEMENT PAGES

SECTION 4.3

GEOLOGY, SOILS, AND SEISMICITY

Pump Station Component

Table 4.3-10

Geology Impacts by Component - Pump Stations

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
3.6.1. Will the pump station component be located within an area of unstable slope conditions?	Overall rating of Moderate to High	Low	P	❍
3.6.2. Will the pump station component be subject to ground rupture due to location near a surface trace of an active fault?	Any portion of facilities within the Alquist-Priolo earthquake fault zones	No	P	==
3.6.3. Will the pump station component be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake?	A rating of High for liquefaction			
• S, BUS, FGS, SEB, G-1		High	P	⊙
• All other pump stations		Moderate to Low	P	❍
3.6.4. Will the pump station component induce seismicity?	Effects of Modified Mercalli V or greater decreasing in recurrence interval by 50% or more for earthquakes with existing recurrences intervals of greater than one year	None	P	==
3.6.5. Will earthquake-induced strong ground shaking damage pump station components?	Construction not in conformance with requirements of the Division of Safety of Dams or applicable building code.	None	P	==
3.6.6. Will construction of the pump station component cause off-site water-related soil erosion?	Construction activities not in compliance with requirements of the project NPDES permit, Division of Safety of Dams regulations or building and grading codes.	None	C	==

REPLACEMENT PAGES

SECTION 4.4

SURFACE WATER HYDROLOGY

(THERE ARE NO REPLACEMENT PAGES FOR THIS SECTION)

REPLACEMENT PAGES

SECTION 4.5

GROUNDWATER

(THERE ARE NO REPLACEMENT PAGES FOR THIS SECTION)

REPLACEMENT PAGES

SECTION 4.6

SURFACE WATER QUALITY

are toxic only at higher concentrations. Dissolved metals are generally more bioavailable (and thus toxic) than total metals. Therefore, most EPA water quality criteria for metals to protect aquatic life are based on dissolved metals concentrations rather than total metals concentrations.

- Physical and Habitat Effects. Some substances have damaging effects on habitat and/or organisms. For example, silt can affect fish and invertebrate gills and accumulate in the bottom of a creek rendering the creek unsuitable for organisms that require sand or gravel substrate. No numeric criteria have been established for physical substances, but narrative criteria have been established for turbidity, oil and grease, suspended matter, settleable matter, floating material, and color.
- Aesthetics. The narrative criteria cited above for physical and habitat effects also protect against aesthetic impacts.

This Surface Water Quality section focuses on water quality constituents that affect biostimulation, toxicity/bioaccumulation, physical/habitat and aesthetics of waters in the Project area.

Specific regulations that relate to inland and ocean surface waters are described below.

Inland Water Regulation

The inland surface waters in the Project area are within the jurisdiction of either the North Coast and the San Francisco Bay Regional Water Quality Control Boards (North Coast Regional Board and Bay Regional Board, respectively). Each Regional Board has a Water Quality Control Plan for basins within its jurisdiction (Basin Plan). The Basin Plans identify beneficial uses of waters, establish numeric and narrative objectives for protection of beneficial uses, and set forth policies to guide the implementation of programs to attain the objectives. In addition, federal criteria and guidelines for particular water quality constituents apply to waters to the extent that the Basin Plans do not include criteria for the constituents. The current Basin Plans used for this report are the Water Quality Control Plan for the North Coast Region dated August 1994 (North Coast Regional Board 1994) and the Water Quality Control Plan for the San Francisco Bay Basin Region dated December 1995 (Bay Regional Board 1995).

The North Coast and Bay Basin Plans both contain relevant discharge prohibitions. The North Coast Basin Plan prohibits discharge into Stemple and Americano Creeks at any time. The Basin Plan also prohibits discharge into the Russian River or its tributaries in excess of one percent of the flow at the point of discharge and during the period from May 15 through September 30. The North Coast Basin Plan includes provisions for exceptions to the Russian River discharge prohibitions. The Bay Basin Plan prohibits discharge where 10:1 dilution would not occur and in any non-tidal water, dead-end slough or similar confined waters. Exception criteria are established in the Bay Basin Plan.

The North Coast Regional Board has established a Waste Reduction Strategy ~~Policy~~ (North Coast Regional Board 1995) for total nitrogen and ammonia for the Laguna de Santa Rosa in compliance with Section 303(d) of the federal Act. Dissolved oxygen and ammonia criteria are not currently attained in the Laguna and the Waste Reduction Strategy ~~Policy~~ sets load reduction goals for nitrogen and ammonia sources, including the Subregional System, such that the criteria will be attained.

and whether "maximum public benefit" is not within the scope of this EIR/EIS.

Thus, a complete analysis of the consistency of proposed alternatives with the Antidegradation Policy is not possible in this EIR/EIS, nor is it necessary according to the State Antidegradation Policy. Therefore, a specific antidegradation policy evaluation criterion was not developed. However, the technical information in this document is intended to provide the basis for any findings that the Regional Board may be required to make.

The Esteros and the National Marine Sanctuary

The Esteros and Bodega Bay are part of the Gulf of the Farallones National Marine Sanctuary. Sanctuary regulations are given in 15 CFR Part 922 Subpart H and 15 CFR 922.80 et. seq. The sanctuary is administered by the National Oceanic and Atmospheric Administration (NOAA), which is part of the United States Department of Commerce.

Ocean Water Regulation

The State Board has established a Water Quality Control Plan for Ocean Waters of California (Ocean Plan). The Ocean Plan identifies beneficial uses of ocean waters, numeric and narrative objectives for protection of beneficial uses, and policies to guide the implementation of programs to attain the objectives. The numeric objectives in the Ocean Plan are the same as the applicable federal criteria and guidelines for saltwater. The current Ocean Plan to be used for this report is the Water Quality Control Plan - Ocean Waters of California dated March 1990.

Reclaimed Water Discharges

Permit Compliance

The quality of reclaimed water is regulated in the discharge permit issued by the Regional Board. The discharge permit imposes limits on biochemical oxygen demand, suspended solids, settleable solids, total coliform organisms, chlorine residual, pH, turbidity and acute toxicity. The discharge permit also establishes a treatment effectiveness requirement. During the three-year period from 1992 through 1994, more than 18,920 determinations of compliance with the effluent limits and treatment effectiveness requirements were made by the Regional Board. Although 15 violations were reported during this period, the Regional Board found none of the violations to be significant and took no enforcement action. Each of the 15 violations related to pH or coliform. The rate of compliance with the effluent limits and treatment effectiveness requirements during the three-year period was 99.92% (18,905/18,920), which indicates a very reliable treatment system.

Reclaimed Water Quality

This section describes the quality of reclaimed water from the Laguna Treatment Plant. Water quality data collected and analyzed from 1988 through January 1995 (metals) and 1991 through January 1995 (organic and other compounds) were used in the evaluation of water quality impacts and are presented in Tables 4.6-1 (chemical constituents) and 4.6-2 (biological constituents). Generally, the data used for impact evaluations were from fresh effluent samples. The exception to this is the evaluation of nitrogen compounds (organic nitrogen and ammonia). The concentration of these compounds is greatly affected by biological activity in the storage ponds, so the concentration in storage ponds was used for evaluation of impacts. The concentration of ammonia used was the average Delta Pond concentration from 1992 through February 1996. Samples for analysis of organic nitrogen in Delta Pond were begun in December 1995. Organic nitrogen from December 1995 through February 1996 averaged 1.25 mg/L. A concentration of 2 mg/L for organic nitrogen was used for waste load calculations to allow for uncertainty due to the short time frame for organic nitrogen data from Delta Pond. The concentration of nitrate-nitrogen used for the waste load reduction analysis was 14 mg /L which is estimated to be the concentration that will be obtained with proposed plant upgrades (CH2M Hill 1995b). The concentrations reported in Table 4.6-1 differ slightly from those reported in other sections of the EIR/EIS (Groundwater and Public Health and Safety) because collection of additional data for these compounds was conducted too recently to be included in the other sections. These slight differences do not affect analyses in other sections. Constituents that have been analyzed in reclaimed water and have not been detected are not included in Table 4.6-1.

Table 4.6-1

Detectable[1] Chemical Constituents of Reclaimed Water

Chemical	Concentration Range (mg/L)	Mean Concentration (mg/L)	Reporting Limit(s)[2] (mg/L)	Number of Detects	Number of Samples
Inorganics					
Total aluminum	N.D. - 0.15	0.032	0.01 - 0.10	20	27
Dissolved aluminum	N.D. - 0.04	0.011	0.01	2	8
Total ammonia-nitrogen (Delta Pond)	N.D. - 5.7	0.99 (as N)	0.1	70[3]	71[3]
Total arsenic	N.D. - 0.0040	0.0024	0.001 - 0.005	25	30
Dissolved arsenic	0.001 - 0.0030	0.0025	N/A	8	8
Asbestos, MFL[4]	N.D. - 0.56	0.25	0.05 - 0.28	2	4
Total barium	N.D. - 0.11	0.023	0.02 - 0.05	4	27
Boron	N.D. - 0.60	0.48	0.10	17	18
Total cadmium	N.D. - 0.007	0.0007	0.0002 - 0.01	6	89
Calcium	22 - 63	31	N/A	19	19
Total chromium	N.D. - 0.014	0.0023	0.001 - 0.02	49	90
Conductivity (mmhos/cm)	644-803	724	N/A	40	40
Total copper	N.D. - 0.04	0.012	0.005 - 0.10	88	90
dissolved copper	0.006 - 0.013	0.010	N/A	8	8
Cyanide	N.D. - 0.03	0.01	0.005 - 0.01	6	11
Total dissolved solids	381-495	444	N/A	45	45
Fluoride	0.18 - 0.31	0.22	N/A	4	4

7 Trihalomethanes include chloroform, bromoform, bromodichloromethane, and dibromochloromethane. Bromoform was not detected at or above the reporting limit for any sample. One half the reporting limit for bromoform was used to calculate the maximum and mean concentrations of trihalomethanes. Total halomethanes includes total trihalomethanes (as above) plus bromomethane and chloromethane.

8 Phthalate numbers given here differ from those given in the *Human Health Risks from Chemical and Biological Components of Reclaimed Water* (Parsons Engineering Science, Inc. 1996c) because these numbers include additional data (See Appendix 5) collected while that technical report was prepared.

9 Radioactivity values are reported as greatest probable value (GPV).

10 pCi/L = pico Curies /L

Table 4.6-2

Biological Constituents of Reclaimed Water

Biological Constituent	Units	Concen-tration Range	Mean Concen-tration	Reporting Limits	Number of Detects	Number of Samples	Point of Signif-incance
BOD	mg/L	1.5 - 19	3.4		49[1]	49[1]	none
Total Coliform	MPN[2]/ 100 ml	ND - 170	2.2	2.2	49[1]	49[1]	none
Enteric Viruses	PFU[3]/#L	ND	N/A	1/~150 mL	0	7	none
Giardia lamblia	#cysts/ #L	ND - 28/203	10/223	1/~200 mL	2	4	none
Cryptosporidium	#oocysts/ #L	ND	N/A	1/~200 mL	0	4	none
Legionella sp.	MPN[2]/ 100 mL	ND	N/A	7840	0	4	none
Salmonella sp.	MPN[2]/ 100 mL	ND	N/A	2.2	0	4	none
Shigella	MPN[2]/ 100 mL	ND	N/A	2.2	0	4	none
Heterotrophic Bacteria Plate Count	CFU[4]/mL	ND - 2	1.25	2	1	4	none

Source: *Reclaimed Water Quality*, Merritt Smith Consulting 1996k

Period of record: 1991 - Jan 1995.
N/A - not available
N.D. - not detected
BOD - Biological Oxygen Demand

1 Numbers shown are the number of monthly averages; these constituents are routinely measured several times per month.

2 MPN - Most Probable Number

3 PFU - Plaque-Forming Units

4 Colony-Forming Units

Table 4.6-9

Wastewater Dischargers to the Russian River

Discharger	Avg Dry Weather Flow (mgd)[1]	Design Wastewater Flow (mgd)	Treatment	Receiving Water	Type of Discharge	Discharge Season	Facilities
Ukiah	2.4	2.8	tertiary ~~secondary~~	Russian River	direct, limited to 1% of Russian River flow	Oct 1 - May 14	primary and secondary sedimentation, trickling filters, chlorination, oxidation/percolation ponds, dechlorination, sludge digestion
Cloverdale	0.5	0.7	secondary	percolation pond	indirect, percolation from pond	N/A	primary and secondary oxidation ponds, disinfection, percolation pond
Healdsburg	1.0	1.4	secondary	open pit quarry	indirect, percolation from quarry	N/A	four aerated ponds, two oxidation/sedimentation ponds, disinfection
Windsor	1.1	1.5	tertiary	Laguna at Trenton-Healdsburg	direct, limited to 1% of Laguna de Santa Rosa flow	Oct 1 - May 14	aerated ponds, settling, coagulation, flocculation, disinfection, storage
Occidental	0.02	0.05	secondary	Dutch Bill Creek	direct, limited to 1% of Dutch Bill Creek flow	Oct 1 - May 14	aerated pond, settling pond, disinfection
Graton	0.08	0.14	secondary	Atascadero Creek	direct, limited to 1% of Atascadero Creek flow	Oct 1 - May 14	aerated ponds, disinfection, storage
Forestville	0.05	0.1	secondary	Green Valley Creek	direct, limited to 1% of Green Valley Creek flow	Oct 1 - May 14	aerated ponds, disinfection, storage
Guerneville	0.35	0.71	tertiary	Russian River	direct, limited to 1% of Russian River flow	Oct 1 - May 14	aeration, clarification, coagulation, filtration, disinfection, solids dewatering

Source: North Coast Regional Water Quality Control Board. Data collected by dischargers 1994-1995

[1] 1994 data - average of 3 consecutive months of lowest flow.

Table 4.6-11

Summary of Water Quality in the Laguna de Santa Rosa

	Above Santa Rosa Creek				Below Santa Rosa Creek			
	Winter	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**
Conductivity (µmhos/cm)	565	670	733	634	328	417	598	534
Turbidity (NTU)	20.2	27.4	28.9	24.5	8.8	22.1	21. 8	5.7
Dissolved oxygen (mg/L)	7.5	8.3	7.1	6.8	9.1	7.3	6.1	6.5
Nitrate-Nitrogen (mg/L)	4.23	1.60	0.25	0.52	1.95	0.95	1.06	0.59
Ammonia-Nitrogen (mg/L)	1.72	1.49	0.24	0.24	0.28	0.08	0.12	0.12
TKN (mg/L)	2.62	5.13	2.27	2.05	no data	no data	1.07	no data
Dissolved orthophosphate-phosphorous (mg/L)	1.47	1.48	1.13	0.74	0.93	0.63	0.41	0.21
Chlorophyll *a* (mg/L)	0.042 ~~0.42~~	0.096	0.232	0.059	0.013	0.048	0.055	0.006

Source: *Laguna de Santa Rosa Water Quality Monitoring Results*, Merritt Smith Consulting 1996j

Period of record: August 1989 - August 1995
NTU = Nephelometric Turbidity Unit
TKN - Total Kjeldahl Nitrogen = sum of organic nitrogen and ammonia concentrations

Table 4.6-16

Summary of Sediment Quality in the Laguna de Santa Rosa (mg/kg wet weight)

Constituent	Above Santa Rosa Creek[1]	Below Santa Rosa Creek[1]	EPA Guidelines[2]
INORGANICS			
Antimony	ND (0.5)	ND (0.5)	
Arsenic	1	1.7	
Cadmium	0.06	0.06	
Chromium	8.2	33	
Cobalt	3	8.2	
Copper	6.6	13	
Lead	3	7.9	
Mercury	ND (0.1)	ND (0.1)	
Nickel	11	38	
Silver	ND (0.1)	ND (0.1)	
Zinc	39	33	
ORGANICS			
Chlorinated Dioxins and PCBs			
PCB-1016	ND (1.0)	ND (0.5)	
PCB-1248	ND (1.0)	ND (0.5)	
PCB-1254	ND (0.5)	ND (0.2)	
PCB-1260	ND (0.5)	ND (0.2)	
Semi-Volatiles			
Benzoic Acid	ND (3.0)	ND (3.0)	
Benzyl Alcohol	ND (0.7)	ND (0.7)	
Dibenzofuran	ND (0.7)	ND (0.7)	
Semi-Volatile, Organochlorines			
Aldrin	ND (0.012)	ND (0.006)	
Chlordane	ND (0.25)	ND (0.10)	
p,p'-DDD	ND (0.030)	ND (0.020)	
p,p'-DDE	ND (0.030)	ND (0.020)	
Dieldrin	ND (0.030, 0.008)[3]	ND (0.020, 0.006)[3]	0.011
Endrin	ND (0.030 (0.008)[3]	ND (0.020 (0.006)[3]	0.0042
Heptachlor	ND (0.030)	ND (0.020)	
Heptachlor epoxide	ND (0.30)	ND (0.020)	

Table 4.6-16

Summary of Sediment Quality in the Laguna de Santa Rosa (mg/kg wet weight)

Constituent	Above Santa Rosa Creek[1]	Below Santa Rosa Creek[1]	EPA Guidelines[2]
Hexachlorobenzene	ND (0.70)	ND (0.70)	
Hexachlorobutadiene	ND (0.70)	ND (0.70)	
g-BHC (Lindane)	ND (0.012)	ND (0.006)	
a-BHC	ND (0.003)	ND (0.002)	
b-BHC	ND (0.003)	ND (0.002)	
Semi-Volatile, Organophosphates			
Methyl Parathion	ND (0.067	ND (0.067)	
Semi-Volatile, Phenolics			
2,4-Dimethylphenol	ND (0.70)	ND (0.70)	
2-Methyl Phenol	ND (0.70)	ND (0.70)	
4-Methyl Phenol	ND (0.70)	ND (0.70)	
Pentachlorophenol	ND (3.00)	ND (3.00)	
Phenol	12.00	ND (0.70)	
Semi-Volatile, Phthalates			
Butylbenzylphthalate	ND (0.70)	ND (0.70)	
Diethyl phthalate	ND (0.70)	ND (0.70)	
Dimethyl phthalate	ND (0.70)	ND (0.70)	
Di-n-octylphthalate	ND (0.70)	ND (0.70)	
Di-n-Butylphthalate	ND (0.70)	ND (0.70)	
Semi-Volatile, PAHs			
Acenaphthene	ND (0.70, 0.18)[3]	ND (0.70, 0.19)[3]	0.13
Acenaphthylene	ND (0.70)	ND (0.70)	
Anthracene	ND (0.70)	ND (0.70)	
Benzo(k)fluoranthene	ND (0.70)	ND (0.70)	
Benzo-a-pyrene	ND (0.70)	ND (0.70)	
Benzo(B)fluoranthene	ND (0.70)	ND (0.70)	
Benzo(g,h,i)perylene	ND (0.70)	ND (0.70)	
Chrysene	ND (0.70)	ND (0.70)	
Dibenzo (a,h)anthracene	ND (0.70)	ND (0.70)	
Fluoranthene	ND (0.70, 0.18)[3]	ND (0.70, 0.19)[3]	0.62
Fluorene	ND (0.70)	ND (0.70)	

Table 4.6-16

Summary of Sediment Quality in the Laguna de Santa Rosa (mg/kg wet weight)

Constituent	Above Santa Rosa Creek[1]	Below Santa Rosa Creek[1]	EPA Guidelines[2]
Indeno(1,2,3-CD)pyrene	ND (0.70)	ND (0.70)	
2-Methylnaphthalene	ND (0.70)	ND (0.70)	
Naphthalene	ND (0.70)	ND (0.70)	
Phenanthrene	ND (0.70, 0.18)[3]	ND (0.70, 0.19)[3]	0.18
Pyrene	ND (0.70)	ND (0.70)	
Volatile, Aromatic & Halogenated			
1,2-Dichlorobenzene	ND (0.70)	ND (0.70)	
1,3-Dichlorobenzene	ND (0.70)	ND (0.70)	
1,2,4-Trichlorobenzene	ND (0.70)	ND (0.70)	

Source: *Sediment Quality Characterization for the Russian River, Laguna de Santa Rosa, Santa Rosa Creek, and Reclaimed Water Storage Ponds*, Merritt Smith Consulting 1996o. EPA guidelines from EPA 1993 a-e.

1. ND = concentration was below detection. Numbers in parentheses are reporting limits.
2. EPA 1993a-e. Blanks under EPA Guidelines indicate that there are no developed EPA guidelines, criteria or standards. Values given in this column are all guidelines, and guidelines are not considered enforceable by EPA.
3. Numbers in parentheses are reporting limits in mg/kg and reporting limits per gram organic carbon, respectively. EPA criteria are in units of mg/g organic carbon.

Table 4.6-17

Summary of Sediment Quality in Santa Rosa Creek (mg/kg wet weight)

Constituent	Willowside	EPA Guidelines[1]
Inorganics		
Antimony	ND (0.5)	
Arsenic	1.1	
Cadmium	0.1	
Chromium	35	
Cobalt	8	
Copper	15	
Lead	13	
Mercury	ND (0.1)	

Table 4.6-17

Summary of Sediment Quality in Santa Rosa Creek (mg/kg wet weight)

Constituent	Willowside	EPA Guidelines[1]
Nickel	50	
Silver	ND (0.1)	
Zinc	47	
Organics		
Chlorinated Dioxins and PCBs		
PCB-1016	ND (1.0)	
PCB-1248	ND (1.0)	
PCB-1254	ND (0.5)	
PCB-1260	ND (0.5)	
Semi-Volatiles		
Benzoic Acid	ND (3.0)	
Benzyl Alcohol	ND (0.70)	
Dibenzofuran	ND (0.70)	
Semi-Volatile, Organochlorines		
Aldrin	ND (0.012)	
Chlordane	ND (0.25)	
p,p'-DDD	ND (0.030)	
p,p'-DDE	ND (0.030)	
Dieldrin	ND (0.030, 0.007)[3]	0.011
Endrin	ND (0.030, 0.007)[3]	0.0042
Heptachlor	ND (0.030)	
Heptachlor epoxide	ND (0.020)	
Hexachlorobenzene	ND (0.70)	
Hexachlorobutadiene	ND (0.70)	
g-BHC (Lindane)	ND (0.012)	
a-BHC	ND (0.003)	
b-BHC	ND (0.003)	
Semi-Volatile, Organophosphates		
Methyl Parathion	ND (0.067)	
Semi-Volatile, Phenolics		
2,4-Dimethylphenol	ND (0.70)	
2-Methyl Phenol	ND (0.70)	
4-Methyl Phenol	ND (0.70)	
Pentachlorophenol	ND (3.0)	
Phenol	ND (0.70)	

Table 4.6-17

Summary of Sediment Quality in Santa Rosa Creek (mg/kg wet weight)

Constituent	Willowside	EPA Guidelines[1]
Semi-Volatile, Phthalates		
Butylbenzylphthalate	ND (0.70)	
Diethyl phthalate	ND (0.70)	
Dimethyl phthalate	ND (0.70)	
Di-n-octylphthalate	ND (0.70)	
Di-n-Butylphthalate	ND (0.70)	
Semi-Volatile, PAHs		
Acenaphthene	ND (0.70, 0.15)[3]	0.013
Acenaphthylene	ND (0.70)	
Anthracene	ND (0.70)	
Benzo(k)fluoranthene	ND (0.70)	
Benzo-a-pyrene	ND (0.70)	
Benzo(B)fluoranthene	ND (0.70)	
Benzo(g,h,i)perylene	ND (0.70)	
Chrysene	ND (0.70)	
Dibenzo (a,h)anthracene	ND (0.70)	
Fluoranthene	ND (0.70, 0.15)[3]	0.62
Fluorene	ND (0.70)	
Indeno(1,2,3-CD)pyrene	ND (0.70)	
2-Methylnaphthalene	ND (0.70)	
Naphthalene	ND (0.70)	
Phenanthrene	ND (0.70, 0.15)[3]	0.18
Pyrene	ND (0.70)	
Volatile, Aromatic & Halogenated		
1,2-Dichlorobenzene	ND (0.70)	
1,3-Dichlorobenzene	ND (0.70)	
1,2,4-Trichlorobenzene	ND (0.70)	

Source: *Sediment Quality Characterization for the Russian River, Laguna de Santa Rosa, Santa Rosa Creek, and Reclaimed Water Storage Ponds*, Merritt Smith Consulting 1996o

1. ND = concentration was below detection. Numbers in parentheses are reporting limits.
2. EPA 1993a-e. Blanks under EPA Guidelines indicate that there are no developed EPA guidelines, criteria or standards. Values given in this column are all guidelines, and guidelines are not considered enforceable by EPA.
3. Numbers in parentheses are reporting limits in mg/kg and reporting limits per gram organic carbon, respectively. EPA criteria are in units of mg/g organic carbon.

West County

The waterways of the West County Project area addressed in this section are shown in Figures 4.4-1a, b, and c.

The types of waterways in the West County Project area are as follows:

- **Creeks**. Creeks in each of the Americano and Stemple watersheds flow from east to west, and discharge into waterways called esteros.

- **Esteros**. The two esteros in the West county area, Estero Americano and Estero de San Antonio, can be considered tidal embayments or estuaries depending on inflow from the creek. The esteros are part of the Gulf of the Farallones National Marine sanctuary.

Creeks

Water quality in Americano Creek and Stemple Creek is affected by the quality of groundwater that discharges to the creek, inputs of water and other material, and internal physical, chemical, and biological processes. Assessments of the Stemple and Americano watershed have identified manure and livestock management as major factors affecting water quality (California Coastal Commission 1987; City of Santa Rosa 1989, 1990a, d; Gold Ridge Conservation District 1995, Marin County Resources Conservation District 1994).

Manure Management

For many years, manure has been recycled onto pastures each fall. A portion of the pasture-spread manure is transported into Americano and Stemple Creeks, then into the esteros when manure application is followed by rainfall of sufficient magnitude to cause runoff. Manure decreases the dissolved oxygen in the creeks and contributes salt, ammonia, and substantial nutrients. Dissolved oxygen is required for aquatic life, and ammonia is toxic to fish and other aquatic life as pH increases above about 7.5. Data from existing studies show that conditions of ammonia toxicity and dissolved oxygen depletion are common in Americano and Stemple creeks.

Livestock Management

Livestock are not excluded from most segments of Americano and Stemple creeks. This affects water quality in three ways. First, livestock prevent development of a riparian canopy, which shades the creek to maintain cooler water. Second, livestock trample the creek bank, which accelerates bank erosion and transport of sediment downstream. Third, livestock urinate and defecate directly in or adjacent to the creeks. One cow urinating in a small creek can cause the water quality objective for ammonia to be exceeded. Livestock tend to congregate in creekbeds during summer because the cooler, moist conditions are

Esteros

Estero Americano and Estero de San Antonio are tidal embayments to which Americano Creek and Stemple Creek discharge, respectively. The esteros are each several miles long and vary in width from more than 1,000 feet to just a few feet. The depth of each estero is also variable, but three to six feet at mean tide is typical. Tidal influence extends to Middle Road in Estero Americano and to Highway 1 in Estero de San Antonio. The progressive accumulation of sediment and water quality changes are documented in several key reports including California Department of Fish and Game (1977), California Coastal Commission (1988), City of Santa Rosa (1988, 1989, 1990), and Marin County Resource Conservation District (1994). This section describes the existing water quality and hydrology conditions in the esteros and key controlling factors. The esteros are part of the Gulf of the Farallones National Marine Sanctuary and the Central California Coast Biosphere Reserve.

Sand Bar

Tidal energy in the ocean controls water movement in the esteros, and thus it also controls water quality in the esteros. Sand can accumulate in the inlet of each estero as a result of wind-induced turbulence and littoral sand transport in Bodega Bay. During spring tide conditions, ebb tide flows are typically sufficient to erode the accumulated sand. If sand accumulates during a neap tide condition, outflow may be insufficient to erode the accumulated sand, and the inlet is blocked. Sand can continue to accumulate, hydraulically isolating the esteros from Bodega Bay. The sand bar may remain until rainfall runoff accumulates in the esteros behind the sand bar, then overtops and quickly cuts through the sand bar. This process does not occur every year in the esteros. The accumulation of sediment in the esteros from watershed erosion during the past 100 years has reduced the volume of tidal water moving between Bodega Bay and the esteros, which likely results in more frequent bar closure than occurred prior to sediment accumulation. Bar closure is described in Marin County Resource Conservation District (1994).

The Estero Americano bar was maintained in an open condition during the 1980s by the owners of a fish farm near the Estero Americano inlet. Manipulation of the Americano bar by the fish farm operators no longer occurs, but local residents have reported that both bars ~~are occasionally~~ have been opened by local land owners to relieve flooding. No specific information about the dates of any such occurrences has been identified.

Mixing and Salinity

Salinity in the esteros is influenced by the amount of freshwater inflow from the creeks, the amount of tidal inflow from Bodega Bay, and evaporation. During and after a large rainfall event, freshwater inflow can flush virtually all seawater from the esteros. As inflow decreases, seawater replaces freshwater in the estero. During summers when the bar is open and freshwater inflow is negligible,

Table 4.6-24

Summary of Estero Water Quality
(mg/L unless otherwise noted)

	Estero Americano		Estero de San Antonio	
	Bar-Open[1]	Bar-Closed[2]	Bar-Open[1]	Bar-Closed[2]
Salinity (parts/thousand)	27.0 / 0-38.8		17.6 / 1.1-38	12.2 / 0.5-18.7
Turbidity (NTU)	17.6 / 1.3-120		12.7 / 2.1-51	12.3 / 2.7-52
Dissolved Oxygen	8.1 / 3-16.8		8.2 / 2.1-20	10.3 / 3.2-20
Nitrate-Nitrogen	0.37 / ND-8.7		0.31 / ND-1.2	0.27 / ND-1.5
Ammonia-Nitrogen	0.60 / ND-10		0.71 / ND-3.3	0.5 / ND-2.8
Un-ionized Ammonia-N	0.004 / ND-0.046		ND	ND
Phosphate-P	0.46 / ND-3.5		0.86 / 0.24-2	1.5 / 0.58-2.2
Copper	0.0058 / ND-0.036		0.0028 / ND-0.006	0.004 / ND-0.012
Lead	0.015 / ND-0.1		0.0005 / ND-0.0007	0.0004 / ND-0.001
Zinc	0.034 / ND-0.36		0.007 / ND-0.01	0.007 / ND-0.024
Planktonic Chlorophyll *a*	0.26/0.004-5.6 ~~0.026 / 0.000014-0.56~~		0.035 / 0.00083-0.242	0.062 / 0.0039-0.169

Source: *Environmental Conditions in West County Waterways*, Merritt Smith Consulting 1996g

NTU = Nephelometric Turbidity Units

1 The average values and the range of observed values are summarized in each cell of the table as follows: average/minimum-maximum.

2 No data are yet available for bar-closed conditions in Estero Americano since the bar has not been closed when water quality data were being collected.

Geysers

The Geysers Alternative will potentially affect creeks adjacent to the pipeline alignment that extends from Delta Pond north to the geysers steamfield area, and creeks in the steamfield area. Water bodies of the geysers study area are shown in Figure 4.4-1a, b, and c.

Creeks

Water quality in the creeks of the geysers study area is influenced by several types of land use in the watersheds that drain the area. Much of the land in the area is

Table 4.6-25

Summary of Water Quality in Geysers Creeks

Constituent[1] (in mg/L unless otherwise noted)	Big Sulphur Creek BiS-26.2		Big Sulphur Creek BiS-16.1		Cobb Creek Co-0.1		Squaw Creek Sq-8.1	
	Range	Average[2]	Range	Average[2]	Range	Average[2]	Range	Average[2]
Alkalinity (as $CaCO_3$)	62-246	132	71-180	127	66-198	119	103-180	145
Aluminum	ND (0.020)-0.13	<0.081	0.21-0.95	0.50	ND (0.030)-0.25	<0.109	ND (0.030)-1.2	<0.500
Arsenic	ND (0.002-0.002)	ND (0.002)	ND (0.002)-0.020	<0.0039	ND (0.002)-0.011	<0.0028	ND (0.002-0.002)	ND (0.002)
Boron	ND (0.05)-1.4	<0.45	0.42-3.90	1.53	0.29-1.2	0.57	ND (0.05)-0.40	<0.26
Cadmium	ND (0.0005-0.001)	<0.00083	ND (0.0005-0.001)	<0.00083	ND (0.0005-0.001)	<0.00083	ND (0.0005-0.001)	<0.00083
Chromium	0.0015-.0002	<0.0018	0.0014-0.012	0.0055	ND (0.001)-0.002	<0.0014	ND (0.001)-0.0029	<0.0020
Chromium Hexavalent	ND (0.001-0.002)	<0.002	ND (0.001-0.002)	<0.002	ND (0.001-0.002)	<0.002	ND (0.001-0.002)	<0.002
Copper	0.003-0.0088	0.0053	ND (0.002)-0.005	<0.0033	ND (0.002-0.003)	<0.0023	ND (0.002)-0.006	<0.0037
Dissolved Oxygen	7.6-11.3	9.4	8.7-11.4	10.0	8.0-10.8	9.6	8.3-10.9	9.6
Conductivity (µmhos/cm)	150-570	300	185-660	391	148-395	250	215-345	287
Flow (cu ft/sec)	0.7-87.0	19.4	2.3-239.9	54.2	0.5-44.6	12.4	0.1-21.1	6.2
Hardness (as $CaCO_3$)	75-170	123	100-190	145	83-130	107	100-150	125
Iron	0.060-0.18	0.109	0.11-1.1	0.54~~540~~	0.060-0.200	0.111	0.12-1.00	0.447

- Unnamed Creek tributary to Pool Creek; and
- Pool Creek.

These creeks are small, or wide and shallow, and probably all are seasonal. They have little if any canopy to maintain lower water temperatures. The substrate for these creeks is predominantly silt and sand indicating erosion upstream and lower velocities. In-stream shelter (root wads, emergent plants, boulders) for aquatic life is generally non-existent. All of these creeks appear influenced by cattle grazing. Grazing animals appear to have access to the creeks and banks are noticeably eroded in many areas. Urban influences from roads and nearby businesses and residences appear to impact water quality in these creeks as evidenced by the presence of trash, water diversions, and channelization.

Santa Rosa Creek and Mark West Creek are located along the proposed geysers pipeline alignment. These creeks were addressed in the Santa Rosa Plain/Russian River section.

Surface Water Quality Goals, Objectives, and Policies

Table 4.6-26 identifies goals, objectives, and policies which provide guidance for development in relation to surface water quality. The table also indicates which criteria in the Surface Water Quality Section are responsive to each set of policies.

Table 4.6-26

General Plan Goals, Objectives, and Policies - Surface Water Quality

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Sonoma County General Plan	Resource Conservation Element	Policy RC-3d Policy RC-3e	Encourage the construction of wastewater disposal systems designed to reclaim and reuse treated wastewater on agricultural crops, and which minimizes discharges into natural waterways to protect water quality If discharge is proposed, review and comment on projects and environmental documents and request that projects maximize reclamation, conservation and reuse programs to minimize discharges and protect water quality and aquifer recharge areas.	1,2,4

Table 4.6-26

General Plan Goals, Objectives, and Policies - Surface Water Quality

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Marin Countywide Plan	Environmental Quality Element	Policy EQ-2.31	Water quality should be maintained or enhanced to promote the continued environmental health of natural waterway habitats	1,2,4

Table 4.6-27

Evaluation Criteria with Point of Significance - Surface Water Quality

		Point of Significance		
Biostimulatory Substances - Adverse. An increase in benthic or planktonic algae.	Benthic algae biomass and planktonic algae biomass as monthly average of chlorophyll *a*	10% increase	10% increase	Basin Plans narrative criteria. 10%, established by professional judgment, for identifying impacts on creeks. Ecological impacts on benthic or planktonic algae are also addressed by the dissolved oxygen criterion.
Biostimulatory Substances - Beneficial. A decrease in benthic or planktonic algae will be considered beneficial.	Benthic algae biomass and planktonic algae biomass as monthly average of chlorophyll *a*	10 % decrease	10% decrease	10%, established by professional judgment, for identifying impacts on creeks. Ecological impacts on benthic or planktonic algae are also addressed by the dissolved oxygen criterion.
Sediment	Suspended sediment in waterways	any increase	any increase	Basin Plans narrative criterion
Salinity. The discharge to San Pablo Bay or its tributaries may cause an increase in salinity.	ppt		any increase above background	Basin Plan narrative criterion
Temperature	°F	5 °F increase in monthly average temperature	4 °F increase in monthly average temperature in estuaries	Basin Plans narrative criteria
Turbidity - Adverse	monthly average planktonic algal biomass as chlorophyll *a*	20% increase	20% increase	Basin Plans narrative criterion~~,~~ of 20%, ~~established by professional judgment,~~ to protect visual-related beneficial uses (i.e., aesthetics and fish feeding). Other causes of turbidity (i.e., soil, streambed, and streambank erosion) are addressed in Sections 4.3 (soil) and 4.4 (streambed and bank)

Table 4.6-27

Evaluation Criteria with Point of Significance - Surface Water Quality

		Point of Significance		
Temperature	°F	5 °F increase in monthly average temperature	4 °F increase in monthly average temperature in estuaries	Basin Plans narrative criteria
Turbidity - Adverse	monthly average planktonic algal biomass as chlorophyll *a*	20% increase	20% increase	Basin Plans narrative criterion~~.~~ of 20%, ~~established by professional judgment,~~ to protect visual-related beneficial uses (i.e., aesthetics and fish feeding). Other causes of turbidity (i.e., soil, streambed, and streambank erosion) are addressed in Sections 4.3 (soil) and 4.4 (streambed and bank)
Turbidity - Beneficial	monthly average planktonic algal biomass as chlorophyll *a*	20% decrease		20%, established by professional judgment, to protect visual-related beneficial uses (i.e., aesthetics and fish feeding).
Waste Reduction Strategy - Adverse a) Discharge to the Laguna may increase the concentration of ammonia. Discharge to the Laguna may cause ammonia-nitrogen load to the Laguna not to be reduced by 21,500 pounds per year	Pounds ammonia-nitrogen/year	a) If ammonia-nitrogen load in the Laguna is not reduced by 21,500 pounds per year.		This criterion applies only to the Laguna a) The North Coast Regional Water Quality Control Board Waste Reduction Strategy establishes an ammonia-nitrogen load reduction goal of 21,500 pounds per year for the Subregional System (see Table 4 in North Coast Regional Board 1995) The waste reduction strategy for ammonia was developed to bring the Laguna into attainment with EPA and Basin Plan ammonia water quality objective.
4. The Project may cause sediment quality evaluation criteria to be exceeded.				
Acenaphthene	µg/g organic carbon	130	230	EPA criteria
Dieldrin	µg/g organic carbon	11	20	EPA criteria
Endrin	µg/g organic carbon	4.2	0.76	EPA criteria

of the narrative-based criteria is described in the *Development of Evaluation Criteria for Potential Water Quality Impacts* Technical Report, (Merritt Smith Consulting 1996f).

Narrative criteria, by definition, do not specify quantitative values or thresholds. The EIR/EIS authors could find no precedent for establishing a point of significance for evaluating Project effects on algae. Therefore, a quantitative point of significance for evaluating Project impacts of biostimulatory substances was established as a matter of professional judgement. The point of significance was established at 10 percent change from existing conditions based on several considerations. Changes in algae biomass affect the dissolved oxygen regime and turbidity (which affects the sight-feeding of fish and aesthetic qualities of the water). Attached algae in particular affect the characteristic of the River bottom, and can make rocks slippery (which is considered a nuisance and safety concern). The combination of the biostimulatory substance, dissolved oxygen, and turbidity evaluation criteria was considered redundant. The 10 percent point of significance was established, based on the professional judgment of the EIR/EIS authors, to be consistent with the 0.5 mg/L dissolved oxygen change (i.e., the authors believe that a 10 percent algae change would result approximately in a 0.5 mg/L dissolved oxygen change). The turbidity criterion was established at 20 percent to be consistent with the 20 percent value established in the North Coast Regional Board Basin Plan, and is intended to address aesthetic concerns.

Special Sites Criteria

The Management Plan of the Gulf of the Farallones National Marine Sanctuary and the regulations (15 CFR ~~936~~Part 922 Subpart H) indicate that the Sanctuary was created to protect an unusual site. The policy of the Bay Regional Board regarding the State-designated Area of Special Biological Significance at Tomales Point is that no Project shall affect water quality in the Area. Therefore, a higher standard is applied to water quality impacts potentially affecting these resources. Any water quality change in the Area of Special Biological Significance or in the Sanctuary is considered significant. This evaluation criterion is based on the Sanctuary's interpretation of the federal regulations for the Sanctuary and findings of significance do not necessarily mean that the water quality change would adversely affect aquatic life or the suitability of Sanctuary habitat for aquatic life.

Sediment Criteria

The EPA has proposed sediment quality criteria under Section 304(a) of the Clean Water Act for the following five nonionic organic chemicals: acenaphthene, dieldrin, endrin, fluoranthene, and phenanthrene. The proposed sediment quality criteria have been used to develop Project evaluation criteria.

METHODOLOGY

Surface water quality impacts were evaluated based on water quality data that characterize the receiving water environment and reclaimed water. The approach used to evaluate potential impacts from Project components that potentially affect surface water quality is described below.

Potential impacts for three components (headworks expansion, pump stations, and geysers steamfield) are not addressed in detail throughout the following section, because they will not affect surface water quality. No methodology is presented for analysis of these components.

Urban Irrigation

Section 2.2 of this EIR/EIS and the *Urban Irrigation Management Guidelines* Technical Report describe conditions under which urban irrigation will occur (Questa Engineering Corporation, Inc. 1996d). The potential for effects on surface water was evaluated based on the Project description and an assessment of potential impacts was made.

Pipelines

Potential impacts of pipeline construction and rupture on water quality were evaluated by inspecting each location where a pipeline will cross a distinct waterway. Waterways were evaluated for substrate type (which relates to erosion and sediment transport potential) and other characteristics that were used to evaluate for potential aquatic life impacts (e.g., vegetation, in-stream shelter). The results of the creek crossing surveys are reported in the *Stream Crossings Assessment* Technical Report (Merritt Smith Consulting 1996p).

Potential impacts of a pipeline rupture on water quality related to numeric criteria were evaluated by comparing undiluted reclaimed water to the appropriate numeric criteria, assuming no dilution of reclaimed water by ambient water. Due to the short duration of exposure from a pipeline rupture, the acute EPA guidelines (one hour) were used to evaluate for potential impacts. Potential impacts from pipeline construction related to narrative criteria were evaluated by considering the type of construction (jack and bore or open trench) at each crossing.

Storage Reservoirs

Storage reservoirs potentially affect surface waters by seepage of reclaimed water through soil, discharge via the spillway due to rainfall runoff, and dam failure. Seepage impacts were evaluated for each storage site by estimating the mixing of reservoir seepage with groundwater and using the groundwater and effluent quality data. This method is described in the *Water Quality and Flow Model for Irrigation/Storage Area Streams* Technical Report (Resource Management Associates 1996a).

The quality of reclaimed water that may seep from reservoirs is not necessarily the same as that described in Table 4.6-1, since biological activity in a thermally stratified storage reservoir affects reclaimed water quality. In particular, dissolved oxygen can depleted, nitrate can be converted to ammonia, and sulfur compounds can be converted to hydrogen sulfide in the bottom layer of a thermally stratified reservoir. Thermal stratification can exist from mid-spring through summer. For purposes of the surface water quality impacts analysis, maximum ammonia and hydrogen sulfide formation was assumed because ammonia is of more concern for aquatic biota than nitrate. The reason for this higher level of concern is that ammonia is toxic to aquatic life, but nitrate is not. The groundwater impacts evaluation assumed that nitrate levels in reclaimed water are not reduced by conversion to ammonia, because drinking water standards for nitrate are the primary concern for groundwater.

Agricultural Irrigation

Agricultural irrigation potentially affects surface waters through subsurface seepage with subsequent discharge (subflow). Subflow quantity and quality were characterized by estimating the mixing of irrigation-related flow and groundwater using the groundwater and effluent quality data. This method is described in the following Technical Reports:

- *Estimation of Nitrogen, Salts, Pesticides in Surface Waters* (Questa Engineering Corporation, Inc. 1996c)
- *Baseline Hydrology and Irrigation Drainage Evaluation for West and South County Reclamation Alternatives* (Questa Engineering Corporation, Inc. 1996b)
- *Estimation of Metals Concentrations in Surface and Groundwater* (Questa Engineering Corporation, Inc. 1996a)
- *Water Quality and Flow Model for Irrigation/Storage Area Streams* (Resource Management Associates 1996a)

Information about background surface and groundwater flow rates and quality, reservoir seepage rate and quality, irrigation subflow rate and quality was input to a model that was established for each watershed. The model was developed to estimate flow and water quality at key locations in the watersheds. Average flow and quality at each location was estimated for each storage option in the watershed (e.g., for Stemple watershed the storage options are Two Rock, Huntley, and no storage). The flow and quality impacts were estimated as average spring and summer conditions. The effect on surface water of irrigating lands located outside of the Tolay watershed and outside of Bay Flats area was evaluated in the *Baseline Hydrology and Irrigation Drainage Evaluation for West and South County Reclamation Alternative* (Questa Engineering Corporation, Inc. 1996b).

Bay Flats were addressed separately from other Project areas because the soils and drainage characteristics of Bay Flats soils are fundamentally different from other Project areas. Project irrigation drainage from the bay flats area will be pumped into the Petaluma River Estuary during the fall/winter season, as managed by Novato Sanitation District. This management approach and potential effects of irrigation of Bay Flats areas on surface water quality are described in *Hydrologic/Water Quality Evaluation of Irrigation of Baylands (Reyes Soils) with Reclaimed Water*, (Questa Engineering Corporation, Inc. 1996e) and *Water Quality Impact Analysis* Technical Report (Merritt Smith Consulting 1996r).

Discharge

Several different methods were used to evaluate the impacts of discharge. Impacts on water quality constituents affected by biological activity were estimated with a water quality simulation model; impacts on conservative constituents were estimated with a dilution model; impacts on waste load reduction were evaluated with a nutrient load model, and impacts on sediment quality were estimated with a partition coefficient model. These methods of impact evaluation are described in the following sections.

Constituents Affected by Biological Activity - Water Quality Simulation Model

The potential impacts of design and contingency discharge on biologically reactive constituents in the Laguna de Santa Rosa and the Russian River were evaluated using a hydraulic and water quality model (Resource Management Associates 1996b). This model was developed from the earlier adaptation of EPA's QUAL2e model by the North Coast Regional Board. North Coast Regional Board staff and other interested parties provided input to establish needs for further model refinement. The model simulates reclaimed water dilution, uptake of nutrients by planktonic and benthic algae, growth of planktonic and benthic algae, average and minimum dissolved oxygen, ammonia, and temperature with different discharge scenarios.

Design discharge scenarios are described in Table 4.6-28.

Table 4.6-29

Russian River Flows

Condition	Russian River Flows Year	Year Approximate Rank	Estimated Return Frequency (years)
Very Dry	1976~~10th percentile~~	10th percentile~~1976~~	18.5
Normal	1961~~50th percentile~~	50th percentile~~1961~~	2
Very Wet	1982~~90th percentile~~	90th percentile~~1982~~	14.5

The 10th percentile water year (1976) is the year in which total annual Russian River flow was less than 90% of the total annual Russian River flow values during the period of record (see Surface Hydrology section). Operations of the Subregional System, including reclaimed water design discharge, for each of the design discharge components cited above in this paragraph were based on the *Water Balance Contingency Plan* Technical Reports (Parsons Engineering Science, Inc. 1996b). Daily flow estimates for 1976, 1961, and 1982 are based on actual River flow measurements that were adjusted to reflect future diversions, consistent with the method described in the *Water Balance Contingency Plan* Technical Report (Parsons Engineering Science, Inc. 1996b).

The model simulates reclaimed water dilution, uptake of nutrients by planktonic and benthic algae, growth of planktonic and benthic algae, dissolved oxygen, temperature, and other water quality characteristics using an hourly time step. From this information, the model estimates the mean, minimum, and maximum monthly biomass of benthic and planktonic algae, temperature, dissolved oxygen concentrations, and ammonia concentrations at locations in Santa Rosa Creek, the Laguna de Santa Rosa, and the Russian River for each of the three hydrologic years. These estimates are made for baseline conditions (without design discharge) and with design discharge.

The model simulates fundamental relationships between physical (e.g., temperature, sunlight, and flow) and chemical conditions (e.g., nutrient concentrations and dissolved oxygen), and algae growth. Like most water quality models, QUAL2E was originally developed so that the rate at which various phenomena occur (e.g., flux of nutrients from sediment and nutrient uptake rate) can be adjusted to most closely represent conditions in the waterway that is the subject of the simulation. The process of fine-tuning the model to represent local conditions is called calibration.

- The Laguna between Santa Rosa Creek and the Russian River,
- The Russian River between the proposed discharge location above the Wohler intakes and the Laguna (SCWA reach),
- The Russian River between the Laguna and a point seven miles downstream (Hacienda reach), and
- The Russian River in the seven-mile reach below the Hacienda reach (Guerneville reach).

Table 3-1 of the North Coast Regional Board Basin Plan states that the 50th and 90th percentile objectives of 10 and 7.5 mg/L (which apply to the Laguna and Russian River) are being attained if 50 and 90% of the monthly averages are equal to or greater than the respective objectives (10 and 7.5 mg/L). The Regional Board has also established a minimum dissolved oxygen objective of 7.0 mg/L; thus if any value in the Laguna or Russian River is less than 7.0 mg/L then the water is not in attainment. The monthly average dissolved oxygen values estimated by the model were calculated in each reach to determine attainment of the objectives under the existing condition baseline and under each design discharge scenario. If the minimum, the 50th, or the 90th percentile objective was not in attainment under the existing condition baseline, then any decrease in monthly average dissolved oxygen was considered significant. If each of the dissolved oxygen objectives was attained under the existing condition baseline but the design discharge alternative caused nonattainment of the minimum, the 50th, or the 90th percentile objective, then the impact was considered significant. Model-predicted changes in dissolved oxygen of less than 0.5 mg/L were not considered significant due to model uncertainty.

Model estimates of the minimum dissolved oxygen (based on hourly estimates) were also evaluated for impacts. These minimum hourly concentrations for each month were evaluated for the same hydraulic years and locations as the monthly average dissolved oxygen. If any predicted minimum monthly dissolved oxygen concentration for the Project alternatives was 1) 0.5 mg/L below the estimated existing monthly dissolved oxygen minimum and 2) below the point of significance for minimum dissolved oxygen, the impact was considered significant.

- **Ammonia**. There are two ammonia criteria: a numeric criterion for protection of aquatic organisms from potential toxic effects, and a narrative criterion for ammonia load reduction. The numeric criterion applies to the Russian River and the narrative criterion applies to the Laguna and Santa Rosa Creek. Model estimates of the monthly maximum total ammonia were made for the Russian River creek reaches defined above; estimates were made for dry, normal, and wet conditions. The numeric ammonia criterion is temperature and pH dependent. To evaluate for significant impacts in the Russian River with respect to the numeric-based ammonia criterion, the monthly maximum total ammonia was compared to the criterion for the long-term average temperature and pH of the lower Russian

River. Average temperatures and average pH values were obtained from data reported in the *Russian River Water Quality Monitoring Results* Technical Report (Merritt Smith Consulting 1996n). The approach used for evaluating for ammonia waste load changes (which applies only to the Laguna de Santa Rosa and Santa Rosa Creek) is described below.

- **Algae.** The monthly average algae biomass (mass per area) and plankton density (mass per water volume) were calculated by averaging all of the estimates for a

Table 4.6-31

Surface Water Quality Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
• Other storage sites			O&M C	❍ ==
Dissolved Oxygen • West County, Tolay, and Sears Point storage sites	< 5 mg/L minimum	< 5 mg/L	O&M C	⊙ ==
• Other storage sites			O&M C	❍ ==
Hydrogen Sulfide • West County, Tolay, and Sears Point storage sites	> 2 mg/L	> 2 mg/L	O&M C	⊙ ==
• Other storage sites			O&M C	❍ ==
All other numeric criteria			O&M C	❍ ==
6.5.2. Will the storage reservoir component cause narrative-based criteria to be exceeded?			O&M C	❍ ==
6.5.3. Will the storage reservoir component impact special sites?				
Will the storage reservoir component cause water quality changes to occur in an Area of Special Biological Significance or in the Sanctuary? • West County reservoirs	(Any water quality change) This evaluation criterion is based on NOAA's interpretation of the regulations of the Sanctuary and findings of significance do not necessarily mean that the water	The concentration of water quality constituents will change	C O&M	== ●

Table 4.6-31

Surface Water Quality Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
	quality change would adversely affect aquatic life or the suitability of Sanctuary habitat for aquatic life			
• South County reservoirs		No Sanctuary or Area of Special Biological Significance in South County	O&M, C	==

Mitigation: *Alternatives 2A, 2C, 2D, and 3.*

2.5.3 Control Program for Hydrogen Sulfide, Ammonia, and Dissolved Oxygen

Alternatives 1, 2B, 4, and 5. No mitigation is proposed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2A, 2C, 2D, and 3.*

If ammonia is detected in the storage reservoir and the creek below the dam, a system of wells will be installed between the reservoirs and downstream receiving waters that will be operated to intercept shallow groundwater seeping from the storage site. Intercepted groundwater will be returned to the storage reservoir and, therefore, ammonia will be prevented from entering the creek below the dam. Interception of seepage would slightly increase the magnitude of the flow reduction that would be caused by the dam. Flow impacts on aquatic habitat are considered in Section 4.9.

Impact: 6.5.1. Dissolved Oxygen. Will the storage reservoir component cause numeric-based criteria to be exceeded?

Analysis: *Significant; Alternatives 2A, 2C, 2D, and 3.*

Americano Creek, Stemple Creek, and Tolay Creek Watersheds. Seepage of this lower layer of anoxic water from any of the storage reservoirs could suppress dissolved oxygen in surface waters to levels that are less than 5 mg/L (the applicable regulatory standard). Dissolved oxygen levels could remain below the standard in reaches of creek up to 120 feet below the dam.

Less than Significant; Alternative 2B

Watersheds of the Lakeville and Adobe Road storage sites. Seepage is not expected to reach surface water in watersheds of the Lakeville and Adobe Road storage sites (Questa Engineering Corporation, Inc. 1996b).

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternative 2A, 2C, 2D, and 3.*

2.5.3. Control Program Hydrogen Sulfide, and Ammonia, and Dissolved Oxygen

Alternative 1, 2B, 4, and 5. No mitigation is proposed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2A, 2C, 2D, and 3.*

See discussion under Impact 6.5.1. Ammonia above.

Impact: **6.5.1. Hydrogen Sulfide. Will the storage reservoir component cause numeric-based criteria to be exceeded?**

- the creeks. Impacts of agricultural irrigation from the commingling of percolate and surface water are discussed in this section.

Table 4.6-32

Surface Water Quality Impacts by Component – Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
6.7.1. Will the agricultural irrigation component cause numeric-based criteria to be exceeded? **Dissolved copper** • West County irrigation	14 µg/L	up to 15 µg/L	O&M O&M-CP	⊙ ⊙
• South County and Sebastopol irrigation		Less than 14 µg/L	O&M O&M-CP	❍ ❍
All other numeric criteria			O&M O&M-CP	❍ and ==
6.7.2. Will the agricultural component cause narrative-based criteria to be exceeded?				
All narrative criteria			O&M O&M-CP	❍ ❍
6.7.3. Will the agricultural irrigation component impact special sites?				
The Project may cause water quality changes to occur in an Area of Special Biological Significance or in the Sanctuary.	Any water quality change			
• West County Irrigation	This evaluation criterion is based on NOAA's interpretations of the regulations of the Sanctuary and findings of significance do not necessarily mean that the water quality change would adversely affect aquatic life or the suitability of	The concentration of water quality constituents will be affected in the esteros	O&M O&M-CP	● ●

Table 4.6-32

Surface Water Quality Impacts by Component – Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
	Sanctuary habitat for aquatic life			
• South County and Sebastopol Irrigation		None	O&M	==
6.7.4. Will the agricultural irrigation component cause sediment quality evaluation criteria to be exceeded?				
All sediment criteria			O&M O&M-CP	❍ and == ❍ and ==

Source: *Water Quality Impacts Analysis*, Merritt Smith Consulting 1996r

Notes: [1]. Type of Impact:
O&M Operation and Maintenance
O&M-CP Operation and Maintenance - Contingency Plan

[2]. Level of Significance codes:
● Significant impact before and after mitigation,
⊙ Significant impact before mitigation; less than significant impact after mitigation
❍ Less than significant impact; no mitigation proposed

surface water quality is expected (Questa Engineering Corporation, Inc. 1996b).

Alternatives 1, 4, and 5 do not have an agricultural irrigation component.

Mitigation: *Alternative 3.*

2.5.2. Control program for dissolved copper.

Alternative 1, 2, 4, and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternative 3.*

Americano Creek and Stemple Creek Agricultural Irrigation Areas. Winter irrigation acreage will initially be limited to 4,500 acres in the Stemple watershed. Winter irrigation will be limited to 360 acres in the subwatershed in which the Bloomfield reservoir is located. These limitations are based on assumptions that will be verified by monitoring. Creeks in the Stemple and Americano watersheds will be monitored monthly for dissolved copper and hardness. With the monitoring information, the irrigation acreage limitations can then be adjusted to a size that will prevent exceedences of the dissolved copper criterion.

The concentrations of dissolved copper in Americano and Stemple Creeks and their tributaries with irrigation were estimated using an average reclaimed water concentration of dissolved copper from 1991 through January 1995 (0.010 mg/L) (Merritt Smith Consulting 1996k). In September 1995, the Sonoma County Water Agency began balancing the pH in drinking water for the purposes of reducing corrosion in water supply pipes. Reducing corrosion of copper water supply pipes will potentially reduce the concentration of dissolved copper in reclaimed water. The concentration of copper in reclaimed water since September 1995 is 0.008 mg/L (n = 2 samples), indicating a potential long-term reduction in dissolved copper (Merritt Smith Consulting 1996l). Therefore, the concentration of dissolved copper in irrigation water may also be reduced.

Contingency irrigation in the Stemple or Americano irrigation areas will not occur prior to collection of dissolved copper and hardness data (in association with design irrigation specified above), and an evaluation of the data to calculate the appropriate contingency irrigation acreage to avoid significant impacts. Contingency irrigation of the indicated acreage could be initiated based on the results of the evaluation. Monitoring of contingency irrigation impacts should be conducted to verify the impacts analysis that is based on the post-design irrigation monitoring data.

Impact: 6.7.2. Will the agricultural irrigation component cause narrative-based criteria to be exceeded?

Analysis: *Less than Significant; Alternatives 2 and 3.*

Measures 2.2.1, 2.2.3, 2.2.4, 2.2.5, 2.2.6, and 2.2.7 will minimize the impact of irrigation and agriculture on streams. The technical analysis (Merritt Smith Consulting 1996r), shows that sediment and nutrient loads will be reduced by the Project. Thus, attainment of narrative objectives will be enhanced by the Project. This impact is considered to be less than significant.

No Impact; Alternatives 1, 4, and 5.

Alternatives 1, 4, and 5 do not have an agricultural irrigation component.

Mitigation: No further mitigation is proposed.

Impact: 6.7.3. Salinity, ammonia, dissolved oxygen, planktonic algae, benthic algae, and metals. Will the agricultural irrigation component cause the special site criterion to be exceeded?

Analysis: *Significant; Alternative 3.*

Americano Creek and Stemple Creek Agricultural Irrigation Areas. Salinity, ammonia, dissolved oxygen, planktonic algae, benthic algae, and metals will be affected. Other constituents, such as algal growth nutrients, individual inorganic minerals (e.g., chloride), and organic compounds (e.g., naturally occurring organic acids) will also be affected in the esteros. The analysis shows that water quality throughout much of the esteros will potentially be affected, although the magnitude of the effect is usually small. The magnitude of the effect is dependent on time of year, estero inlet condition (open vs. closed), and hydrology (e.g., wet year). Were it not for the policy-based evaluation criterion, some of the water quality changes in the Sanctuary (such as increased dissolved oxygen and decreased manure load) would be considered beneficial.

No Impact; Alternatives 1, 2, 4, and 5.

Sebastopol and South County Irrigation Areas. There are no Areas of Special Biological Significance or Sanctuaries in the Sebastopol or South County Agricultural Irrigation Areas, and so no significant impacts have been identified.

Alternatives 1, ~~2~~, 4, and 5 do not have an agricultural irrigation component.

Mitigation: *Alternative 3.* No feasible mitigation has been identified (Merritt Smith Consulting 1996r).

Alternatives 1, 2, 4, and 5. No mitigation is needed.

Table 4.6-33

Significant Adverse and Beneficial Impacts of Each Alternative[1] Before and After Mitigation[2]

Constituent	Santa Rosa Creek	Laguna	Russian River Below Laguna	Russian River Above Laguna
Conductivity				*5A*
Cyanide	*1*, ~~5B~~	*1*, ~~5B~~		
Average Dissolved Oxygen	*5B*	*5B*		
Benthic Algae				
• Adverse	*1*, 2&3, 4, 5A, 5B	*1*, 2&3, 4, 5A, 5B	*1*, 5A, 5B	5A
• Beneficial	*1*, 2&3, 4, 5A, **5B**	*1*, 2&3, 4, 5A, **5B**	*1*, 2&3, 4, 5A, **5B**	
Planktonic Algae				
• Adverse		2&3, 5A	5B	5A
• Beneficial	*1*, 5B	*1*, 5B	5A	
Turbidity				
• Adverse				~~5A~~
• Beneficial	*1*, ~~5B~~	*1*, ~~5B~~	5A	
Waste Reduction Strategy				
• Total Nitrogen				
♦ Adverse	*1*, ~~5B~~			
♦ Beneficial	2&3, 4, 5A			
• Ammonia N				
♦ Adverse	*1*, ~~5B~~		Criterion applies only to Laguna system	
♦ Beneficial	2&3, 4, 5A			
Toxicity	*1*, ~~5B~~			

Source: Section 4, *Water Quality Impacts Analysis*, Merritt Smith Consulting 1996r

1. Components causing a significant adverse or beneficial impact are shown. Overstriking indicates impact avoided with mitigation, italics indicates no mitigation proposed, bold indicates impacts that are significant after mitigation that are not significant before mitigation. Components are identified as follows:
   1 = (Alt 1) - No Action discharge scenario
   2&3 = (Alts 2&3) - 1% design discharge scenario
   4 = (Alt 4) - Geysers discharge scenario
   5A = (Alt 5A) - 20% design discharge scenario to River
   5B = (Alt 5B) - 20% design discharge scenario to Laguna
2. Mitigation of benthic algae, planktonic algae, and average dissolved oxygen involves revising discharge operations to minimize discharge during fall and spring. Mitigation for waste reduction strategy (total nitrogen load and ammonia load) is to reduce nitrogen load to the Laguna at appropriate sources. Mitigation for the No Action discharge scenario (Alt 1) is not considered in this EIR/EIS.

Table 4.6-34

Surface Water Quality Impacts by Component - Discharge

		Russian River			Laguna de Santa Rosa and Santa Rosa Creek		
Evaluation Criteria	**Point of Significance[1]**	**Impact**	**Type of Impact[2]**	**Level of Signifi-cance[3]**	**Impact**	**Type of Impact[2]**	**Level of Signifi-cance[3]**
Average Dissolved Oxygen	~~> 7 mg/L minimum and~~ 10 mg/L 50th percentile monthly average or any decrease if receiving water not in compliance						
• Alt 1 - No Action discharge	Upper row shows the lowest ~~minimum~~ monthly	8.8 mg/L, 9.5 mg/L <0.5 mg/L decrease	O&M	❍	7.0 mg/L, 8.2 mg/L <0.5 mg/L decrease	O&M	❍
• Alt 2 and 3 - 1% design discharge	average and lowest median ~~monthly average~~	8.6 mg/L, 9.6 mg/L <0.5 mg/L decrease	O&M	❍	7.0 mg/L, 8.3 mg/L <0.5 mg/L decrease	O&M	❍
• Alt 4 - Geysers discharge	value of the 3 hydrologic years. Lower row shows	8.9 mg/L, 9.6 mg/L <0.5 mg/L decrease	O&M	❍	7.0 mg/L, 8.3 mg/L <0.5 mg/L decrease	O&M	❍
• Alt 5A - 20% design discharge to the Russian River	change from existing conditions.	9.0 mg/L, 9.5 mg/L <0.5 mg/L decrease	O&M	❍	7.0 mg/L, 8.3 mg/L <0.5 mg/L decrease	O&M	❍
		<0.5 mg/L decrease	O&M-CP	❍	<0.5 mg/L decrease	O&M-CP	❍

Table 4.6-34

Surface Water Quality Impacts by Component - Discharge

		Russian River			Laguna de Santa Rosa and Santa Rosa Creek		
Evaluation Criteria	**Point of Significance[1]**	**Impact**	**Type of Impact[2]**	**Level of Signifi-cance[3]**	**Impact**	**Type of Impact[2]**	**Level of Signifi-cance[3]**
• Alt 5B - 20% design discharge to the Laguna	Less than 0.5 mg/L change not considered significant.	8.8 mg/L, 9.5 mg/L <0.5 mg/L decrease <0.5 mg/L decrease	O&M O&M-CP	❍ ❍	7.0 mg/L, 8.2 mg/L 0.5 mg/L decrease <0.5 mg/L decrease	O&M O&M-CP	● ❍
Minimum Dissolved Oxygen	< 7.0 mg/L minimum and > 0.5 mg/L change. Less than 0.5 mg/L change not considered significant.				< 6.0 and < 7.0 mg/L minimum (Santa Rosa Creek and Laguna, respectively) and > 0.5 mg/L change. Less than 0.5 mg/L change not considered significant.		
• Alt 1 - No Action discharge	Upper row shows the lowest hourly	7.3 mg/L <0.5 mg/L decrease	O&M	❍	5.7 mg/L <0.5 mg/L decrease	O&M	❍
• Alt 2 and 3 - 1% design discharge	minimum value of the 3 hydrologic years.	7.3 mg/L <0.5 mg/L decrease	O&M	❍	5.9 mg/L <0.5 mg/L decrease	O&M	❍
• Alt 4 - Geysers discharge	Lower row shows decrease from existing conditions.	7.3 mg/L <0.5 mg/L decrease	O&M	❍	5.9 mg/L <0.5 mg/L decrease	O&M	❍

Table 4.6-34

Surface Water Quality Impacts by Component - Discharge

		Russian River			Laguna de Santa Rosa and Santa Rosa Creek		
Evaluation Criteria	**Point of Significance[1]**	**Impact**	**Type of Impact[2]**	**Level of Signifi-cance[3]**	**Impact**	**Type of Impact[2]**	**Level of Signifi-cance[3]**
• Alt 5A - 20% design discharge to the Russian River	For contingency discharge, upper row shows the lowest hourly minimum value for months in which contingency discharge occurs. Lower row shows decrease from existing conditions.	7.9 mg/L <0.5 mg/L decrease	O&M	❍	5.9 mg/L <0.5 mg/L decrease	O&M	❍
		7.4 mg/L <0.5 mg/L decrease	O&M-CP	❍	6.8 mg/L 1.1 mg/L decrease	O&M-CP	⊙
• Alt 5B - 20% design discharge to the Laguna		7.3 mg/L <0.5 mg/L decrease	O&M	❍	5.5 mg/L <0.5 mg/L decrease	O&M	❍
		7.4 mg/L <0.5 mg/L decrease	O&M-CP	❍	7.8 mg/L <0.5 mg/L decrease	O&M-CP	❍
All other numeric-based criteria.			C	❍		C	❍
			P	==		P	==
			O&M	❍		O&M	❍
			O&M-CP	❍		O&M-CP	❍

Table 4.6-34

Surface Water Quality Impacts by Component - Discharge

		Russian River			Laguna de Santa Rosa and Santa Rosa Creek		
Evaluation Criteria	**Point of Significance[1]**	**Impact**	**Type of Impact[2]**	**Level of Signifi-cance[3]**	**Impact**	**Type of Impact[2]**	**Level of Signifi-cance[3]**
6.9.2. Will the discharge component cause narrative-based criteria to be exceeded?							
Biostimulatory substances - Adverse	> 10% increase in chlorophyll *a*, monthly average	(number shown for higher of benthic algae or planktonic algae)			(number shown for higher of benthic algae or planktonic algae)		
• Alt 1 - No Action discharge		69% increase	O&M	●	134% increase	O&M	●
• Alt 2 and 3 - 1% design Discharge		<1% increase	O&M	❍	29% increase	O&M	●
• Alt 4 - Geysers discharge		3% increase	O&M	❍	40% increase	O&M	●

Impact: 6.9.1. Conductivity. Will the discharge component cause numeric-based criteria to be exceeded?

Analysis: *Laguna and Santa Rosa Creek*

The conductivity evaluation criterion does not apply to the Laguna or Santa Rosa Creek.

Russian River

Significant; Alternative 5A.

Discharge to the Russian River may cause exceedence of the conductivity criterion in the Russian River. Conductivity is dependent upon the salt content of the water. Reclaimed water always contains more electro-conductive salts than the River, since reclaimed water derives from the River and salts are among the contaminants added as water is converted to sewage. Salts are not removed in the treatment process. Therefore, any discharge elevates the conductivity of the River. The Regional Board has established a 50th percentile water quality objective for conductivity of 250 µmhos/cm in the River above the confluence with the Laguna de Santa Rosa. This standard is the point of significance for conductivity evaluation criterion. The 50th percentile standard is met in the River currently. The attainment of the 50th percentile standard is determined using the average monthly conductivity in a calendar year. If the average monthly conductivity exceeds 250 µmhos/cm in six or more months, the River will be considered to be in non-attainment of the standard (i.e., the standard is attained if the median of twelve monthly average values is less than 250 µmhos/cm).

The 20% design discharge to the Russian River could cause conductivity in the Russian River above the Laguna to increase by as much as about 48 ~~45~~ µmhos/cm. ~~This estimate is conservative since lack of data in the upper River required the use of conductivity data from the Russian River below the confluence with the Laguna to estimate impacts (Merritt Smith Consulting 1996r). Since the Russian River below the confluence contains reclaimed water, conductivity in the Russian River above the confluence is likely to be lower. In some months during the discharge season that do not currently exceed the 250 µmhos/cm point of significance, this increment is sufficient to cause the average to exceed 250 µmhos/cm.~~ The average conductivity is predicted to exceed the point of significance in eight ~~nine~~ of the twelve months.

The 20% design discharge to the Russian River with contingency discharge could cause conductivity in the Russian River above the Laguna to increase by as much as about 60 ~~50~~ µmhos/cm. In some months during the discharge season that do not currently exceed the 250 µmhos/cm point of significance, this increment is sufficient to cause the average to exceed

Russian River

Less than Significant; Alternative 5.

Contingency discharge is not predicted to cause total cyanide to exceed the water quality criterion for cyanide in the Russian River above or below the confluence with the Laguna.

No Impact; Alternatives 1, 2, 3, and 4.

These alternatives do not have contingency discharge.

Mitigation: *Alternative 5B.*

2.5.6. Cyanide Monitoring and Source Control Program

Alternatives 1, 2, 3, 4, and 5A. No mitigation is proposed.

After Mitigation: *Significant; Alternative 1.*

The No Action (No Project) Alternative, by definition, does not include mitigation.

Less than Significant after Mitigation; Alternative 5B.

Monitoring will determine if source control is needed. If the concentration of cyanide in a storage pond exceeds the concentration determined to cause no impact for three consecutive samples or if the annual average cyanide concentration in a storage pond exceeds the concentration determined to cause no impact, the City shall implement a cyanide source control program.

Cyanide is known to be introduced into the Subregional System sewer at only a few locations. With implementation of the source control program, cyanide levels will be reduced to a level below significance by enforcement of limits for industrial dischargers of cyanide as needed to avoid exceeding the cyanide point of significance in receiving waters.

Impact: **6.9.1. Average Dissolved oxygen. Will the discharge component cause numeric-based criteria to be exceeded?**

Analysis: ***Operation and Maintenance***

Laguna and Santa Rosa Creek

Significant; Alternative 5B

The Laguna is rarely in attainment of the Basin Plan objectives for dissolved oxygen. Nutrients that derive from reclaimed water and other sources (North Coast Regional Board 1995) stimulate growth of algae (see 6.9.2, Narrative-based Evaluation Criteria section below), and the increase in algae consumes dissolved oxygen at night (when no photosynthesis can occur) more rapidly than oxygen is replenished from the atmosphere. Therefore, a contribution to a reduction of ~~average~~ dissolved oxygen on the part of the Project would be considered significant, because it will worsen an existing exceedence of the standards. The 20% discharge scenario will reduce average dissolved oxygen in the Laguna and/or Santa Rosa Creek by up to 0.5 mg/L (a difference of less than 0.5 mg/L was considered insignificant due to insufficient model precision). This reduction in dissolved oxygen will be from 9.61 mg/L to 9.10 mg/L.

Less than Significant; Alternatives 1, 2, 3, 4, and 5A.

The impacts of discharge on ~~average~~ dissolved oxygen in the Laguna and Santa Rosa Creek are less than significant for all discharge scenarios except 20% design discharge to the Laguna (see Table 4.6-36).

Table 4.6-36

Effects of Discharge on Average Dissolved Oxygen in the Laguna and Santa Rosa Creek (mg/L)

Discharge Scenarios	Lowest Monthly Average of 3 Hydrologic Years[1]	Lowest Median Monthly Average Value of 3 Hydrologic Years[2]	Maximum Effects Relative to Existing Conditions Baseline[3]
Alt 1 - No Action discharge	7.0	8.2	<0.5
Alt 2 & 3 - 1% Design discharge	7.0	8.3	<0.5
Alt 4 - Geysers discharge	7.0	8.3	<0.5
Alt 5A - 20% Design discharge to the Russian River	7.0	8.3	<0.5
Alt 5 B 20% Design discharge to the Laguna	7.0	8.2	0.5[4]
Existing Conditions	7.0	8.3	-

Source: *Water Quality Impacts Analysis*, Merritt Smith Consulting 1996r

1. Value shown is the lowest model predicted monthly average dissolved oxygen concentration of the three hydrologic years (normal dry, wet) for Santa Rosa Creek and the Laguna. The lowest value was identified from among 72 possible values (12 months x 3 years x 2 location).
2. Value shown is the lowest of the six median monthly average dissolved oxygen concentration (one median of 12 monthly average dissolved oxygen values for each of the hydrologic years for Santa Rosa Creek and the Laguna).
3. Value shown is the largest difference between existing monthly average dissolved oxygen concentrations and predicted monthly average dissolved oxygen for discharge scenario. The largest difference was identified from among 72 possible values (see footnote 1).
4. The maximum difference between existing monthly average dissolved oxygen and predicted monthly average dissolved oxygen with Alternative 5 B occurred in a month that was not the lowest of the three hydrologic years nor the lowest median monthly average.

Russian River

Less than Significant; All Alternatives.

The impacts of discharge on average dissolved oxygen in the Russian River are less than significant because predicted average dissolved oxygen concentrations for all discharge scenarios are not different from existing conditions (<0.5 mg/L difference between predicted average dissolved oxygen and existing average dissolved oxygen).

Operation and Maintenance - Contingency Plan

Laguna and Santa Rosa Creek

Less than Significant; Alternatives 5.

The impacts of contingency discharge on average dissolved oxygen in the Laguna and Santa Rosa Creek are less than significant.

No Impact; Alternatives 1, 2, 3, and 4.

These alternatives are not expected to have a contingency discharge.

Russian River

Less than Significant; Alternative 5.

The impacts of contingency discharge on average dissolved oxygen in the Russian River are less than significant.

No Impact; Alternatives 1, 2, 3, and 4.

These alternatives are not expected to have a contingency discharge.

Mitigation: *Alternative 5B.* No feasible mitigation has been identified.

Alternatives 1, 2, 3, 4, and 5B. No mitigation is proposed.

Impact: 6.9.1. Minimum Dissolved Oxygen. Will the discharge component cause numeric-based criteria to be exceeded?

Analysis: ***Operation and Maintenance***

Laguna and Santa Rosa Creek

Less than Significant; Alternatives 1, 2, 3, 4, and 5A

The impacts of discharge on minimum dissolved oxygen in the Laguna and Santa Rosa Creek are less than significant because predicted minimum dissolved oxygen concentrations for all discharge scenarios were either above the point of significance or were not different from existing conditions (<0.5 mg/L difference and/or between predicted minimum dissolved oxygen and existing minimum dissolved oxygen.

Russian River

Less than Significant; All Alternatives.

The impacts of discharge on minimum dissolved oxygen in the Russian River are less than significant for all discharge scenarios because predicted minimum dissolved oxygen concentrations for all discharge scenarios were above the point of significance and/or were not materially different from existing conditions (<0.5 mg/L difference between predicted minimum dissolved oxygen and existing minimum dissolved oxygen).

Operation and Maintenance - Contingency Plan

Laguna and Santa Rosa Creek

Significant; Alternative 5A

Predicted minimum dissolved oxygen in the Laguna in one month with contingency discharge (April) is predicted to be 6.8 mg/L which is below the point of significance for the Laguna of 7.0 mg/L. This predicted minimum dissolved oxygen was 1.1 mg/L less than the predicted existing minimum dissolved oxygen for that month.

Less than Significant; Alternative 5B.

The impacts of contingency discharge on minimum dissolved oxygen in the Laguna and Santa Rosa Creek are less than significant because predicted minimum dissolved oxygen concentrations for all discharge scenarios were above the point of significance and/or were not materially different from existing conditions (<0.5 mg/L difference between predicted minimum dissolved oxygen and existing minimum dissolved oxygen).

No Impact; Alternatives 1, 2, 3, and 4

These alternatives are not expected to have a contingency discharge.

Russian River.

Less than Significant; Alternative 5.

The impacts of contingency discharge on minimum dissolved oxygen in the Russian River are less than significant because predicted minimum dissolved oxygen concentrations for all discharge scenarios were either above the point of significance or were not different from existing conditions (<0.5 mg/L difference between predicted minimum dissolved oxygen and existing minimum dissolved oxygen), or both.

No Impact; Alternatives 1, 2, 3, and 4.

These alternatives are not expected to have a contingency discharge.

Mitigation: *Alternative 5A - Contingency Discharge*

2.5.11. Discharge to the Laguna During Very Dry Years

Alternatives 1, 2, 3, 4, and 5B. No mitigation is proposed.

Alternatives 1, 2, 3, 4, and 5B.

No mitigation is proposed.

Impact: **6.9.1. Acrolein, chlorpyrifos, demeton, guthion (azinphos-methyl), malathion, parathion, and toxaphene. Will discharge scenario cause numeric-based criteria to be exceeded?**

Analysis: *Laguna, Santa Rosa Creek, and Russian River*

Less than Significant; All Alternatives.

These substances are not detectable in reclaimed water but the detection limit is greater than the evaluation criterion. Recognized analytical methods that are routinely available to wastewater discharges do not provide sufficiently low detection limits to evaluate attainment of EPA's water quality standard. This impact is considered less than significant, but mitigation is required to assure that periodic monitoring for these substances is conducted.

~~No s~~Significant impacts are predicted from ~~contingency discharge~~ mitigation operations for biostimulatory substances (Measure 2.5.4) that would ~~are~~ not also result ~~predicted~~ from design discharge. ~~with one exception. The only exception is for contingency discharge with mitigation discharge operating scenario.~~ In the case of Alternative 5B, contingency discharge with mitigation operations (Measure 2.5.4) is predicted to cause increases in the maximum ammonia concentration in two ~~one~~ months of the year (January and February) that exceed the point of significance. Ammonia is of concern because high concentrations are toxic to aquatic life. For Alternative 5B, contingency discharge with mitigation operations is also predicted to cause a decrease in the minimum dissolved oxygen concentration in one month of the year that is less than the point of significance.

Significant beneficial impacts of reclaimed water discharge scenarios have been identified for particular constituents in particular creek reaches and are summarized in Table 4.6-42. Table 4.6-42 summarizes the number of beneficial impacts of each discharge scenario with and without mitigation. The Mitigation Discharge Operating Scenario generally increases the number of significant beneficial impacts.

Table 4.6-43 illustrates the net impact of discharge scenarios on benthic algae, planktonic algae, turbidity and waste reduction strategy. Net impact is calculated by subtracting the percent of significant adverse impacts shown in Table 4.6-41 from the percent of significant beneficial impacts shown in Table 4.6-42. Thus, a positive value in Table 4.6-43 indicates more beneficial than adverse impacts on benthic algae, planktonic algae and turbidity. Table 4.6-43 shows that mitigation will provide a net beneficial impact for the discharge scenarios for which mitigation is proposed (Alternatives 4, 5A, 5B). Net impact can be so calculated only for benthic algae, planktonic algae, turbidity and waste reduction strategy because these are the only surface water quality evaluation criteria for which significant beneficial impacts could be identified.

Table 4.6-42

Number of Significant Beneficial Impacts of Project and Mitigation Discharge Operating Scenario

		Percent of Analyses with Significant Impacts							
		Benthic Algae		Planktonic Algae		Turbidity		Waste Reduction Strategy	
Discharge Scenario	No.[1] Analyses	Project	Mitig	Project	Mitig	Project	Mitig	Project	Mitig
Alt 1	108	0%		4%		4%		0%	
Alts 2 & 3	108	14%	14%	0%	0%	0%	0%	100%	100%

Table 4.6-42

Number of Significant Beneficial Impacts of Project and Mitigation Discharge Operating Scenario

		Percent of Analyses with Significant Impacts							
		Benthic Algae		Planktonic Algae		Turbidity		Waste Reduction Strategy	
Alt 4	108	13%	12%	0%	0%	0%	0%	100%	100%
Alt 5A	144	9%	17%	12%	15%	8%	8%	100%	100%
Alt 5B	108	0%	16%	4%	2%	4%	0%	0%	0%

Source: *Water Quality Impacts Analysis*, Merritt Smith Consulting 1996R

[1] This column shows the number of scenarios that were analyzed using the evaluation approach described in this report (108 = 3 creek segments *x* 3 types of years *x* 12 months/year).

These measures are consistent with the Long-Term Project description and mitigation (see Section 2.2) and, as such, will tend to reduce impacts of the West County irrigation and storage components. However, the measures recommended in the Stemple Creek/Estero de San Antonio Watershed Enhancement Plan will result in changes to the flow and quality of Stemple Creek that will cause water quality changes in Estero de San Antonio. Under the evaluation criteria established to evaluate the significance of potential impacts in the Esteros, the impact of the Stemple Creek/Estero de San Antonio Watershed Enhancement Plan, Santa Rosa's irrigation and storage components, or both will be considered significant. This evaluation criterion is based on the Sanctuary's interpretation of regulations of the Sanctuary and findings of significance do not necessarily mean that the water quality change would adversely affect aquatic life or the suitability of Sanctuary habitat for aquatic life. The Stemple Creek/Estero de San Antonio Watershed Enhancement Plan was developed to provide a beneficial impact on Estero de San Antonio.

South County

Cumulative projects with a potential nexus with water quality impacts of Project components are shown in Table 4.6-50. Potential impacts of cumulative projects (projects listed in Table 4.6-50) plus irrigation and storage components of the Long-Term Project on surface water quality are evaluated below.

Tolay Creek. As noted in Section 7.1.1 of the *Water Quality Impacts Analysis* technical report (Merritt Smith Consulting 1996r), obstructions in the Tolay Creek channel are expected to limit the effect of the Project to Tolay Creek above Highway 121. These obstructions will not be eliminated by the cumulative projects cited in Table 4.6-50. The cumulative projects cited in Table 4.6-50 will enhance tidal circulation in the slough downstream of the obstructions. Thus, the impact of cumulative projects is considered to be less than significant.

Petaluma River. The Petaluma Wastewater Facilities Project has a potential water quality nexus with Project irrigation in the Petaluma watershed. Chapter 2 of the *Petaluma Wastewater Treatment and Storage Facilities Project* Draft EIR 1994 indicates that Petaluma's wastewater discharge into the Petaluma River will have similar quality but less quantity (due to increased storage and irrigation) than current discharge. Any impacts on the Petaluma River of future Petaluma discharge will be reduced from current impacts. The concentration of some metals in undiluted Petaluma wastewater exceeds applicable water quality criteria (see Table 4.6-20). These criteria may also be exceeded in the Petaluma River near Petaluma's outfall. With the exception of copper, the concentrations of detectable constituents in Santa Rosa's reclaimed water and in ditch water (estimated concentration) from Bay Flats irrigation are less than the applicable points of significance. The estimated concentration of copper in ditch water from bay flats Long-Term Project irrigation (11.8 mg/l) is less than the concentration of copper in Petaluma's wastewater (20 mg/L - see Table 4.6-20). Therefore, discharge of Bay Flats irrigation water could only lessen any impacts of Petaluma's discharge. Thus, the Project cannot cause an exceedence, or cause the magnitude of an existing exceedence to increase, despite any impacts of cumulative projects on water quality and cumulative projects impact is considered to be less than significant.

been identified that will change background water quality conditions in the Laguna or Santa Rosa Creek, which are not affected by any wastewater discharges except that of the Subregional System and the City of Windsor. The City of Windsor discharges to the Laguna at Trenton Healdsburg Road. Increased total annual volume was evaluated, but no changes in its maximum discharge rate (because of Basin Plan restrictions) or quality (because of pretreatment regulations) are included in cumulative projects. Thus, the Project cannot cause an exceedence, or cause the magnitude of an existing exceedence (e.g. cyanide) to increase, despite any impacts of cumulative projects on water quality. Therefore, the cumulative impacts analysis will not address any of the constituents evaluated using the dilution method, other than conductivity in the Russian River.

The Project design discharge alternatives caused an exceedence of the conductivity point of significance in the Russian River above the Laguna, and conductivity in the Russian River is potentially affected by other discharges. The potential for cumulative projects to cause significant conductivity impacts in the River above and below the Laguna has been evaluated as described below.

Conductivity Evaluation above the Laguna

For purposes of this analysis, the incremental (cumulative Project) discharge from other communities was assumed not to lower the baseline conductivity in the Russian River above the Laguna, and will probably cause conductivity to increase. This assumption is based on the fact that Ukiah, Cloverdale, and Healdsburg derive much of their water supply from the Russian River. The remaining water comes from wells with conductivity and/or TDS concentrations that equal or exceed that found in the Russian River (pers. comm., Frank Noyd, City of Ukiah; Tony Villa, City of Cloverdale; Dick Pusick, City of Healdsburg). As it passes through the treatment system, water cannot decrease in conductivity without the use of reverse osmosis, and none of these communities have capability. Therefore, although conductivity is not measured in their treated effluent (pers. comm., Frank Noyd, City of Ukiah; Tony Villa, City of Cloverdale; Dick Pusick, City of Healdsburg), the future incremental discharge from Ukiah, Cloverdale, and Healdsburg is expected to result in equal or higher conductivity than the baseline conductivity in the Russian River above the Laguna. Since the 20% design discharge to the Russian River above the Laguna is estimated to cause a significant impact on conductivity, this impact of cumulative projects will also be considered significant.

Conductivity Evaluation below the Laguna

The impact of cumulative projects on conductivity in the Russian River below the Laguna was assessed by assuming that all the conductivity in the River is due to reclaimed water (a conservative approach). The flow in the River in each month of an average year (1961) was obtained from the monthly water balance model, and the proportion of the monthly flow that will be due to the incremental flow from non-Santa Rosa reclaimed water discharge was determined then multiplied by the existing monthly conductivity to get a predicted monthly increase in conductivity due to non-Santa Rosa reclaimed water discharge. The estimated incremental monthly conductivity value was added to the monthly conductivity values predicted for a 20% design discharge to the Laguna and 20% design discharge to the River (see Table 4.6-12) to estimate monthly conductivity under the cumulative project condition. If the median of twelve monthly average conductivity values exceeded the point of significance, then the impact will be considered to be significant.

implementation of the Regional Board's nutrient load reduction strategy in the Laguna.

Impacts are further described below.

Table 4.69-53

Frequency of Significant Adverse Impacts of Cumulative Projects, the Project, and Mitigation Operations

		Percent of the Total Number of Analyses With Significant Impact							
		Benthic Algae		Planktonic Algae		Turbidity		Dissolved Oxygen	
Discharge Component	**No. of Analyses[1]**	**Project**	**Mitig**	**Project**	**Mitig**	**Project**	**Mitig**	**Project**	**Mitig**
Alt. 1	36	55%	-	0%	-	0%	-	0%	-
Alts. 2&3	36	3%	6%	0%	0%	0%	0%	0%	0%
Alt. 4	36	3%	3%	0%	0%	0%	0%	0%	0%
Alt. 5A	48	27%	15%	0%	0%	0%	0%	0%	0%
Alt. 5B	36	58%	0%	3%	0%	0%	0%	3%	0%

[1] This column shows the maximum number of significant impacts that could be identified using the evaluation approach described in this report (36 = 3 stream segments *x* 12 months/year, 48 = 4 stream segments x 12 months/year).

SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Table 4.6-58

Summary of Impacts and Mitigation Measures - Surface Water Quality

Impact	Level of Significance	Mitigation Measure
No Action Alternative		
6.1.1. The No Action Alternative may cause numeric-based criteria to be exceeded. (See 6.9.1 for detailed description).	Alt 1 - ●	No mitigation
6.1.2. The No Action Alternative may cause narrative-based criteria to be exceeded. (see 6.9.2 for detailed description).	Alt 1 - ●	No mitigation
Storage Reservoir Component		
6.5.1 Ammonia. The storage reservoir component may cause numeric-based criteria to be exceeded.	Alt 2A - ⦿ Alt 2C - ⦿ Alt 2D - ⦿ Alt 3 - ⦿	2.5.3 Control Program for Hydrogen Sulfide, Ammonia, and Dissolved Oxygen.
6.5.1 Dissolved oxygen. The storage reservoir component may cause numeric-based criteria to be exceeded.	Alt 2A - ⦿ Alt 2C - ⦿ Alt 2D - ⦿ Alt 3 - ⦿	2.5.3 Control Program for Hydrogen Sulfide, Ammonia, and Dissolved Oxygen.
6.5.1 Hydrogen sulfide. The storage reservoir component may cause numeric-based criteria to be exceeded.	Alt 2A - ⦿ Alt 2C - ⦿ Alt 2D - ⦿ Alt 3 - ⦿	2.5.3 Control Program for Hydrogen Sulfide, Ammonia, and Dissolved Oxygen.
6.5.3. The storage reservoir component may impact special sites.	Alt 3 - ●	~~No feasible mitigation has been identified.~~2.5.3 Control program for hydrogen sulfide, ammonia, and dissolved oxygen.
Agricultural Irrigation Component		
6.7.1 Dissolved copper. The agricultural irrigation component may cause numeric-based criteria to be exceeded.	Alt 3 - ⦿	2.5.2 Control Program for Dissolved Copper Levels in West County Creeks.

Table 4.6-58

Summary of Impacts and Mitigation Measures - Surface Water Quality

Impact	Level of Significance	Mitigation Measure
6.7.3. Salinity, ammonia, dissolved oxygen, planktonic algae, benthic algae, and metals. The agricultural irrigation component may cause the special site criterion to be exceeded. Were it not for the policy-based evaluation criterion, some of the water quality changes in the Sanctuary (such as increased dissolved oxygen and decreased manure load) would be considered beneficial.	Alt 3 - ●	~~No feasible mitigation has been identified.~~ 2.5.1 Pesticide Control Program, 2.5.2 Control Program for Dissolved Copper Levels
Discharge Component		
6.9.1. Conductivity. The discharge component may cause numeric-based criteria to be exceeded.	Alt 5A - ●	No feasible mitigation has been identified.
6.9.1. Cyanide. The discharge component may cause numeric-based criteria to be exceeded.	Alt 1 - ● Alt 5B - ⊙	 2.5.5. Cyanide Monitoring and Source Control Program.
6.9.1. Dissolved oxygen. The discharge component may cause numeric-based criteria to be exceeded.	Alt 5B - ●	No feasible mitigation has been identified.
6.9.2. Biostimulatory Substances. The discharge component may cause narrative based criteria to be exceeded.	Alt 1 - ● Alt 2 - ● Alt 3 - ● Alt 4 - ● Alt 5 - ●	2.5.4 Discharge Operations.
6.9.2. Biostimulatory Substances. Beneficial. The discharge component may cause narrative-based criteria to be exceeded.	Alt 1 - + Alt 2 - + Alt 3 - + Alt 4 - + Alt 5 - +	None required.
6.9.2. Turbidity-Adverse. The discharge component may cause narrative-based criteria to be exceeded.	Alt 5 - ●	2.5.4 Discharge Operations.

Table 4.6-58

Summary of Impacts and Mitigation Measures - Surface Water Quality

Impact	Level of Significance	Mitigation Measure
6.9.2. Turbidity. Beneficial. The discharge component may cause narrative-based criteria to be exceeded.	Alt 1 - + Alt 5A - + Alt 5B - +/❍	None required.

Table 4.6-60 summarizes the significant adverse and beneficial impacts of Project components on surface water quality, and the level of significance after implementation of mitigation. Storage, irrigation, and discharge components were found to have a significant impact, and other components were found to cause a less-than-significant impact or no impact. The impacts of the storage, irrigation, and discharge components are discussed below.

Storage Reservoir Component

Construction of a storage reservoir is included in Alternatives 2 and 3. Storage reservoirs will have a significant effect on water quality immediately downstream of a dam due to seepage from the reservoir. This will be mitigated by intercepting any seepage that discharges to surface water and pumping it back to the reservoir.

Storage will also affect flow, and, in West County, changes in flow are considered to result in a significant impact on water quality in the Estero de San Antonio or the Estero Americano (part of the Gulf of the Farallones National Marine Sanctuary). Any water quality impact in the Sanctuary is considered to be significant. Measures have been adopted as part of the Project which will reduce this significant impact, but no mitigation has been identified which will avoid impacts in the esteros altogether.

Agricultural Irrigation Component

Subflow from irrigation that discharges to streams in West County (Alternative 3) will cause a significant impact in Stemple and Americano creeks with respect to the concentration of dissolved copper. Mitigation involves reducing irrigation acreage to avoid a significant impact.

Irrigation, like storage, is projected to affect the flow in West County streams. Although storage alone will slightly decrease stream flow, the combined effect of storage and irrigation is to increase flow into the esteros by up to about 2.5 cfs. Measures have been adopted as part of the Project to improve management of animal waste and other agricultural materials in the watershed. The combined effect of reduced animal waste and slightly increased flow will have a small, but significant impact on water quality in the esteros. No mitigation has been identified which will completely avoid impacts in the esteros. Were it not for the policy-based evaluation criterion, these water quality changes in the Sanctuary would be considered beneficial.

Discharge Component

The No Action Alternative (Alternative 1) will involve continued discharge to the Laguna, but if the City takes no action on a Long-Term Project, CEQA does not require mitigation for impacts. Therefore, Alternative 1 is considered to have a greater impact than the 20% design discharge (Alternative 5). The impact of cumulative projects plus the discharge under the No Action Alternative component is similar to the impact of the No Action discharge alone.

Table 4.6-60

Summary of Significant Adverse and Beneficial Surface Water Quality Impacts[1]

Evaluation Criterion	Santa Rosa Creek	Laguna	Russian River	West Co. Creeks	Esteros	Tolay Creek	Petaluma River	Other Waters
Dissolved Copper	None	None	None	~~Irrig~~	*Irrigation & Storage (any water quality change is significant, and changes in many parameters are predicted) Were it not for the policy-based evaluation criterion, some of the water quality changes in the Sanctuary (such as increased dissolved oxygen and decreased manure load) would be considered beneficial*	None	None	None
Ammonia	See Waste Red. Strategy	See Waste Red. Strategy	None	~~Storage~~		~~Storage~~	None	None

Table 4.6-60

Summary of Significant Adverse and Beneficial Surface Water Quality Impacts[1]

Evaluation Criterion	Santa Rosa Creek	Laguna	Russian River	West Co. Creeks	Esteros	Tolay Creek	Petaluma River	Other Waters
Conductivity	Criterion not applicable		*20% River*	Criterion NA		Criterion not applicable		
Cyanide	~~20%,~~ *NP*	~~20%~~, *NP*	None	None		None	None	None
Dissolved Oxygen	**20%**	20%	None	~~Storage~~		~~Storage~~	None	None
Hydrogen Sulfide	None	None	None	~~Storage~~	None	~~Storage~~	None	None

Table 4.6-60

Summary of Significant Adverse and Beneficial Surface Water Quality Impacts[1]

Evaluation Criterion	Santa Rosa Creek	Laguna	Russian River	West Co. Creeks	Esteros	Tolay Creek	Petaluma River	Other Waters
Biostimulatory Substances - Benthic algae					*Irrigation & Storage (any water quality change is significant, and changes in many parameters are predicted)*). Were it not for the policy-based evaluation criterion, some of the water quality changes in the Sanctuary (such as increased dissolved oxygen and decreased manure load) would be considered beneficial.			
• Adverse	1%,20%, 20% River, *NP*, G	1%, 20%, 20% River, *NP*, G	20%, 20% River, *NP*	None		None	None	None
• Beneficial	1%, **20%,** 20%River, G, *NP*	1%, **20%,** 20%River, G, *NP*	1%, **20%,** 20%River, G, *NP*	None		None	None	None

Table 4.6-60

Summary of Significant Adverse and Beneficial Surface Water Quality Impacts[1]

Evaluation Criterion	Santa Rosa Creek	Laguna	Russian River	West Co. Creeks	Esteros	Tolay Creek	Petaluma River	Other Waters
Biostimulatory Substances Planktonic algae								
• Adverse		1%, 20%River	20%, 20% River	None		None	None	None
• Beneficial	20%, *NP*	20%, *NP*	20% River	None		None	None	None
Turbidity								
• Adverse			~~20% River~~					
• Beneficial	*NP*, ~~20%~~	*NP*, ~~20%~~	20% River					
Waste Reduction Strategy			Criterion not applicable					
• Total Nitrogen								
♦ Adverse	~~20%~~, *NP*							

REPLACEMENT PAGES

SECTION 4.7

PUBLIC HEALTH AND SAFETY

The California Health and Safety Code provides authority for mosquito abatement districts to advise and control mosquito production on private and public lands and to assess the land owner for the cost of that control. The districts also have the authority to hold hearings and assess civil penalties to abate nuisance and potential health threats to the general public (California Health and Safety Code, Sections 2270-2294). The Marin/Sonoma Mosquito Abatement District (Abatement District) and the Vector Biology and Control Branch of the California Department of Health Services are responsible for overseeing the mosquito prevention program within the Project area. The primary objective of the Abatement District is to suppress the mosquito population below the threshold level required for disease transmission or nuisance tolerance level.

The Abatement District has produced several documents addressing mosquitoes and other biting arthropods associated with wastewater reclamation or disposal projects. These documents provide project design criteria for mosquito prevention as well as guidelines for proper management of wastewater reclamation or disposal projects. The design criteria include minimizing the amount of over-irrigation, ponding, or tail water, thereby significantly reducing the need to treat these sites with pesticides and the subsequent need to provide the Abatement District with compensation for that control effort. These criteria are addressed in the Project design where new irrigated areas would be created (refer to the *Irrigation Management Guidelines*, Questa Engineering Corporation 1996).

Public Health and Safety Goals, Objectives, and Policies

Table 4.7-6 identifies goals, objectives, and policies which provide guidance for development in relation to potable water supplies and exposure to hazardous materials or waste. The table also indicates which criteria in the Public Health and Safety Section are responsive to each set of policies.

Table 4.7-6

General Plan Goals, Objectives, and Policies - Public Health and Safety

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Sonoma County General Plan	Resource Conservation Element	Goal RC-3	~~Assure an adequate long term supply of water for domestic use~~ Conserve, enhance, and manage water resources, protect their quality, and assure an adequate supply of water for domestic, fishing, industrial, and agricultural use	1

Table 4.7-6

General Plan Goals, Objectives, and Policies - Public Health and Safety

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Sonoma County General Plan	Public Safety Element	Goal PS-4 Objective PS-4.2	Prevent unnecessary exposure of people and property to risks from hazardous materials, and regulate their transport, storage and use to reduce risks to acceptable levels	1

Table 4.7-9

Summary of Possible Exposure Pathways

Pathway	Comments
Russian River to Domestic Water Supply	Potentially complete pathway; Russian River flows will dilute discharge; Groundwater will dilute discharge; Discharge occurs for a maximum of 7.5 months per year
Fish Consumption	Potentially complete pathway; Animal data indicate that this pathway is not significant
Recreational Use	Potentially complete pathway; Discharge occurs during portion of year when swimming and wading uses are low; Fishers protected by clothing
Urban and Agricultural Irrigation	Potentially complete pathway; Orders of magnitude smaller exposure than domestic water use scenario; Ingestion discouraged by State-mandated posting of warning signs and design requirements
Storage Ponds	No probable complete pathway; Ponds are fenced and public access is restricted
Reservoirs to Domestic Water Supply	Potentially complete pathway; Groundwater dilution of nitrates may not be adequate at some reservoir sites
Geyser Injection	No probable complete pathway; Closed system of pipes and tanks; Water injected in excess of 3,000 feet below ground surface

Source: Parsons Engineering Science, Inc. February 1996

Toxicity Assessment and Risk Characterization

Hazard quotients are used to evaluate the noncarcinogenic health effects of the chemical components. A hazard quotient of less than 1.0 indicates that a chemical is not expected to produce an adverse health effect. Excess cancer risks are used to evaluate carcinogenic health effects of the chemical components. In general, excess cancer risks greater than one in a million (1×10^{-6}) to one in one-hundred thousand (1×10^{-5}) are considered by the State of California to pose a significant threat to human health (Title 22, California Code of Regulations, э12703). For this assessment the lower excess cancer risk of 1.0×10^{-6} is used as a screening level for carcinogenic health effects. This is the most health-protective value.

The analysis of risk from the detected biological components in the Laguna Plant effluent is evaluated by comparing the data to a known infective dose (*Giardia*), to background concentrations (total coliform, *Cryptosporidium* and *Giardia*, and heterotrophic bacteria), and to regulatory standards (total coliform).

Chemical and biological components that do not pass the screen are examined further and are evaluated as to their environmental fate (chemical or biological degradation), attenuation (loss of viability in the case of pathogens), filtration, dilution by groundwater or surface water, background concentrations, and

California Office of Emergency Services requires preparation of an inundation map and development of a downstream evacuation plan for areas within the potential inundation area (California Water Code §6002, and California Government Code §8589.5). This requirement is discussed in Chapter 2, Measure 2.2.14, Dam Safety.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: No mitigation is proposed.

Impact: 7.5.6. Will the storage reservoir component increase the potential exposure of the public to disease vectors (i.e., mosquitoes)?

Analysis: *Significant; Alternatives 2 and 3.*

The impoundment of water will create potential habitat for mosquitoes. Shallow reservoirs with a large surface area to volume ratio, such as Tolay, will be more likely to create mosquito habitat than deeper reservoirs. Reservoirs with irregular shorelines will also be more likely to create mosquito habitat. Reservoirs will generally be filled during the winter and early spring and emptied during the summer as water is withdrawn for irrigation. Thus, potential mosquito habitat will be created by the reservoirs at any time when water is present.

No Impact; Alternatives 1, 4 and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternatives 2 and 3.*

2.3.16 Mosquito Prevention Program

Alternatives 1, 4 and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Mosquito abatement measures will reduce impacts to less than significant.

much smaller than potential uptake via exposure to reclaimed water in a domestic use scenario, which includes ingestion, inhalation and dermal contact, and from eating fish. Chemicals that do not present an adverse health risk via the domestic use or fish consumption pathways will not present an adverse health risk to persons swimming or wading in the River.

Only historic concentrations of nitrate and nitrite in the Laguna Plant effluent exceed California and Federal drinking water standards and the human health criteria for the domestic use scenario (100 percent reclaimed water as a domestic water source). Discharges at a Russian River outfall, however, will be diluted with river water, which will bring the nitrate and nitrite levels below levels of concern even at the 20 percent discharge rate. In the Laguna de Santa Rosa, shallow groundwater conditions indicate that it is a groundwater discharge area, that is, during winter months (the discharge season) when groundwater levels are high, the prevailing hydrologic conditions result in movement of water from groundwater into streams (Section 4.5, Groundwater). Thus, neither discharge location will adversely affect drinking water quality at domestic water sources.

The human health risk assessment found no chemicals that presented an unacceptable risk via the fish consumption pathway. Swimming or wading will not adversely affect human health because ingestion during recreational exposure (possibly of a few milliliters on an irregular basis) would be very much less than ingestion in the domestic exposure, which assumes a person drinks 2 liters of water per day. In addition, discharge would occur during the time of year when the recreational activities that represent the highest potential level of exposure (i.e., swimming and wading) will be least likely to occur.

Microorganism concentrations (coliform bacteria) are below levels set by the State for reclaimed water usage for recreational impoundments. In addition, the concentrations of coliform bacteria in the Russian River upstream of the confluence with Mark West Creek are higher than the historical concentrations in the Laguna Plant effluent. Thus the discharge does not present any additional risk than already exists in the River, based on the presence of coliform bacteria. While *Giardia* and *Cryptosporidium* ~~*lamblia*~~ cysts were detected in the Laguna Plant effluent, the discharge will not cause the existing concentration of cysts in the Russian River to increase.~~, they do not present an unacceptable risk based on the EPA's risk criterion as stated in the Surface Water Treatment Rule and calculated in the human health risk assessment. In addition, *Giardia* cysts have been detected in the Russian River.~~ No other pathogenic microorganisms (~~*Cryptosporidium*,~~ *Legionella*, *Salmonella*, *Shigella*, or enteric viruses) were detected in the Laguna Plant effluent.

Mitigation: No mitigation is proposed.

REPLACEMENT PAGES

SECTION 4.8

TERRESTRIAL BIOLOGICAL RESOURCES

Table 4.8-2

Special-Status Animal Species

	STATUS				MANAGEMENT CONCERNS	
Species	**State**	**Federal**	**Other**	**Source**	**Habitat**	**Potential Threats**
Dendroica petechia Yellow warbler	SSC	--	--	1,4	Coastal and valley riparian forests and woodlands.	Habitat degradation and loss, and brood parasitism.
Elanus leucurus White-tailed kite	CFP	--	--	1,4	Grasslands, agricultural lands, meadows, and marshes for foraging. Nests and perches in dense topped trees.	Habitat destruction due to agricultural and urban development.
Falco columbarius Merlin	SSC			1	Foraging habitat includes brackish and freshwater marsh, salt ponds, grassland, oak woodland, and agricultural land.	Habitat degradation and loss.
Falco mexicanus Prairie falcon	SSC			1	Foraging habitat includes freshwater marsh, grassland, and agricultural land.	Loss of foraging habitat, human disturbance at eyries, and shooting.
Geothlypis trichas sinuosa Salt marsh common yellowthroat	SSC	--	--	1,2,3,4, 5	Fresh and saltwater marshes; needs thick continuous cover down to the water surface for foraging.	Habitat degradation and loss.

Notes and sources are at the end of the table.

and prairie falcon (*Falco mexicanus*) also forage in fallow fields during the fall and winter months. Migratory waterfowl species such as Canada goose (*Branta canadensis*) may seasonally depend on croplands for foraging habitat.

Croplands are found in association with a variety of habitat types such as orchard-vineyard, pasture, annual grassland, valley foothill riparian, mixed chaparral, and fresh emergent wetland.

Orchard-Vineyard

Animal species which may use orchard or vineyard communities for cover, foraging, or breeding habitat include widespread species such as, western scrub jay (*Aphelocoma californica*), American crow (*Corvus brachrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottus*), and California ground squirrel (*Spermophilus beecheyi*). No special-status animal species are associated with this man-made, cultivated habitat.

Orchards and vineyards may be associated with cropland, pasture, and urban wildlife habitats. They are also found near native habitats such as valley foothill riparian and mixed chaparral.

Pasture

Pastures may be utilized by a wide variety of wildlife species. However, the use of this habitat is dependent upon the geographic region and availability of adjacent habitat types. Waterfowl, ring-necked pheasant (*Phasianus colchicus*), California quail, (*Callipepla californica*) and other ground-nesting birds will nest in pastures if adequate vegetation is present at the start of the nesting season. Pastures that pond water naturally (i.e., during the winter) or that are flood-irrigated provide feeding and roosting sites for wetland-associated birds such as shorebirds, waterfowl, and some raptors. In addition, deer will graze in pastures if sufficient escape cover is available. Although there are no special-status animal species that are associated with pastures, overwintering ferruginous hawks and other special-status raptors often use pastures as foraging habitat.

Pastures are frequently associated with several other wildlife habitat types including cropland, annual grassland, and orchard-vineyard.

Annual Grassland

Relatively undisturbed annual grasslands provide nesting habitat for bird species such as western meadowlark (*Sturnella neglecta*) and horned lark (*Eremophila alpestris*), as well as the western burrowing owl (*Speotyto cunicularia hypugea*). This habitat produces large numbers of seeds that are shed and become available to bird species such as American pipit (*Anthus rubescens*), lark sparrow

(*Chondestes grammacus*), and savanna sparrow (*Passerculus sandwichensis*). Mammals that also forage on seeds and are found in this habitat include deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californicus*), California ground squirrel, and Botta's pocket gopher (*Thomomys bottae*). These rodents also become the prey base for various resident raptors, such as golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), white-tailed kite (*Elanus leucurus*), and northern harrier (*Circus cyaneus*), that utilize wide, open grasslands as foraging habitat. Prairie falcons also forage in this habitat during the winter months. In addition, coyote (*Canis latrans*), Pacific gopher snake (*Pituophis melanoleucus catenifer*), western yellow-bellied racer (*Coluber constrictor mormon*), and western rattlesnake (*Crotalus viridis*) feed on seed-eaters in this community. Due to its extensive distribution, annual grassland intergrades with all of the different habitat types discussed in this section.

Under certain soil conditions, shallow depressions in annual grassland may fill with water during the rainy-season forming seasonal wetlands such as vernal pools. Vernal pools support a unique wildlife assemblage and plant community especially adapted to the annual cycle of seasonal inundation and desiccation. This seasonally dynamic community supports many endemic special-status animal and plant species and provides seasonal foraging habitat for shorebirds and waterfowl. Special-status species that are associated with vernal pools and other seasonal wetlands are discussed under Aquatic Biological Resources, Section 4.9.

Mixed Chaparral

Mixed chaparral provides important cover, foraging, and breeding habitat for many wildlife species. Characteristic bird species that utilize this habitat include wrentit (*Chamaea fasciata*), bushtit (*Psaltriparus minimus*), California quail, orange-crowned warbler (*Vermivora celata*), spotted towhee (*Pipilo maculatus*), California thrasher (*Toxostoma redivivum*), western scrub jay, and northern mockingbird. During the winter months, chaparral also provides suitable foraging habitat for Cooper's hawk (*Accipiter cooperii*) and sharp-shinned hawk (*Accipiter striatus*).

Chaparral also offers valuable foraging habitat and cover for wild pig (*Sus scofa*), black-tailed deer (*Odocoileus h~~n~~emionus*), bobcat (*Felis rufus*), coyote (*Canis latrans*), brush rabbit (*Sylvilagus bachmani*), black-tailed jackrabbit (*Lepus californicus*), and California kangaroo rat (*Dipodomys californicus)*. Due to the relatively dry nature of the chaparral community, few if any amphibian species inhabit this community. However, chaparral does provide suitable shelter, basking sites, and foraging habitat for reptiles like the western rattlesnake, common kingsnake (*Lampropeltis getulus*), Pacific gopher snake, striped racer (*Masticophis lateralis*), and western fence lizard. Some of the special-status animal species that may be found in association with chaparral habitats in the

(*Urocyon cinereoargenteus*). A variety of woodpecker species are primary-cavity nesters in oak trees, while house wren (*Troglodytes aedon*), western bluebird (*Sialia mexicana*), and American kestrel (*Falco sparverius*) are secondary-cavity nesters (i.e., utilizing abandoned woodpecker cavities). <u>Coastal oak woodland is also important to neotropical migrant songbirds (i.e., warblers, vireos, grosbeaks) in terms of providing feeding, resting, and nesting habitat.</u>

Typical amphibian and reptile species that utilize this habitat include ensatina (*Ensatina eschscholtzi*), western skink (*Eumeces skiltonianus*), California slender salamander (*Batrachoseps attenuatus*), arboreal salamander (*Aneides lugubris*), sharp-tailed snake (*Contia tenuis*), ringneck snake (*Diadophis punctatus*), Pacific tree frog (*Pseudacris regilla*), western terrestrial garter snake (*Thamnophis elegans*), western fence lizard (*Sceloporus occidentalis*), and northern alligator lizard (*Elgaria coeruleus*).

Cooper's hawk, white-tailed kite, golden eagle, and northwestern pond turtle are special-status wildlife species that may be found in association with oak woodlands.

Montane Hardwood

Montane hardwood habitat provides resources for many species of forest birds and mammals. Bark and leaf-gleaning insectivores (e.g., white-breasted nuthatch and chestnut-backed chickadee [*Parus rufescens*]) are common residents of montane hardwood habitat, as are birds and mammals that feed primarily on the abundant acorn crops (e.g., wild turkey [*Meleagris gallopavo*], band-tailed pigeon, western scrub jay, acorn woodpecker, western gray squirrel, and black-tailed deer). Sharp-tailed snake, ensatina, and western fence lizard are reptile and amphibian species found in montane hardwood habitat. Many of these species are prey for mammalian and avian predators such as ringtail (*Bassarisus astut**<u>u</u>**s*), gray fox, Cooper's hawk, and red-shouldered hawk. Mature trees and snags provide habitat for cavity-nesting birds (e.g., northern flicker) and mammals (e.g., raccoon) while raptors such as red-tailed hawk and golden eagle often nest near the tops of large conifers.

This habitat often transitions with valley foothill conifer habitat at lower elevations. At middle elevations, montane hardwood habitat interfaces with mixed chaparral. Common associated habitats include valley foothill riparian, annual grassland, and mixed chaparral.

Montane Hardwood-Conifer

Montane hardwood conifer woodlands typically occur on coarse, well-drained mesic soils, often in mountainous terrain with narrow valleys (Mayer and Laudenslayer 1988). This particular habitat type is well-represented in regions with cool, wet winters and warm, dry summers.

Eucalyptus trees are common along fence lines. Although the floodplain of the Petaluma River formerly supported extensive tidal marshes, this area was diked, reclaimed, and is now dominated by cropland and pasture interspersed with seasonal wetlands (including vernal pools) (Association of Bay Area Governments 1991). The remaining tidal marshes are primarily associated with the east side of the Petaluma River.

The Baylands area along northern San Pablo Bay formerly consisted of salt or freshwater marsh wetlands, and are part of the tidal marshes on the north shore of San Pablo Bay. Most of the Baylands area has been drained for agriculture and many of the tidal areas are now surrounded by levees. Channels, agricultural fields, and levees provide the substrate for most of the plant communities found in this area. The channels surround the perimeter of many of the agricultural fields in the Baylands area and are used primarily to convey stormwater during periods of high seasonal runoff. The channels vary from deep (typically up to 10 feet) to shallow and may or may not have emergent vegetation. Seasonally dry areas are found within many of the channels, while standing water may be present within the deeper sections of the channels year-round. Although the Baylands area currently supports primarily crop and pasture land (composed of annual grasses), historic wetlands, farmed wetlands, and wetland pastures are also present (refer to Jurisdictional Wetlands Resources, Section 4.10). The channels and their banks in the southern portion of the Baylands area primarily support salt-tolerant vegetation due to the relatively high salinity of the water. This vegetation typically includes alkali bulrush, alkali heath, pickleweed, and salt grass. The agricultural fields in the Baylands area are primarily composed of common oat, with a few other species present including bird's-foot trefoil, field bindweed, and Italian ryegrass. Stands of eucalyptus and golden wattle (*Acacia longifolia*) surround many of the agricultural fields. Italian ryegrass, ripgut grass, slender wild oat, and wild radish are the major constituents of the levee plant community, with a few scattered coyote brush shrubs also present (Marcus and Velms 1989). Common avian species occurring within the baylands include great egret, killdeer, American avocet, greater yellowlegs, willet, long-billed curlew, western and least sandpiper, dunlin, and ring-billed gull. These species tend to use the baylands sporadically, but are normally abundant following flooding events. Raptors such as red-tailed hawk, northern harrier, and western burrowing owl utilize the open grasslands and agricultural fields for foraging habitat.

Important habitat features associated with the South County geographic area include the Petaluma Marsh, Cunningham Marsh, Petaluma River, and San Pablo Bay. Three state wildlife areas are located within the vicinity of the South County geographic area and include San Pablo Bay Wildlife Area in Sonoma and Marin counties; Napa-Sonoma Marshes Wildlife Area in Solano, Napa, and Sonoma counties; and the Petaluma Marsh Wildlife Area in Sonoma County. The wildlife areas provide foraging habitat and cover for migratory waterfowl; and cover, breeding, and foraging habitat for resident water birds and other wildlife including ~~special-status species~~ great egret, killdeer, American avocets, greater yellowlegs, willet, long-billed curlew, western and least sandpiper, dunlin, and ring-billed gull. These water birds use the baylands sporadically, but can be very abundant following flooding events (California State Coastal Conservancy 1989). Special-status species associated with the unique habitat features in the South County geographic area are represented by animals such as San Pablo vole, San Pablo song sparrow, California black rail, California clapper rail, and salt marsh harvest mouse. Examples of special-status plants found in this

Table 4.8-5

General Plan Goals, Objectives, and Policies - Biological Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Windsor General Plan	Environmental Resources Element	Policy D1.3	Development Projects which would fill wetlands or vernal pools shall be required to conform with applicable state and federal regulations	4.10.1
Windsor General Plan	Environmental Resources Element	Policy D.1.6	Preserve oak woodlands and significant stands of oaks and heritage trees, and require proper measures to assure their long-term survival	4.8.5

Source: Harland Bartholomew and Associates, Inc., 1995

Notes:
1 Criteria are described as follows:
Terrestrial Biological criteria in Table 4.8-9
Aquatic Biological criteria in Table 4.9-7
Jurisdictional Wetlands criteria in Table 4.10-2

EVALUATION CRITERIA WITH POINTS OF SIGNIFICANCE

Table 4.8-6 summarizes both the evaluation criteria and point of significance used to address potential impacts to terrestrial biological resources.

The California Fish and Game Code, NEPA, CEQA, the Federal Endangered Species Act, and the California Endangered Species Act were used as supporting documentation in developing the evaluation criteria and points of significance. In addition, pertinent policies and data bases from the California Department of Fish and Game, United States Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration were also considered. Policies adopted by local private organizations such as the Sierra Club - Sonoma Chapter, Marin and Sonoma Resource Conservation Districts~~Leagues~~, Sonoma Land Trust, and the Marin Land Trust were also evaluated.

Table 4.8-6

Evaluation Criteria and Point of Significance - Terrestrial Biological Resources

Evaluation Criteria	As Measured By	Point of Significance	Justification
1. Will the Project cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species[1]?	a. Number of individuals of a plant or wildlife species that would be lost b. Acres of occupied or designated critical habitat	a. Greater than 0 individuals b. Greater than 0 acres	FESA, CESA (Sections 2062 and 2067), CEQA (Article 5, Section 15065), and California Native Plant Protection Act (CDFG Code Sections 1900-1913)
2. Will the Project cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Number of plant species or populations that would experience a loss of individuals	Greater than 15 percent of known occurrences or populations in Sonoma and Marin counties	California Native Plant Protection Act (CDFG Code Sections 1900-1913), CEQA (Article 5, Section 15065)
3. Will the Project cause loss of active raptor nest sites?	Number of active nesting sites	Greater than 0 active nest sites	CEQA (Article 5, Section 15065), CDFG Wildlife Habitat Relationships model - (Version 5.2), Fish and Game Code - (Section 3503.5)
4. Will the Project cause permanent loss of sensitive terrestrial wildlife habitat[2]?	Acres of sensitive terrestrial wildlife habitat	Greater than 25 percent of each habitat type in Sonoma and Marin counties	CEQA (Article 5, Section 15065), CDFG Wildlife Habitat Relationships model - (Version 5.2)
5. Will the Project cause permanent loss of sensitive native terrestrial plant communities?	Acres of sensitive native terrestrial plant community lost	Greater than 0 acres	CEQA (Article 5, Section 15065), California Native Plant Protection Act (Fish and Game Code, Sections 1900-1913), CDFG Interim Wildlife/Hardwood Management Guidelines (February 1, 1989), CDFG (CNDDB 1994, 1995), Sonoma County Tree Ordinance 4014 (June 13, 1989)

Table 4.8-6

Evaluation Criteria and Point of Significance - Terrestrial Biological Resources

Evaluation Criteria	As Measured By	Point of Significance	Justification
6. Will the Project substantially block or disrupt major ~~terrestrial~~fish or aquatic wildlife migration ~~or travel~~ corridors~~[4]~~?[1]	Number of corridors substantially blocked or disrupted	Greater than 0 corridors	CEQA (Appendix G)
7. Will the Project may result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological Quotient (EQ)[3]	EQ greater than 10	Menzie et al. 1993

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

CDFG California Department of Fish and Game
CEQA California Environmental Quality Act
CESA California Endangered Species Act
CNDDB California Natural Diversity Data Base
CNPS California Native Plant Society
FESA Federal Endangered Species Act
USFWS United States Fish and Wildlife Service

1. Endangered, threatened, or rare is defined here as:
   - federally listed endangered, threatened, or proposed plant or wildlife species
   - state listed endangered, threatened, or proposed plant or wildlife species or rare plant species
   - federal candidates for listing
   - CNPS List 1B plant species
2. Sensitive terrestrial wildlife are defined here as:
   - wildlife designated as “species of special concern” by the California Department of Fish and Game
   - wildlife listed as “fully protected” in California
3. Ecological quotient is the ratio of the exposure concentration or exposure rate to the appropriate benchmark value (i.e., reference values for potential effects on site organisms).
4. In terms of terrestrial habitats, a “major corridor”, for purposes of the EIR/EIS, is defined as any habitat which serves as a movement corridor for entire populations of a given species, essential to completion of their life cycle.

METHODOLOGY

The following section provides a brief discussion of the survey and analytical methodologies utilized in assessing terrestrial biological resource impacts within the Area of Directs Impacts and Area of Indirect Impacts.

Terrestrial biological resources potentially impacted by Project alternatives were identified through literature review, California Natural Diversity Data Base (CNDDB) record searches, consultation with natural resource experts, and field surveys. The CNDDB contains occurrence records for special-status plant and animal species, as well as sensitive natural vegetation communities. CNDDB record searches were conducted in

1994 and 1995 for each 7.5 minute USGS quadrangle that contains portions of the Area of Indirect Impacts. In addition, resource agency representatives (California Department of Fish and Game, United States Fish and Wildlife Services, National Marine Fisheries Service) and local natural resources experts (e.g., Milo Baker Chapter of the California of the surrounding landscape (e.g., ponds and rock formations) which are essential to the life history of a wildlife species.

The Wildlife Habitat Relationship analysis predicts wildlife species occurrences within given habitat types. Habitat types are rated for their potential (low, moderate, or high) to provide reproductive, cover, and feeding requirements for each wildlife species (Mayer and Laudenslayer 1988). Based on the model's output, habitat was evaluated for its potential to support special-status wildlife species that were deemed likely to occur within the construction zone of the reservoir sites. Wildlife habitat types that were rated high for reproduction, cover, or feeding for a particular special-status wildlife species were evaluated in the impact analysis. Refer to the *Biological Resources Technical Memorandum*, *Volume 1* for a more detailed description of the Wildlife Habitat Relationship system and habitat types (Harland Bartholomew & Associates, Inc. 1996a).

Wildlife Surveys

Riparian bird surveys were conducted on all reservoir sites where access was permitted, in the spring of 1994 and 1995 (i.e., mid-April to mid-June). Biologists walked meandering transects along all riparian corridors within a given reservoir site in order to obtain one hundred percent visual coverage. Binoculars were used for visual identification, and auditory identification of songs and calls was also used to identify all bird species encountered. All species identified during the riparian bird surveys were recorded on standardized field forms.

Burrowing owl habitat assessments were conducted concurrently with other focused surveys, such as riparian bird surveys and sampling transects. The burrowing owl habitat assessments consisted of searching for the presence of ground squirrel colonies and suitable nearby foraging habitat (i.e., primarily short to medium height grassland, pasture, or fallow agricultural fields).

In addition, biologists also recorded the wildlife species observed incidentally during other focused surveys on standardized field forms. The results of all focused wildlife surveys conducted on storage reservoir sites are summarized and presented in the *Biological Resources Technical Memorandum*, *Volume I* (Harland Bartholomew & Associates, Inc. 1996a).

Agricultural Irrigation Areas

Surveys to assess the terrestrial biological resources located within the agricultural irrigation areas were conducted from April ~~August~~ through October 1995. A general approach to these surveys was established through consultation with the California Department of Fish and Game, U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers. Because access to private property was not always granted, on-site surveys of some parcels located within agricultural irrigation areas could not be conducted. These parcels methodology and results is presented in the *Ecological Risk Assessment* (Parsons Engineering Science, Inc. 1996).

ENVIRONMENTAL CONSEQUENCES (IMPACTS) AND RECOMMENDED MITIGATION

No Action (No Project) Alternative

Table 4.8-7

Terrestrial Biological Resources Impacts by Component - No Action Alternative

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
8.1.1. Will the No Action Alternative cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?	a. Greater than 0 individuals b. Greater than 0 acres	None	C	==
8.1.2. Will the No Action Alternative cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 percent of known occurrences or populations in Sonoma and Marin counties~~County~~	None	C	==
8.1.3. Will the No Action Alternative cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	C	==
8.1.4. Will the No Action Alternative permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25 percent of each habitat type in Sonoma and Marin counties~~County~~	None	C	==
8.1.5. Will the No Action Alternative cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres	None	C	==
8.1.6. Will the No Action Alternative substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	C	==

Table 4.8-8

Terrestrial Biological Resources Impacts by Component - Pipelines

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
8.4.1. Will the pipeline component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?	a. Greater than 0 individuals b. Greater than 0 acres	None	C	==
8.4.2. Will the pipeline component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 percent of known occurrences or populations in Sonoma and Marin counties~~County~~	None	C	==
8.4.3. Will the pipeline component cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	C	==
8.4.4. Will the pipeline component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25 percent of each habitat type in Sonoma and Marin counties~~County~~	Less than 1 percent~~None~~	C	==
8.4.5. Will the pipeline component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres	None	C	==
8.4.6. Will the pipeline component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	C	==
8.4.7. Will the pipeline component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological Quotient (EQ) greater than 10	None	O&M	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
C Construction
O&M Operation and Maintenance

2. Level of Significance:
❍ Less than significant impact; no mitigation proposed
== No impact

- will not block major terrestrial wildlife migration or travel corridors (criterion #7); and
- will not create a potential ecological risk to terrestrial organisms (criterion #8).

Alternatives 1 and 5B do not have a pipeline component.

Mitigation: No mitigation is needed.

Impact: 8.4.4. Will the pipeline component cause a permanent loss of sensitive terrestrial wildlife habitat?

Analysis: ***Less than Significant***~~*No Impact*~~*; All Alternatives.*

Sensitive wildlife habitats are defined as habitats that provide high suitability for foraging and breeding for state species of special concern and California fully protected species, and important resting, foraging, and breeding habitat for migratory songbirds and other wildlife. Sensitive wildlife habitats that were identified within the pipeline corridors include coastal oak woodland, montane hardwood, and valley foothill riparian (Table 4.8-9).

Table 4.8-9

Sensitive Wildlife Habitats in Pipeline Corridors to Be Avoided (acres)

Alternative	Coastal Oak Woodland	Montane Hardwood	Valley Foothill Riparian
Tolay Extended	1.72	0.34	5.16
Adobe Road/Lakeville	1.72	0.34	5.16
Tolay Confined	1.72	0.34	5.18
Sears Point/Lakeville	1.72	0.34	5.19
Two Rock	1.72	0.34	8.08
Bloomfield	1.72	0.34	8.12
Carroll Road	1.72	0.34	8.08
Valley Ford	1.72	0.34	8.08
Huntley	1.72	0.34	8.08
Geysers Recharge	17.6~~0.00~~	29.8~~0.00~~	1.93~~0.93~~
Russian River Discharge	1.38	6.50	1.62

Source: Harland Bartholomew & Associates, Inc. 1996

Table 4.8-10

Sensitive Plant Communities in Pipeline Corridors to Be Avoided
(acres)

Alternative	Mixed Riparian	Willow Riparian	Oak Woodland	Oak-Bay-Madrone Woodland
Tolay Extended	4.82	0.35	1.72	0.34
Adobe Road/Lakeville	4.82	0.35	1.72	0.34
Tolay Confined	4.82	0.38	1.72	0.34
Sears Point/Lakeville	4.82	0.39	1.72	0.34
Two Rock	4.46	3.67	1.72	0.34
Bloomfield	4.46	3.72	1.72	0.34
Carroll Road	4.46	3.67	1.72	0.34
Valley Ford	4.46	3.67	1.72	0.34
Huntley	4.46	3.67	1.72	0.34
Geysers Recharge	1.09~~0.45~~	0.85~~0.50~~	17.6~~0.00~~	29.8~~0.00~~
Russian River Discharge	1.45	1.21	1.38	6.54

Source: Harland Bartholomew & Associates, Inc. 1996

Storage Reservoir Component

Table 4.8-11

Terrestrial Biological Resources Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
8.5.1. Will the storage reservoir component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?	a. Greater than 0 individuals	None	C, P	==
	b. Greater than 0 acres			

Table 4.8-11

Terrestrial Biological Resources Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
8.5.2. Will the storage reservoir component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 % of known occurrences in populations in Sonoma and Marin counties			
• Two Rock		10%	P	❍
• Huntley		5%	P	❍
• All other reservoirs		None	P	==
8.5.3. Will the storage reservoir component cause loss of active raptor nest sites?	Greater than 0 active nest sites~~acres of suitable nesting habitat~~[3]	Greater than 0 active nests~~acres~~	C, P	⊙
8.5.4. Will the storage reservoir component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25% of each habitat type in Marin and Sonoma counties[3]			
• Tolay Extended		3%	P	❍
• Adobe Road		15%	P	❍
• Tolay Confined		3%	P	❍
• Lakeville Hillside		3%	P	❍
• Sears Point		14%	P	❍
• Two Rock		4%	P	❍
• Bloomfield		2%	P	❍
• Carroll Road		4%	P	❍
• Valley Ford		4%	P	❍
• Huntley		2%	P	❍
8.5.5. Will the storage reservoir component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres[4]			
• Tolay Extended		32	P	⊙
• Adobe Road		77	P	⊙
• Tolay Confined		32	P	⊙
• Lakeville Hillside		12	P	⊙

Table 4.8-11

Terrestrial Biological Resources Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
• Sears Point		60	P	⦿
• Two Rock		75	P	⦿
• Bloomfield		11	P	⦿
• Carroll Road		18	P	⦿
• Valley Ford		10	P	⦿
• Huntley		7	P	⦿
8.5.6. Will the storage reservoir component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	C, P	==
8.5.7. Will the storage reservoir component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological Quotient (EQ) greater than 10	EQ less than 2.28	O&M	❍

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

1. Type of Impact:
   - C — Construction
   - O&M — Operation and Maintenance
   - P — Permanent
   - -- — Not Applicable
2. Level of Significance:
   - ⦿ — Significant impact before mitigation; less than significant impact after mitigation
   - ❍ — Less than significant impact; no mitigation proposed
   - == — No impact
3. The most adverse impact on a population is represented here. See discussion of impact for percent affected per species.
4. The total impact of all sensitive plant communities is represented here. See discussion of impact for acreage affected per species.

Impact: **8.5.1. Will the storage reservoir component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?**

Analysis: *No Impact; All Alternatives.*

Results of intensive special-status terrestrial wildlife and plant surveys indicate that none of the storage reservoir sites currently support endangered threatened, or rare terrestrial wildlife or plant species (See Aquatic Biological Resources section for discussion of amphibians). The proposed storage reservoirs and associated facilities (including dams, access roads, pump stations, electrical distribution lines and diversion channels) will not result in the loss of individuals or populations or occupied habitat of the designated species. In addition, results of intensive literature review and coordination with the U.S. Fish and Wildlife Service indicate that habitats within the construction zone boundary of storage reservoir sites have not been designated as critical habitat for any federally-proposed or listed species by the U.S. Fish and Wildlife Service.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: No mitigation is needed.

Impact: 8.5.2. Will the storage reservoir component cause a loss of populations of CNPS Lists 2, 3, or 4 terrestrial plant species?

Analysis: *Less than Significant; Alternatives 3A and 3E.*

Construction of the Huntley storage reservoir component will result in the loss of two populations of hayfield tarplant (Table 4.8-12). One of the populations is found near the center of the reservoir site and another population exists near the freshwater pond on the southeastern boundary of the site. These occurrences are presented on maps in *Biological Resources Technical Memorandum, Volume 4C* (Harland Bartholomew & Associates, Inc. 1996e). These populations consist of scattered individual plants occupying an area of less than 10,000 square feet, in an area that has been exposed to moderate to heavy grazing. Review of the records of the U.C. Berkeley Herbarium determined that twenty populations or occurrences of hayfield tarplant have been identified in Sonoma and Marin counties (eight in Marin County and <u>twelve</u> ~~ten~~ in Sonoma County). An additional 15 populations were identified during surveys undertaken in support of this document (five in Marin County and <u>10</u> ~~12~~ in Sonoma County). Therefore, there is a total of 37 known and historical records of hayfield tarplant in Sonoma and Marin counties. The two populations identified within the construction boundary zone on the Huntley storage reservoir site represent approximately five percent of the known populations of this species.

A loss of 15 percent or less of the known and historic records of hayfield tarplant in the region of the Project will not cause a substantial range contraction, result in the hayfield tarplant becoming threatened with extinction, or substantially diminish the habitat of hayfield tarplant (see CEQA Section 15065).

Construction of the Two Rock storage reservoir component will result in the loss of one population of bristly linanthus (Table 4.8-12). The location of this occurrence is presented on Map C-1 in *Biological Resources Technical Memorandum, Volume 4C* (Harland Bartholomew &

Valley foothill riparian habitat is especially important for resting, foraging, and nesting neotropical migrant songbirds (birds that breed in North America and migrate to Mexico, Central and South America to spend the winter). Table 4.8-14 provides a list of potential sensitive species found in these habitats and those observed during field surveys for this Project.

This impact is determined by comparison of mapped habitat on each storage reservoir site with the total mapped habitat for Sonoma and Marin Counties per California Department of Forestry's California Vegetation map (CalVeg) or total mapped habitat within the reservoir and agricultural irrigation areas. See *Biological Resources, Volume 1* for more information on California vegetation mapping (Harland Bartholomew & Associates, Inc. 1996a). For each habitat type the impacted acreage in each reservoir site is less than the point of significance, 25% of the Marin and Sonoma acreage. In fact, the total of all habitat types affected on each reservoir is also less than 25% of the Marin/Sonoma acreage. Therefore, impacts on terrestrial wildlife habitats are less than significant at all reservoir sites.

Coastal oak woodland, montane hardwood, and valley foothill riparian are valuable not just as wildlife habitat as evaluated under this criterion, but also as sensitive plant communities under criterion 5. Under criterion 5, impacts to these habitats will be mitigated through measure 2.3.11, Sensitive Resource Conservation Program.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: No mitigation is proposed.

Table 4.8-13

Sensitive Wildlife Habitat Impacted by Storage Reservoirs

Community	Acres	Percent of habitat type in Sonoma & Marin Counties (%)
Annual Grassland		
Tolay Extended	413	3
Adobe Road	271	2
Tolay Confined	343	2
Lakeville Hillside	178	1
Sears Point	397	2
Two Rock	264	2
Bloomfield	320	2

Table 4.8-14

Special-Status Wildlife Species Associated with Wildlife Habitat Relationship System Habitat Types
(High Suitability Only)

Wildlife Species	Observed During Surveys	Annual Grassland	Coastal Scrub	Coastal Oak Woodland	Montane Hardwood	Valley Foothill Riparian
Pallid bat[1]	No	F		F		
Ringtail[1]	No					F, R
White-tailed kite[2]	Yes	F		R		R
Northern harrier[1]	Yes	F, R				
Ferruginous hawk[1]	No	F				
Golden eagle[1]	Yes	F		R	R	
Prairie falcon[1]	Yes	F				
Long-billed curlew[1]	No	F				
Tricolored blackbird[1]	Yes	F				
Sharp-shinned hawk[1]	Yes		F	F	F, R	F
Cooper's hawk[1]	Yes		F	F, R	F, R	F, R
Merlin[1]	Yes					F
Burrowing owl[1]	Yes	F, R				
Yellow warbler[1]	No			F		F, R
Yellow-breasted chat[1]	No			F		F

Source: Harland Bartholomew & Associates, 1996

Notes:
F = high suitability for foraging
R = high suitability for reproduction
1 Species of special concern, California Department of Fish and Game
2 Fully protected, California Department of Fish and Game

Impact: 8.5.5. Will the storage reservoir component cause the permanent loss of sensitive native terrestrial plant communities?

Analysis: *Significant; Alternatives 2 and 3.*

Storage reservoirs and associated facilities will result in the loss of oak woodland at Adobe Road, Sears Point, Two Rock, Bloomfield, Valley Ford; riparian woodland at all reservoir sites; and native grassland at Tolay Extended, Tolay Confined, Lakeville Hillside, Two Rock, Carroll Road, Huntley (see Table 4.8-15).

Table 4.8-16

Terrestrial Biological Resources Impacts by Component - Pump Stations

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
8.6.1. Will the pump station component cause loss of individuals or occupied habitat of endangered, threatened, or rare, terrestrial wildlife or plant species?	Greater than 0 individuals and Greater than 0 acres	None	P	==
8.6.2. Will the pump station component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15% of known occurrences or populations in Sonoma and Marin counties~~County~~	None	P	==
8.6.3. Will the pump station component cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	P	==
8.6.4. Will the pump station component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25% of each habitat type in Sonoma and Marin counties~~County~~	Less than 1%	C	❍
8.6.5. Will the pump station component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres	None	P	==
8.6.6. Will the pump station component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	P	==
8.6.7. Will the pump station component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	EQ Greater than 10	None	P	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
1. Type of Impact:
- P Permanent
- C Construction

2. Level of Significance codes:
- == No impact
- ❍ Less than significant impact; no mitigation proposed

Impact: **8.6.1-3, 6-7. Will the pump station component impact terrestrial wildlife or plant species based on evaluation criteria 1, 2, 3, 6, and 7?**

Analysis: *No Impact; All Alternatives.*

Measure 2.2.5, Avoid Sensitive Biological Resources, adopted as part of the Project, provides measures to avoid environmentally sensitive areas near pump stations and electrical systems and establishes procedures for avoidance of construction impacts to wildlife or plant species and occupied habitats. Preconstruction surveys will be conducted for sensitive biological resources prior to final Project design. Project siting and design will reflect avoidance of identified resources with an associated exclusionary buffer. Construction within a 0.25 mile buffer of raptor nests will be timed to occur prior to or after the nesting season.

Results of habitat assessments, literature review, and coordination with the U.S. Fish and Wildlife Service and the state Department of Fish and Game indicate that after implementation of Measure 2.2.5., the pump station component:

- Will not be constructed on occupied habitat for endangered, threatened, or rare, proposed, or federal candidate terrestrial wildlife or plant species (criterion #1);
- Will not be constructed in habitat that supports CNPS List 2, 3, or, 4 terrestrial plant species (criterion #2);
- Will not impact nesting raptors (criterion #3);
- Will not block major terrestrial wildlife migration or travel corridors (criterion #7); and
- Will not create a potential ecological risk to terrestrial organisms (criterion #8).

Alternative~~s~~ 1~~, 4 and 5~~ does not have a pump station ~~storage reservoir~~ component.

Mitigation: No additional mitigation is needed.

Impact: **8.6.4. Will the pump station component cause permanent loss of sensitive terrestrial wildlife habitat?**

Analysis: *Less than Significant; Alternatives 2, 3, and 4.*

Results of the habitat assessments indicate that there are sensitive wildlife habitats present (i.e. coastal oak woodland, valley foothill riparian habitat, and annual grassland) within the current pump station construction zones. With the exception of annual grassland and coastal scrub habitat, all other sensitive wildlife habitat identified are also considered sensitive plant communities. With implementation of Measure 2.2.5, adopted as part of the Project, all sensitive plant communities will be avoided in the construction of pump stations.

Surveys indicate that there will be less than nine acres of annual grassland habitat impacted by any alternative. Of that, no greater than one acre will be lost permanently. The remaining acreage will be temporarily impacted through construction activities. The construction scars will be restored to their original form through implementation of Measure 2.2.8 Revegetate Temporarily Disturbed Sites, adopted as part of the Project. The total permanent loss of annual grassland is much less than the point of significance threshold of 25% of any habitat type in Sonoma and Marin counties and this impact is less than significant.

No Impact; Alternatives 1 and 5.

These alternatives do not have a pump station component.

Mitigation: No additional mitigation is proposed.

Impact: 8.6.5. Will the pump station component cause permanent loss of sensitive native terrestrial plant communities?

Analysis: *No Impact; All Alternatives.*

Habitat assessments were conducted to identify sensitive vegetative communities potentially affected by the proposed pump station locations. Two proposed pump stations (G3 and G4), are located in the vicinity of well-developed stands of oak-bay-madrone woodland. Each of these pump stations has ~~will have~~ an approximate construction zone boundary of one acre, which could result~~ing~~ in the combined loss of at least two acres of oak-bay-madrone woodland.

However, Measure 2.2.5, adopted as part of the Project, provides measures to avoid sensitive plant communities near pump stations and electrical systems and establishes procedures for avoidance of construction impacts to wildlife or plant species and occupied habitats. Project siting and design will reflect avoidance of identified resources with an associated exclusionary buffer.

Because exclusionary buffers for sensitive biological resources will be incorporated into the final Project design there will be no impacts to sensitive native terrestrial plant communities.

Alternatives 1 and 5 do not have a pump station component.

Mitigation: No additional mitigation is needed.

woodland, and montane hardwood communities will not be included in irrigation areas, but will be avoided. The potential conversion of annual grassland and coastal scrub to cropland will result in decreased value and capability of this habitat to support sensitive terrestrial wildlife species. The potential loss of coastal scrub represents less than 0.01% and is less than significant.

Because the exact boundaries of agricultural irrigation for Alternatives 2 and 3 have not been defined, potential annual grassland conversion to cropland has been estimated upon the following assumptions:

- Conversion to irrigated pasture or silage (forage) will not substantially diminish sensitive wildlife use;

- Predicted cropping patterns and acreage are based on the high technological cropping scenarios developed in Cropping Scenarios For the West County and South County Reclamation Alternatives (1996). High technological cropping scenarios result in the largest acreage of land conversions for this Project; and

- With the exception of Sebastopol (utilizing the most conservative approach) all agricultural production is assumed to occur on annual grasslands. It is assumed in this analysis, as it is for the cropping analysis, that Sebastopol irrigation will include 1,600 acres of existing orchards and vineyards.

The results of this analysis are presented in Table 4.8-21. For all alternatives the maximum loss of annual grassland is less than the 25% point of significance. Therefore this impact is less than significant.

Table 4.8-23

Terrestrial Biological Resources Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
8.9.2. Will the discharge component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 percent of known occurrences or populations in Sonoma and Marin counties	None	P, O&M	==
8.9.3. Will the discharge component cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	P, O&M	==
8.9.4. Will the discharge component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25 percent of each habitat type in Sonoma and Marin counties~~County~~			
• Russian River		Less than 1%	P	❍
• Laguna		None	P, O&M	==
8.9.5. Will the discharge component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres			
Russian River		.25 acre	P	⊙
Laguna		None	P, O&M	==
8.9.6. Will the discharge component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	P, O&M	==
8.9.7. Will the discharge component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	EQ greater than 10	EQ less than 8.02	O&M	❍

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

1. Type of Impact:
   - O&M — Operation and Maintenance
   - P — Permanent

2. Level of Significance:
   - ⊙ — Significant impact before mitigation; less than significant impact after mitigation
   - ❍ — Less than significant impact; no mitigation proposed
   - == — No impact

Impact: **8.9.4. Will the discharge component cause permanent loss of sensitive terrestrial wildlife habitat?**

Analysis: *Less than Significant; Alternative 5A.*

No special-status terrestrial wildlife species were observed at the site for the discharge outfall structure, but the area supports a well-developed valley foothill riparian woodland directly adjacent to the Russian River. The approximate construction zone boundary associated with this outfall structure is 100 feet by 100 feet (0.25 acres), subsequently, the potential loss of valley foothill riparian habitat will not be greater than 0.25 acres.

The loss of 0.25 acres of valley foothill riparian habitat represents less than a 25 percent loss of this habitat in the region, therefore the impact is less than significant. The loss of this resource is mitigated under Impact 8.9.5.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

Discharge at the Laguna involves no construction.

Mitigation: No mitigation is proposed.

Impact: **8.9.5. Will the discharge component cause permanent loss of sensitive native terrestrial plant communities?**

Analysis: *Significant; Alternative 5A.*

A well-developed mixed riparian woodland occurs along the Russian River, at the location for the discharge outfall structure. The approximate construction zone boundary associated with this outfall structure is 100 feet by 100 feet (0.25 acres), subsequently, the potential loss of riparian woodland will not be greater than 0.25 acres.

Partial avoidance of riparian woodland at the outfall structure location may be possible through implementation of Measure 2.2.5 (Avoid Sensitive Biological Resources). Since complete avoidance of riparian habitat loss will not be possible, the impact will be significant.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

Discharge at the Laguna involves no construction.

Mitigation: *Alternative 5A.*

2.3.11 Sensitive Resource Conservation Program

Alternatives 1, 2, 3, 4, and 5B. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternative 5A.*

Loss of riparian habitat will be mitigated by creating new riparian habitat (1 acre created:each acre lost), restoring (1.5 acres restored:each acre lost) or preserving (two acres preserved:each acre lost) riparian habitat of equal function and value.

Impact: **8.9.7. Will the discharge component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?**

Analysis: *Less than Significant; All Alternatives.*

Potential ecological risks were evaluated for a design discharge rate of 20 percent (i.e., highest design discharge rate). In relation to terrestrial biological resources, two transfer pathways were considered for the potential exposure of Russian River and Laguna de Santa Rosa organisms to effluent constituents: water ingestion by wildlife species and exposure by fish consumption by fish-eating birds and mammals (see 4.9-10, Aquatic Biological Resources impacts analysis for discharge for further discussion). EQ for terrestrial exposure to the Russian River discharge ranges from 0.0 to 0.75. EQs for terrestrial exposure to Laguna discharge (in the Laguna) range from 0.0 to 8.02. See Ecological Risk Assessment Report (Parsons Engineering Science, Inc., 1996a) for more details. Ecological quotient values are less than the threshold value of 10 and so the impacts are less than significant.

Mitigation: No mitigation is proposed.

CUMULATIVE IMPACTS

There are six impacts -- either less than significant or significant -- identified in the Terrestrial Biological Resources section:

Impact: **8.2C. Will the Project plus cumulative projects cause loss of individuals of CNPS list 2, 3, or 4 terrestrial plant species?**

Analysis: Alternatives 3A and 3E.

The loss of two populations of hayfield tarplant at the Huntley storage site represents 5 percent of the known populations in Sonoma and Marin counties and the loss of one population of bristly linanthus represents 10 percent of the known populations in Sonoma and Marin counties. Both are less than the 15 percent point of significance and therefore are considered less than significant.

Loss of four additional populations of hayfield tarplant or one additional population of bristly linanthus from cumulative projects will result in a significant effect. Though it is unknown if the implementation of the projects identified on the cumulative project list will result in the loss of

Losses of annual grassland and coastal scrub occur from pump stations (less than eight acres) and from conversion of habitat to crop production which is less suitable for wildlife habitat. The largest loss of annual grassland will occur with implementation of Alternative 3D (21 percent of the estimated 16,884 acres in Sonoma and Marin counties). The largest loss of coastal scrub will occur with implementation of Alternative 3C (less than 0.01 percent of the estimated 73,361 ~~249,820~~ acres in Sonoma and Marin counties). Mitigation for losses to coastal scrub and annual grassland are not proposed.

Many of the projects identified on the cumulative project list will result in small incremental (but unknown) losses to both annual grassland and coastal scrub. The projects most likely to result in large losses to these habitats are reclamation projects. Additional agricultural irrigation with reclaimed water is planned for Petaluma (2,075 acres), Windsor (745 acres), the Airport (unknown), Camp Meeker (unknown), Forestville (unknown), Graton (unknown), Occidental (unknown), and the Russian River Sanitation District (200-400 acres). Habitat types potentially affected by the cumulative projects are unknown but assumed to be similar to those of the Project. Implementation of these projects in conjunction with the Project will not result in greater than 25 percent loss of coastal scrub (18,340 ~~62,455~~ acres) in the region. Implementation of any of these projects in conjunction with the Project may result in significant losses to the region's annual grassland. Total cumulative loss to the annual grassland of all cumulative projects potentially exceeds 40 percent. This is a significant cumulative impact.

Mitigation: No feasible mitigation has been identified.

Impact: 8.5C. Will the Project plus cumulative projects cause permanent loss of sensitive native terrestrial plant communities?

Analysis: Alternatives 2, 3, and 5A.

Any loss of sensitive native terrestrial plant communities is considered significant in this analysis. All reservoir sites are associated with some loss of sensitive plant communities (oak woodland, riparian woodland, and native grassland). All losses to sensitive native plant communities acreage and functions will be fully mitigated through habitat creation, restoration and preservation.

Though cumulative projects may result in the loss of these communities, there will be no net loss for the Project and therefore the effects of the Project are not additive. No change in significance or mitigation of the Project is proposed.

REPLACEMENT PAGES

SECTION 4.9

AQUATIC BIOLOGICAL RESOURCES

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

Species	Status				Management Concerns	
	State[1]	Federal[1]	CNPS[1]	Source	Habitat	Potential Threats
Plants						
Alopecurus aequalis var. *sonomensis* Sonoma alopecurus	--	FPE	1B	2,3,5,10	Freshwater marsh, riparian scrub, and wet meadow.	Grazing and wetland habitat loss.
Astragalus tener var. *tener* Alkali milk-vetch	--	--	4	6	Valley grasslands (adobe clay), alkali flats, and vernally moist meadows.	Grazing, agriculture, and urbanization.
Blennosperma bakeri Sonoma sunshine	SE	FE	1B	2,3,5	Found in association with vernal pools, wet grasslands, and drainage swells.	Urbanization, grazing, and agriculture.
Calamagrostis bolanderi Bolander's reed grass	--	--	4	6	Freshwater marsh, coastal scrub, bogs, moist meadows, and open woodlands.	Unknown.
Calamagrostis crassiglumis Thurber's reed grass	--	--	2	2,5	Coastal scrub (mesic) and freshwater marsh.	Grazing.
Campanula californica Swamp harebell	--	--	1B	2,3,5	Bog/fen, freshwater marsh, north coast coniferous forest, closed-cone coniferous forest, and coastal marshy areas.	Grazing, development, and marsh habitat loss.
Carex albida White sedge	SE	FPE	1B	2,3,5,10	Freshwater marsh. Believed to be limited to a single population at Pitkin Marsh.	Wetland drainage and spraying of chemical effluents.
Carex californica California sedge	--	--	2	8	Meadows drier areas of swamps.	Unknown.
Carex comosa Bristly sedge	--	--	2	6	Lake margins and wet places.	Marsh drainage.

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

	Status				Management Concerns	
Species	**State[1]**	**Federal[1]**	**CNPS[1]**	**Source**	**Habitat**	**Potential Threats**
Castilleja uliginosa Pitkin Marsh Indian paintbrush	SE	--	1A	2,3,5,7	Freshwater marsh and moist places.	Grazing, development, and marsh habitat loss.
Cordylanthus maritimus ssp. *palustris* Point Reyes bird's-beak	--	--	1B	2,3,5	Coastal salt marsh.	Development, foot traffic, non-native plants, and altered hydrology.
Cordylanthus mollis ssp. *mollis* Soft bird's-beak	SR	FPE	1B	2,3,5,7	Coastal salt marsh	Development, foot traffic, non-native plants, and altered hydrology.
Dichanthelium lanuginosum var. *thermale* [*Panicum acuminatum* var. *acuminatum*] Geysers dichanthelium [panicum]	SCE	--	1B	8	Meadows and seeps in the vicinity of hot springs, marshes, and streambanks.	Energy development.
Downingia pusilla Dwarf downingia	--	--	2	3	Valley-foothill grasslands (mesic), vernal pools, and roadside ditches.	Urbanization, agriculture, grazing, and off-road vehicles.
Eleocharis parvula Small spikerush	--	--	4	6	Coastal salt marsh.	Unknown.
Grindelia stricta var. *angustifolia* Marsh gumplant	--	--	4	8	Coastal salt marsh and tidal areas.	Unknown.
Helianthus exilis Serpentine sunflower	--	--	4	8	Seeps in cismontane woodland and chaparral with serpentine soils.	Unknown.
Lasthenia burkei Burke's goldfields	SE	FE	1B	2,3,5	Vernal pools and wet meadows.	Agriculture, urbanization and grazing.

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

	Status				Management Concerns	
Species	**State[1]**	**Federal[1]**	**CNPS[1]**	**Source**	**Habitat**	**Potential Threats**
Lathyrus jepsonii var. *jepsonii* Delta tule pea	--	--	1B	9	Brackish and freshwater marsh, coastal and estuarine marshes.	Agriculture and water diversions.
Legenere limosa Legenere	--	--	1B	2,3,5,7	Vernal pools and sloughs. Occurs in pools with *Downingia pusilla*.	Grazing and development.
Lilaeopsis masonii Mason's lilaeopsis	SR	--	1B	9	Brackish or freshwater marsh, riparian scrub, and intertidal streambanks.	Development, flood control, recreation, erosion, and agriculture.
Lilium maritimum Coast lily	--	--	1B	2,5,6	Coastal scrub, coastal prairie, bogs, broad-leaved upland forest, and gaps in coniferous forest.	Road maintenance, urbanization, and horticultural collecting.
Lilium pardalinum ssp. *pitkinense [L. pitkinense]* Pitkin Marsh lily	SE	FPE	1B	2,3,5,10	Freshwater marsh and valley-oak scrub. Endemic to Vine Hill area.	Marsh habitat loss, horticultural collection, and grazing.
Limnanthes douglasii ssp. *sulphurea* Point Reyes meadowfoam	SE	--	1B	2,5	Vernal pools, freshwater marsh, and wet meadows of coastal prairies.	Grazing, trampling, and non-native plants.
Limnanthes vinculans Sebastopol meadowfoam	SE	FE	1B	2,3,5	Vernal pools and wet meadows. Endemic to Sonoma County.	Urbanization, agriculture, and grazing.
Navarretia leucocephala ssp. *bakeri* Baker's navarretia	--	--	1B	3	Vernal pools, valley-foothill grasslands, cismontane woodland, and mesic meadows.	Unknown.

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

	Status				Management Concerns	
Species	**State[1]**	**Federal[1]**	**CNPS[1]**	**Source**	**Habitat**	**Potential Threats**
Navarretia leucocephala ssp. *plieantha [N. plieantha]* Many-flowered navarretia	SE	FPE	1B	2,3,5	Vernal pools.	Grazing, development, and off-road vehicles.
Plagiobothrys glaber Hairless popcorn-flower	--	--	1A	2	Wet alkaline soils in valleys and coastal salt marshes.	Grazing and development.
Plagiobothrys mollis var. *vestitus* Petaluma popcorn-flower	--	--	1A	2,3,5,7	Wet sites in valley-foothill grassland.	Draining and development of marshes.
Pleuropogon hooverianus North Coast semaphore grass	SR	--	1B	2,3,5	Broad-leaved, upland forests and meadows; vernal pools; marshes; and redwood forests.	Unknown.
Pogogyne douglasii ssp. *parviflora [P. douglasii]* Douglas pogogyne	--	--	3	8	Chaparral with serpentine soils, valley-foothill grasslands, vernal freshwater marshes, and vernal pools.	Urbanization and agriculture.
Polygonum marinense Marin knotweed	--	--	3	2,3,5	Coastal saltmarsh.	Coastal development.
Potentilla hickmanii Hickman's cinquefoil	SE	FPE	1B	2,3,5,7	Vernally wet meadows and open pine forests.	Urbanization and recreational activities.
Ranunculus lobbii Lobb's aquatic buttercup	--	--	4	6	Shallow water, vernal pools, valley and foothill grassland, oak woodland, and mixed forest.	Urbanization and agriculture.

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

Species	Status				Management Concerns	
	State[1]	Federal[1]	CNPS[1]	Source	Habitat	Potential Threats
Rhynchospora alba White beaked-rush	--	--	4	6	Freshwater marsh.	Unknown.
Rhynchospora californica California beaked-rush	--	--	1B	2,3,5	Meadows, freshwater marshes, seeps, and bogs.	Marsh habitat loss.
Rhynchospora globularis var. *globularis* Round-headed beaked-rush	--	--	2		Freshwater marsh.	Marsh habitat loss.
Sidalcea calycosa ssp. *rhizomata* Point Reyes checkerbloom	--	--	1B	8	Marshes near coast.	Unknown.
Sidalcea oregana ssp. *valida* Kenwood Marsh checkerbloom	SE	FPE	1B	2,3,5,10	Freshwater marsh.	Grazing and habitat alteration.
Suaeda californica California seablite	--	FPE	1B	2,5	Coastal salt marsh	Recreation, erosion, and alteration of marsh habitat. Development, foot traffic, non-native plants, and altered hydrology.
INVERTEBRATES						
Branchinecta conservatio Conservancy fairy shrimp	--	FE	--	1	Valley-foothill grasslands in vernal pools.	Habitat destruction due to agricultural and urban development.
Branchinecta longiantennae Longhorn fairy shrimp	--	FE	--	1	Valley-foothill grasslands in vernal pools.	Habitat destruction due to agricultural and urban development.
Branchinecta lynchi Vernal pool fairy shrimp	--	FT	--	1	Valley-foothill grasslands in vernal pools.	Habitat destruction due to agricultural and urban development.

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

	Status				Management Concerns	
Species	State[1]	Federal[1]	CNPS[1]	Source	Habitat	Potential Threats
Lepidurus packardi Vernal pool tadpole shrimp	--	FE	--	1	Valley-foothill grasslands in vernal pools.	Habitat loss and degradation.
Syncaris pacifica California freshwater shrimp	SE	FE	--	2,3,5	Suitable habitat in streams with riparian tree cover and submerged roots and branches along undercut banks.	Degradation of water quality, loss of annual stream flow, and introduction of exotic predatory fish.
FISH						
Eucyclogobius newberryi Tidewater goby	SSC	FE	--	2,3,5	Brackish water habitats. Still, but not stagnant, water.	Degradation of habitat and water quality, and changes in flow and salinity.
Hypomesus transpacificus Delta smelt	ST	FT	--	7	Confined to the upper Sacramento-San Joaquin River estuary in shallow waters near the entrapment zone.	Degradation of water quality, and changes in flow and salinity.
Hysterocarpus traskii pomo Russian River tule perch	SSC	--	--	3,5	Confined to the Russian River and its tributaries.	Degradation of water quality and habitat.
Lampetra ayresi River lamprey	SSC	--	--	7	Coastal streams and rivers from San Francisco north.	Degradation of habitat and water quality and changes in flow regimes.
Lavinia symmetricus navarroensis Navarro roach	SSC	--	--	2,5	Slower, warmer reaches of streams in the Russian and Navarro River drainages.	Degradation of water quality, changes in flow regimes, and competition from introduced species.

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

	Status				Management Concerns	
Species	**State[1]**	**Federal[1]**	**CNPS[1]**	**Source**	**Habitat**	**Potential Threats**
Lavinia symmetricus navarroensis Navarro roach	SSC	--	--	2,5	Slower, warmer reaches of streams in the Russian and Navarro River drainages.	Degradation of water quality, changes in flow regimes, and competition from introduced species.
Mylopharodon conocephalus Hardhead	SSC	--	--	1	Large pools with little silt in the Sacramento-San Joaquin and Russian River systems.	Competition from introduced centrarchids and habitat loss.
Oncorhynchus kisutch Coho salmon (California Coast population)	SSC	F~~P~~T	--	7, 9	Most coastal streams and rivers from San Lorenzo Creek in Santa Cruz County north.	Damming, agricultural development, logging, overfishing, and improper watershed management.
Oncorhynchus mykiss Steelhead trout (Central California Coast population)	--	FPE	--	8	Coastal streams and rivers from the Russian River south to Santa Cruz County.	Damming, agricultural development, logging, and improper watershed management.
Pogonichthys macrolepidotus Splittail	SE	FPT	--	2,5	Backwater slough areas in the lower Delta, San Pablo Bay, and Petaluma River.	Habitat loss, degradation of water quality, and changes in flow regimes.
Spirinchus thaleichthys Longfin smelt	SSC	--	--	2,5	Prefers moderately saline waters in major bays and estuaries from San Francisco Bay northward.	Degradation of water quality and changes in flow regimes.

AMPHIBIANS

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

	Status				Management Concerns	
Species	**State[1]**	**Federal[1]**	**CNPS[1]**	**Source**	**Habitat**	**Potential Threats**
Ambystoma californiense California tiger salamander	SSC	FC	--	2,4,5	Oak savannah, valley-foothill grasslands, and vernal pools.	Habitat destruction due to agricultural and urban development.

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

	Status				Management Concerns	
Species	**State[1]**	**Federal[1]**	**CNPS[1]**	**Source**	**Habitat**	**Potential Threats**
Rana aurora draytoni California red-legged frog[8]	SSC	FT	--	2,3,4,5, 7	Marshes, streams, lakes, reservoirs, and ponds in foothills and grasslands.	Habitat destruction due to agricultural and urban development, introduction of exotic predators, degradation of water quality, and changes in flow regimes.
Rana aurora aurora Northern red-legged frog	SSC	--	--	7	Marshes, streams, lakes, reservoirs, and ponds in foothills and grasslands.	Habitat destruction due to agricultural and urban development, introduction of exotic predators, degradation of water quality, and changes in flow regimes.
Rana aurora draytoni California red-legged frog [10] [8]	SSC	FT	--	2,3,4,5, 7	Marshes, streams, lakes, reservoirs, and ponds in foothills and grasslands.	Habitat destruction due to agricultural and urban development, introduction of exotic predators, degradation of water quality, and changes in flow regimes.
Rana boylii Foothill yellow-legged frog	SSC	--	--	2,4,5	Fast-moving streams and rivers in chaparral, forests, and woodlands.	Habitat destruction due to agricultural and urban development, introduction of exotic predators, degradation of water quality, and changes in flow regimes.

Notes at end of table.

Table 4.9-1

Special-Status Species Associated with Aquatic Habitats

	Status				Management Concerns	
Species	State[1]	Federal[1]	CNPS[1]	Source	Habitat	Potential Threats
REPTILES						
Clemmys marmorata marmorata Northwestern pond turtle	SSC	--	--	2,3,4	Lakes, ponds, reservoirs, and slow-moving streams and rivers, primarily in foothills and lowlands.	Habitat destruction, degradation of water quality, and changes in flow regimes.

Source: Harland Bartholomew and Associates, Inc., 1996

Notes:

1. State status data taken from California Department of Fish and Game documents, Endangered and Threatened Animals of California and Listing Dates (Revised January 1995) and Special Animals (Revised August 1994)

   SE = State-listed Endangered
   ST = State-listed Threatened
   SSC = Species of Special Concern

Federal status and probable distribution in Marin and Sonoma counties determined by correspondence with Laurie Simons-United States Fish and Wildlife Service, 9 February 1994.

FE = Endangered

FT = Threatened

FPE = Proposed Endangered

FPT = Proposed Threatened

FC = Candidate for listing under the Endangered Species Act

CNPS 2 = California Native Plant Society List 2

CNPS3 = California Native Plant Society List 3

CNPS4 = California Native Plant Society List 4

2. CNDDB = Natural Diversity Data Base, California Department of Fish and Game, 15 March 1995.
3. Distribution of State listed species and Species of Special Concern confirmed with California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, April 1990.
4. United States Fish and Wildlife Service letter from Cay Goude, 16 February 1995.
5. Species requested to be included by Caitlin Bean, California Department of Fish and Game Biologist, Region 3.
6. United States Fish and Wildlife Service letter from Joel Medlin, 22 June 1995.
7. Federal Register, 61 (101) 25813-25833.
8. Federal Register, 61 (105) 41541-41561.
9. Federal Register, 61 (212) 56138-56213.

Habitat Sources:

California Department of Fish and Game Natural Heritage Program, Natural Diversity Data Base, 23 December 1993.

EIP Associates. December 1990. Santa Rosa Sub-Regional Water Reclamation System "Long-Term Wastewater System Draft Environmental Impact Report/Statement."

Note: In a series of federal register notices (50 CFR Part 17, Volume 61, Number 40, 7457-74563 and 7595-7613, February 28, 1996), the United States Fish and Wildlife Service reclassified 96 candidate taxa of plants and animals. The United States Fish and Wildlife Service no longer recognizes a federal candidate category 2 status. There are now 182 plant and 89 animal taxa on a single candidate species list. These taxa are considered by the United States Fish and Wildlife Service as candidates for possible addition to the List of Endangered and Threatened Plants and Animals. As a consequence, the status of many taxa originally included in the analysis has changed, requiring that many taxa be removed from the list of species being considered in this EIR/EIS analysis. See Biological Resources, Volume 2 for further information (Harland Bartholomew & Associates 1996b).

10~~8~~ Note: There are two closely related subspecies of red-legged frog in the Project area: California and northern. The identity of the species within any one alternative is unclear. Northern red-legged frogs are a California Department of Fish and Game species of special concern. The California red-legged frog is federally-threatened.

The recent federal ruling establishing the final status of California red-legged frog as federally-threatened provided the geographic range of the species. Red-legged frogs in the Walker Creek, Sonoma Creek, Petaluma River, and Tolay Creek watersheds are identified as the California subspecies and are considered federally-threatened (personal communication, Karen Miller, USFWS, July 11, 1996.) All other red-legged frogs in the Project area are considered ~~appear~~ to be the northern subspecies (Miller 1996).~~, although final confirmation as not been received.~~

In the current analysis, ~~all~~ red-legged frogs found in the Walker Creek, Sonoma Creek, Petaluma River, and Tolay Creek watersheds are identified as the California subspecies and are considered federally-threatened. Northern red-legged frogs will be evaluated as a species of special concern. ~~Project area are considered to be the California subspecies though the status will be confirmed prior to the Final EIR/EIS. All red-legged frogs not determined to be the California subspecies will be evaluated as a species of special concern. Findings of significance and proposed mitigation are not expected to change.~~

Table 4.9-2

Relationship of Aquatic Plant Community and Wildlife Habitat Relationship System Habitat Type

Aquatic Plant Community	Corresponding CWHR Habitat
N/A	Estuarine
Coastal Brackish Marsh	Saline Emergent Wetland
Coastal Salt Marsh	Saline Emergent Wetland
Freshwater Marsh	Fresh Emergent Wetland
Freshwater Pond	Lacustrine (Palustrine[1])
Freshwater Seep	Habitat element within various Wildlife Habitat Types
N/A	Riverine
Drainage	Habitat element of Annual Grassland
Seasonally Wet Vegetation	Habitat element of Annual Grassland
Vernal Pool	Habitat e~~E~~lement of Annual Grassland

Source: Mayer, K.E. and W. F. Laudenslayer,~~Grentell, W. E.,~~ Jr., 1988. A Guide to Wildlife Habitats of California

Notes:
N/A Not Applicable
CWHR California Wildlife Habitat Relationship System
1. Freshwater ponds are conventionally considered palustrine habitat and will be referenced throughout this section as palustrine, though the CWHR System groups lacustrine and palustrine together under lacustrine.

Titles used below refer to aquatic plant community. Corresponding CWHR habitat is in parentheses.

Estuaries

Estuarine

Estuaries develop in the mouths of partially closed rivers or bays where inflowing fresh water mixes with marine water. Estuaries are dynamic systems influenced by many randomly occurring elements of the physical environment. The water chemistry (e.g., salinity) and hydrology of estuaries are influenced daily and seasonally by tributary stream hydrology and tidal rhythms.

The marine influence of small estuaries of the Sonoma and Marin counties coastal region is interrupted, on a seasonal basis, by sand bar formation at the mouth of the estuaries. During these times, water movement between the marine and

Freshwater Seep (Element of Many Wildlife Habitat Types)

Seeps occur where the groundwater table is high or where underground springs seep water out of the ground. Seeps are common at many locations throughout the Area of Indirect Impacts, and may form permanently or temporarily wet conditions. Seepage from underground springs produces an environment conducive to the growth of hydrophytic grasses, rushes, sedges, and herbaceous vegetation.

Freshwater seeps are included as a habitat element within various Wildlife Habitat Relationship System habitat types (Table 4.9-2). Many species of mammals and small birds utilize freshwater seeps as a source of water and cover. Reptiles and amphibians that occasionally use freshwater seeps include garter snakes and Pacific chorus frog.

Freshwater seep communities have the potential to support several special-status plant species including Mount Tamalpais thistle (*Cirsium hydrophilum* var. *vaseyi*), California lady's-slipper (*Cypripedium californicum*), Geyser's dichanthelium (*Dichanthelium lanuginosum* var. *thermale*), and California beaked-rush.

Seasonally Wet Vegetation (Element of Annual Grassland)

Seasonal wet vegetation wetland is a common plant community or habitat in the Area of Indirect Impacts. This plant community or habitat occurs in shallow depressions, swales, and drainages that fill with precipitation and runoff, and remain saturated or inundated during winter and spring months. These habitats support species adapted to temporarily wet conditions followed by long periods of desiccation. Seasonal ly wet vegetation ~~wetlands~~ supports many of the same types of species found in vernal pools and freshwater seeps.

Seasonally wet vegetation ~~wetlands~~ provide**s** important foraging habitat for migratory waterfowl and shorebirds, and nesting habitat for mallard and cinnamon teal. Wildlife species observed utilizing this habitat ~~seasonal wetlands~~ also include black-tailed deer (*Odocoileus hemionus*), black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), gopher snake, gray fox (*Urocyon cinereoargenteus*), and muskrat (Harvey et al. 1992). This wetland habitat type also often supports a high diversity of small aquatic invertebrates, (i.e., zooplankton, mollusks, crustaceans, and aquatic insect larvae). In addition, vertebrates such as Pacific tree frog use seasonal wetlands as breeding habitat.

Special-status plant species that occur in habitats which support seasonally wet vegetation include Sonoma sunshine, Sebastopol meadowfoam (*Limnanthes douglasii* ssp. *sulphurea*), Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*), Burke's goldfields (*Lasthenia burkei*), and Douglas's pogogyne (e.g., starry flounder and English sole [*Parophrys vetulus*]) and those fish species that complete their life cycle within estuarine environments (e.g., shiner surfperch [*Cymatogaster aggregata*] and tidewater goby). Species that spawn in the Estero (e.g., Pacific herring [*Clupea harengus*] and topsmelt [*Atherinops affinis*]) or spend the early part of their life cycle in estuaries (plainfin midshipman [*Porichthys notatus*]) are also present in the Estero (Merritt Smith Consulting 1996a). The Estero Americano historically supported spawning runs of coho salmon and steelhead trout. Occasional steelhead adults still wander into this watershed (CSCC 1977, Buell and Associates 1988, Merritt Smith Consulting 1996a).

The composition of the fish species assemblage in the Estero at any given time is strongly influenced by the relative salinity of the water. Species diversity increases as salinity increases when the sand bars are open, particularly near the mouth of the Estero. Decreased species diversity occurs when the bars are closed, primarily because salinity in the lower reaches of the Estero is reduced and coastal recruitment of marine species is precluded.

In addition to the more than 45 fish species documented in the Estero Americano, over 110 benthic invertebrate species have also been identified (Merritt Smith Consulting 1996a). "The most common invertebrates are mysids, ~~including~~ caridian shrimp (*Crangon* spp.), and crabs". Crab species inhabiting the Estero Americano include Dungeness crab (*Cancer magister*), rock crab (*Cancer antennarius*), yellow shore crab (*Hemigrapsis oregonensis*), and the introduced green crab. Tidewater goby, a federal/state endangered species, is the only special-status aquatic species known to occur in the Estero Americano (Merritt Smith Consulting 1996a).

Stemple Creek and Estero de San Antonio

The Stemple Creek watershed is located immediately south of the Americano Creek watershed. This watershed begins east of Petaluma and empties into the Pacific Ocean through the Estero de San Antonio. The watershed encompasses approximately 50 square miles, almost all of which is in agricultural production. The drainage is cut almost exactly in half by the Sonoma-Marin county line. Though probably perennial in the past, Stemple Creek is now ephemeral (Prunuske Chatham 1994). The mainstem and tributaries of Stemple Creek have been heavily influenced by livestock ranching and other agricultural operations. On the eastern and western ends of the watershed, near Petaluma and Dillon Beach, rural residential development is encroaching on the watershed. The land draining into Stemple Creek is largely gently-sloping grassland (Prunuske Chatham 1994).

The Estero de San Antonio has become degraded through historic cattle utilization (Merritt Smith Consulting 1996a). Most of the mainstem flows through dairy and

In addition, the National Oceanic and Atmospheric Administration (NOAA) has administrative authority over the Gulf of the Farallones National Marine Sanctuary. This sanctuary was designated under Section 302(a) of Title III of the Marine Protection, Research and Sanctuaries Act of 1972. The sanctuary encompasses an area of the waters adjacent to the coast of California north and south of the Point Reyes Headlands, between Bodega Head and Rocky Point and the Farallone Islands (including Noonday Rocks). NOAA is a cooperating agency in the preparation of this EIR/EIS.

According to the Code of Federal Regulations (Title 15, Part 922, Subparts A and J), the Gulf of Farallones National Marine Sanctuary was designated for the purpose of protecting and preserving the ecosystem, including marine birds, mammals, and other natural resources of the waters surrounding the Farallon Islands and Point Reyes. The Sanctuary is also protected to ensure the continued availability of the area as a research and recreational resource.

EVALUATION CRITERIA WITH POINT OF SIGNIFICANCE

Table 4.9-3

Evaluation Criteria with Point of Significance - Aquatic Biological Resources

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project cause loss of individuals or occupied habitat of endangered, threatened, or rare aquatic wildlife or plant species[1]?	a) Number of individuals that will be lost b) Acres of occupied or critical habitat lost	a) Greater than 0 individuals b) Greater than 0 acres	FESA, CESA (Sections 2062 and 2067), CEQA (Article 5, Section 15065), and California Native Plant Protection Act (CDFG Code Sections 1900-1913)
2. Will the Project cause loss of individuals of CNPS List 2, 3, or 4 aquatic plant species?	Number ~~of species that will experience a loss~~ of individuals that will be lost	Greater than 15 percent of known occurrences in Sonoma and Marin counties	California Native Plant Protection Act (CDFG Code Sections 1900-1913), CEQA (Article 5, Section 15065), Caitlin Bean, Biologist, CDFG, Yountville, meeting January 1994.
3. Will the Project cause loss of potential or occupied habitat of aquatic species of aquatic wildlife concern?	Acres of potential or occupied habitat lost	Greater than 20 percent of potential habitat in local watershed	FESA, CESA (Sections 2062 and 2067), CEQA (Article 5, Section 15065), and California Native Plant Protection Act (CDFG Code Sections 1900-1913)

Table 4.9-3

Evaluation Criteria with Point of Significance - Aquatic Biological Resources

Evaluation Criteria	As Measured by	Point of Significance	Justification
4. Will the Project cause permanent loss of sensitive aquatic plant communities and associated wildlife habitats (i.e., freshwater marsh, brackish marsh, vernal pools)?	Acres of sensitive aquatic plant communities lost	Greater than 0 acres	CEQA (Article 5, Section 15065), California Native Plant Protection Act (Fish and Game Code, Sections 1900-1913), See Also Jurisdictional Wetlands Section 4.10, CDFG (CNDDB 1994, 1995)
5. Will the Project cause permanent loss of aquatic habitat (i.e., streams and ponds)?	a) Linear feet of coolwater Type A and coolwater Type B stream habitat permanently lost b) Linear feet of warmwater Type A stream habitat permanently lost c) Linear feet of warmwater Type B stream habitat permanently lost and d) Acres of pond habitat permanently lost	a) Greater than 0 % of Coolwater A/B habitat locally ~~linear feet~~ b) Greater than 15% of Warmwater A habitat ~~type in~~ locally ~~watershed~~ (linear feet and acreage respectively) c and d) Greater than 25% of Warmwater B or pond habitat ~~type in~~ locally ~~watershed~~ (linear feet and acreage respectively)	CEQA (Article 5, Section 15065), with concurrence from Bill Cox (CDFG fisheries biologist, Region 3 [Yountville]) Note: See Criterion #1 of Jurisdictional Wetlands Section
6. Will the Project cause a change to the physical condition of aquatic habitat in the Estero Americano or Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary?	Change in salinity[4] in parts per thousand (ppt) in the Esteros	Greater than 0 ppt salinity change	National Marine Sanctuaries Act (16 U.S.C. 1436), National Oceanic and Atmospheric Administration (15 CFR 922), CEQA (Article 5, Section 15065)

Table 4.9-3

Evaluation Criteria with Point of Significance - Aquatic Biological Resources

Evaluation Criteria	As Measured by	Point of Significance	Justification
7. Will the Project substantially block or disrupt major fish or aquatic wildlife migration ~~or travel~~ corridors?[5]	Number of corridors substantially blocked or disrupted	Greater than 0 corridors	CEQA (Appendix G)
8. Will the Project cause a decrease in streamflows, affecting aquatic habitat or aquatic life downstream from proposed dam sites?	Linear feet of warmwater stream habitat where 50 percent decrease in wet season streamflow[6] or any decrease in dry season streamflow occurs	Greater than 0 linear feet Greater than 0 linear feet	CEQA (Article 5, Section 15065)
9. Will the Project result in ecological risk to aquatic plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological quotient[2] (EQ)	EQ Greater than 10	Menzie et al. 1993

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
CDFG California Department of Fish and Game
CNPS California Native Plant Society
USFWS United States Fish and Wildlife Service
FESA Federal Endangered Species Act
CESA California Endangered Species Act
CEQA California Environmental Quality Act

1. Endangered, threatened, or rare is defined here as:
   - federally listed endangered, threatened, or proposed plant or wildlife species
   - state listed endangered, threatened, rare or proposed plant or wildlife species
   - federal candidates for listing
   - CNPS List 1B plant species
2. Species of concern wildlife are defined here as:
   - wildlife designated as “species of special concern” by the California Department of Fish and Game
   - wildlife listed as “fully protected” in California
3. Ecological quotient is the ratio of the exposure concentration or exposure rate to the appropriate benchmark value (i.e., reference values for potential effects on site organisms).
4. Salinity is measured by total dissolved solids, which measures all of the salts.
5. In terms of aquatic habitats, a “major corridor”, is defined as any waterway that supports a viable population of anadromous fish and/or acts as a movement corridor for entire populations of a given species, and is essential to completion of their life cycle.
6. Wet season streamflow, for purposes of this EIR/EIS, is defined as average daily stream flow present within a stream during the months of December through March during a dry year, an average year, and/or a wet year. Dry season is defined as June through September.

METHODOLOGY

The following section provides a brief discussion of the survey and analytical methodologies utilized in assessing aquatic biological resource impacts within the Area of Direct Impacts and Area of Indirect Impacts. *Biological Resources*, *Volume 1* provides a more detailed description of specific survey methodologies and survey results (Harland Bartholomew & Associates, Inc. 1996a).

Aquatic biological resources potentially impacted by Project actions were identified through literature review, California Natural Diversity Data Base (CNDDB) record searches, consultation with natural resource experts, and field surveys. The CNDDB contains occurrence records for special-status plant and animal species, as well as sensitive natural vegetation communities. Special-status aquatic species include:

- those plants and animals that are legally protected, proposed, or candidates for protection under the California Endangered Species Act (CESA) and Federal Endangered Species Act (FESA);
- plants and animals defined as endangered or rare under the California Environmental Quality Act (CEQA);
- animals designated as "species of special concern" by the California Department of Fish and Game;
- animals listed as "fully protected" in California (Fish and Game Code Sections 3511, 4700, 5050); and
- plants identified and classified in the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (1994).

CNDDB record searches were conducted in 1994 and 1995 for each 7.5 minute USGS quadrangle that contains portions of the Area of Indirect Impacts. In addition, resource agency representatives from the U.S. Fish and Wildlife Service, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, the California Department of Fish and Game, and local natural resource experts (e.g., Sierra Club - Sonoma Group, Marin Conservation League, Resource Conservation League of Sonoma, Marin and Madrone Chapters of the National Audubon Society, and the Russian River Watershed Protection Committee, California Native Plant Society) were consulted to acquire available occurrence data.

Field surveys were conducted at the site of Project components in order to describe, inventory, and map the existing aquatic biological resources. The results of CNDDB record searches, field observations, and field mapping of aquatic biological resources were entered into a Geographic Information System (GIS) data base. Acreage and locations of vegetation communities, wetlands, and wildlife habitats, and number and location of special-status species occurrences present within the construction zone mind. Limited permissible access prohibited the kind of in-stream surveys typically conducted for this type of analysis (Merritt Smith Consulting 1996c). In most cases, the surveys were conducted from the bridge crossing the streams in the public road right-of-way. However, the information collected on the forms (e.g., permanence, type of substrate, embeddedness, in-stream shelter, and percent canopy closure) provides an effective method for characterizing aquatic habitat given the restrictions of access (Merritt Smith Consulting 1996c). The locations for all of the identified stream crossings are shown in Maps E-1 through E-21 of *Biological Resources, Volume 4E* (Harland Bartholomew & Associates, Inc. 1996f).

Ecological Risk Assessment

An ecological risk assessment of representative scenarios under the various Project alternatives was undertaken to evaluate potential adverse effects to ecological resources as a result of exposure to chemical constituents in reclaimed water. The primary objective of the ecological risk assessment was to identify and characterize the potential risks posed to environmental receptors (i.e., individual species) as a result of the alternative uses of the reclaimed water.

Two main routes of exposure were identified for evaluation of ecological risk to terrestrial and aquatic organisms due to the implementation of the Project: direct contact with the media (surface soil, water, and sediment) and indirect exposure by dietary intake. Specific ecological receptors were selected to evaluate potential effects on aquatic biota and wildlife exposure through food ingestion. Key ecological receptors, representative of various trophic levels, were evaluated, including red-legged frog, steelhead trout, mallard duck, harbor seal, and great blue heron. Ecological receptors are species which potentially could be exposed to the chemical constituents of concern.

Monitoring data for reclaimed water of the Laguna Plant storage ponds were used as the basis for assessment of ecological risk ~~assessment~~ to aquatic organisms in ~~for~~ reclaimed water storage. This approach assumes that future water quality in the reservoirs will be similar to the current reclaimed water quality in the storage ponds. Water quality data were evaluated in terms of potential effects on aquatic organisms (including amphibians) by direct exposure. The assessment of potential effects associated with exposure to sediments in storage reservoirs was based on the use of monitoring data for existing reclaimed water storage ponds of the Santa Rosa water reclamation facility. This approach assumes that future sediment conditions in the reservoirs will be similar to, or better than, those in existing ponds because reclaimed water quality has improved in recent years and will be maintained following implementation of the Project.

The assessment of ecological risk was based on the calculation of the ecological quotients (EQs). The quotient is calculated as the ratio between exposure concentration for a given chemical substance and an applicable benchmark value that identifies possible adverse effect levels on ecological receptors. The characterization of potential effects on receptor organisms was based on the following guidelines (EPA 1989; Watkins and Stelljes 1993; Menzie et al., 1993):

1. Adverse effects are not expected for EQ values equal to, or less than, 1;
2. A low potential for environmental effects is indicated by an EQ value between 1 and 10;
3. A significant potential for adverse effects is indicated by an EQ value greater than 10; and
4. EQs in excess of 100 identify a very high probability for adverse effects on ecological receptors and biological communities.

Six major pathways were identified for the potential exposure of aquatic organisms and wildlife to the reclaimed water: 1) direct exposure to the reclaimed water in Santa Rosa Creek and the Laguna de Santa Rosa; 2) exposure of organisms associated with the Russian River at 1 percent, 5 percent, 10 percent, and 20 percent Russian River Discharge with Russian River and Laguna discharge sites; 3) exposure of rooted vegetation, benthic organisms, and waterfowl to sediments in the Laguna de Santa Rosa and the Russian River; 4) exposure of aquatic and terrestrial vegetation by reclaimed water application to irrigation fields; and 6) potential releases from pipelines along the transfer route to the geysers injection area. Exposure risks include effects of existing discharges along the Russian River. For more detailed information on the ecological risk assessment methodology and results, see the *Ecological Risk Assessment* (Parsons Engineering Science, Inc. 1996).

ENVIRONMENTAL CONSEQUENCES (IMPACTS) AND RECOMMENDED MITIGATION

No Action (No Project) Alternative

Table 4.9-5

Aquatic Biological Resources Impacts by Component - No Action Alternative

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
9.1.1. Will the ~~pipeline component~~ No Action Alternative cause loss of individuals or occupied habitat of endangered, threatened or rare aquatic wildlife or plant species?	a) Greater than 0 ~~species~~ individuals and b) Greater than 0 acres	None	C	==

Table 4.9-5

Aquatic Biological Resources Impacts by Component - No Action Alternative

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
9.1.2. Will the ~~pipeline component~~ No Action Alternative cause loss of individuals of CNPS List 2, 3, or 4 aquatic plant species?	Greater than 15% of known ~~existing~~ occurrences or populations in Sonoma and Marin counties	None	C	==
9.1.3. Will the ~~pipeline component~~ No Action Alternative cause loss of potential or occupied habitat of aquatic wildlife species of concern?	Greater than 20% of potential habitat in local watershed	None	C	==
9.1.4. Will the ~~pipeline component~~ No Action Alternative cause a permanent loss of sensitive native aquatic plant communities?	Greater than 0 acres	None	C	==
9.1.5. Will the ~~pipeline component~~ No Action Alternative cause a permanent loss of aquatic habitat ~~and associated wetlands~~?	Greater than 15% of warmwater A habitat locally; or Greater than 25% of warmwater B or pond habitat locally	None	C	==
9.1.6. Will the ~~pipeline component~~ No Action Alternative cause a change in the physical condition of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary?	Greater than 0 parts per thousand salinity change	None	C	==
9.1.7. Will the ~~pipeline component~~ No Action Alternative substantially block or disrupt major fish or aquatic wildlife migration or travel corridors?	Greater than 0 corridors	None	C	==
9.1.8. Will the ~~pipeline component~~ No Action Alternative cause a decrease in streamflows, affecting aquatic habitat or aquatic life downstream from proposed dam sites?	Greater than 0 linear feet	None	C	==

Table 4.9-5

Aquatic Biological Resources Impacts by Component - No Action Alternative

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
9.1.9. Will the ~~pipeline component~~ No Action Alternative result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological Quotient (EQ) greater than 10	EQ values range from 0.0 to 4.64	O&M	❍

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

1. Type of Impact:
   - C Construction
   - O&M Operation and Maintenance
   - -- Not Applicable
   - P Permanent
2. Level of Significance:
   - ❍ Less than significant impact; no mitigation proposed
   - ⦿ Significant impact before mitigation; less than significant impact after mitigation
   - == No Impact

Impact: 9.1.1-8. Will the No Action Alternative impact aquatic biological resources based on evaluation criteria 1 through 8?

Analysis: *No Impact; Alternative 1.*

There will be no construction of facilities under the No Action (No Project) Alternative. Therefore, Alternative 1 will not affect aquatic habitat.

Mitigation: No mitigation is needed.

Impact: 9.1.9. Will the No Action Alternative result in ecological risk to aquatic plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?

Analysis: *Less than Significant; Alternative 1.*

Continued or increased discharge through the Laguna to the Russian River will result in an increased ecological risk, EQ ranging from 0.0 to 4.64, which is slightly higher than the current discharge but well below the point of significance (EQ>10).

Mitigation: No mitigation is proposed.

Pipeline Component

Table 4.9-6

Aquatic Biological Resources Impacts by Component - Pipelines

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
9.4.1. Will the pipeline component cause loss of individuals or occupied habitat of endangered, threatened or rare aquatic wildlife or plant species?	a. Greater than 0 ~~species~~ individuals and b. Greater than 0 acres	None	C	==
9.4.2. Will the pipeline component cause loss of individuals of CNPS List 2, 3, or 4 aquatic plant species?	Greater than 15% of known ~~existing~~ occurrences or populations in Sonoma and Marin counties	None	C	==
9.4.3. Will the pipeline component cause loss of potential or occupied habitat of aquatic wildlife species of concern?	Greater than 20% of potential habitat in local watershed	None	C	==
9.4.4. Will the pipeline component cause a permanent loss of sensitive native aquatic plant communities?	Greater than 0 acres	None	C	==
9.4.5. Will the pipeline component cause a permanent loss of aquatic habitat and associated wetlands?	Greater than 15% of warmwater A habitat locally; or Greater than 25% of warmwater B or pond habitat locally	None	C	==
9.4.6. Will the pipeline component cause a change in the physical condition of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary?	Greater than 0 parts per thousand salinity change	None	C	==

sensitive aquatic plant communities located along the current pipeline alignments. The point locations for sensitive native aquatic plant communities found along the pipeline routes are identified on maps bound in *Biological Resources, Volume 4E* (Harland Bartholomew & Associates, Inc. 1996g). Table 4.9-8 presents a summary of aquatic habitat crossed by pipelines.

Measure 2.2.5, Avoid Sensitive Biological Resources, adopted as part of the Project, establishes procedures for avoidance of construction impacts to sensitive aquatic wildlife or plant species, their habitats and sensitive aquatic plant communities. Preconstruction surveys will be conducted for sensitive biological resources prior to final Project design. Project siting and design will provide avoidance of these resources through realignment of pipelines and establishment of associated exclusionary buffers where no activity will be allowed.

The pipelines will not cause a change in the physical condition of aquatic habitat in the Estero Americano and Estero de San Antonio since the construction zones are located well outside the National Marine Sanctuary and there will be no impact to the esteros.

Measure 2.2.5 establishes that no construction will occur within a perennial stream and construction in ephemeral streams will occur in the dry season and be temporary in nature. Therefore, there is no potential for pipelines to substantially block or disrupt major fish travel corridors or affect stream flows.

Table 4.9-7

Pipeline Stream Crossings Potentially Supporting Sensitive Aquatic Wildlife Species

Alternatives	Perennial (linear feet in width of stream crossing)	Seasonal/Intermittent (linear feet in width of stream crossing)
Alternative 2A	74 linear feet (2 crossings)	659 linear feet (15 crossings)
Alternative 2B	74 linear feet (2 crossings)	659 linear feet (15 crossings)
Alternative 2C	74 linear feet (2 crossings)	659 linear feet (15 crossings)

These scenarios are based on the assumption that undiluted reclaimed water is discharged to streams on an occasional basis without a significant dilution from the receiving waters. Consequently, the risk evaluation was based on short-term (i.e., acute) exposure of aquatic organisms to reclaimed water constituents. No chronic exposure or bioaccumulation will be expected to occur.

For all organic and inorganic chemicals detected in the effluent, calculated Ecological Quotient (EQ) values (i.e., $0.04 \leq EQ \leq 1.44$) [the EQ is greater than or equal to 0.04 but less than or equal to 1.44] were below the threshold value of 10 indicative of potential significant adverse effects on freshwater organisms. Any potential impacts will therefore be less than significant.

No Impact; Alternatives 1 and 5B.

These alternatives do not have a pipeline component.

Mitigation: No additional mitigation is proposed.

Storage Reservoir Component

The storage reservoir component table is presented as a separate table for each criterion to present the information more clearly.

Table 4.9-10

Aquatic Biological Resources Impacts by Component - Storage Reservoirs, Criterion #1

Evaluation Criteria	Point of Significance	Impact[1]		Type of Impact[2]	Level of Significance[3]
9.5.1. Will the storage reservoir component ~~may~~ cause loss of individuals or occupied habitat of endangered, threatened, or rare aquatic wildlife or plant species?	a) Greater than 0 individuals b) Greater than 0 acres ~~of occupied habitat~~				
California red-legged frog		**Individuals**	**Acres**		
• Tolay Extended		2	4.8 ~~4.1~~	C, P	⊙
• Adobe Road		0	0	C, P	==
• Tolay Confined		2	4.8 ~~4.1~~	C, P	⊙
• Lakeville Hillside		4	1.4 ~~1.7~~	C, P	⊙
• Sears Point		2	1.6 ~~2.1~~	C, P	⊙

Table 4.9-10

Aquatic Biological Resources Impacts by Component - Storage Reservoirs, Criterion #1

Evaluation Criteria	Point of Significance	Impact[1]		Type of Impact[2]	Level of Significance[3]
• ~~Two Rock~~		~~11~~	~~8.4~~	~~C, P~~	~~⊙~~
• ~~Bloomfield~~		~~1~~	~~3.6~~	~~C, P~~	~~⊙~~
• ~~Carroll Road~~		~~0~~	~~0~~	~~C, P~~	~~==~~
• ~~Valley Ford~~		~~2~~	~~8.4~~	~~C, P~~	~~⊙~~
• ~~Huntley~~		~~8~~	~~1.2~~	~~C, P~~	~~⊙~~
Steelhead trout		**Individuals**	**Linear Feet**		
• Carroll Road		3	2,700[4]	C, P	⊙
• All other reservoirs		0	0	C, P	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

1. See note at end of analysis.
2. Type of Impact:
   - C Construction
   - P Permanent
3. Level of Significance codes:
   - ⊙ Significant impact before mitigation; less than significant impact after mitigation
   - == No impact
4. The loss of steelhead trout habitat is addressed in Impact 9.5.5 (loss of Coolwater B aquatic habitat).

Impact: **9.5.1. Will the storage reservoir component cause a loss of individuals or occupied habitat of endangered, threatened, or rare aquatic wildlife or plant species?**

Analysis: *Significant; Alternatives 2* ***A, 2B, 2C, 2D and****,* ~~***3A, 3B,***~~ *3C,* ~~***3D, and 3E***~~.

Tolay Extended, Tolay Confined, Lakeville Hillside, and Sears Point~~, Two Rock, Bloomfield, Valley Ford, and Huntley~~ Reservoirs and associated facilities (including dams, access roads, pump stations, and diversion channels) will result in the loss of at least one California red-legged frog and greater than zero acres of occupied California red-legged frog habitat. Maps B-1 through B-7 of the *Biological Resources, Volume 4B* illustrate the California red-legged frog occurrences identified for each storage reservoir site (Harland Bartholomew & Associates, Inc. 1996d). Impacts of the Adobe Road site are discussed under No Impact below.

Carroll Road reservoir and associated facilities will result in the loss of at least three steelhead trout. Note that the loss of steelhead habitat is addressed under Impact 9.5.5. Map B-6 of the *Biological Resources Technical Memorandum, Volume 4B* illustrates the steelhead occurrences identified at the Carroll Road reservoir site (Harland Bartholomew & Associates, Inc. 1996d).

No other endangered, rare, or threatened species or their habitat was found.

*No Impact; Alternatives 1, **3A, 3B, 3D, 3E**, ~~3C,~~ 4, and 5.*

The Adobe Road, Bloomfield, Huntley, Two Rock, and Valley Ford ~~and Carroll Road~~ reservoirs and associated facilities will not result in the loss of individuals or occupied habitat of federally proposed or listed or federal candidate aquatic wildlife or plant species and therefore there is no impact.

Note: There are two closely related subspecies of red-legged frog in the Project area: California and northern. ~~The identity of the species within any one alternative is unclear.~~ Northern red-legged frogs are a California Department of Fish and Game species of special concern. The California red-legged frog is federally-threatened.

The recent federal ruling establishing the final status of California red-legged frog as federally-threatened provided the geographic range of the species. Red-legged frogs in the Walker Creek, Sonoma Creek, Petaluma River, and Tolay Creek watersheds are identified as the California subspecies and are considered federally-threatened (Miller 1996.) All other red-legged frogs in the Project area are considered ~~appear~~ to be the northern subspecies (Miller 1996).~~, although final confirmation as not been received.~~

In the current analysis, ~~all~~ red-legged frogs found in the Walker Creek, Sonoma Creek, Petaluma River, and Tolay Creek watersheds are identified as the California subspecies and are considered federally-threatened. ~~Project area are considered to be the California subspecies though the status will be confirmed prior to the Final EIR/EIS. All~~ Northern red-legged ~~frogs not determined to be the California subspecies~~ will be evaluated as a species of special concern (refer to Impact 9.5.3). ~~Findings of significance and proposed mitigation are not expected to change.~~

No other endangered, rare, or threatened species or their habitat was found.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: *Alternatives 2 **A, 2B, 2C, 2D, and*** ~~3A, 3B~~, ***3C***~~., 3D, and 3E~~.

2.3.11. Sensitive Resource Conservation Program

2.4.4. California Red-legged Frog Capture and Relocation Program

Alternatives 1, ~~3C,~~ 4, and 5. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternatives 2 A, 2B, 2C, 2D, and ~~3A, 3B~~, 3C. ~~, 3D, and 3E.~~*

California red-legged frog and steelhead trout habitat will be created (one acre created to one acre impacted) or restored (two acres restored to one acre impacted) in conjunction with other associated biological resource mitigation (e.g. jurisdictional wetlands, aquatic habitat, and sensitive vegetative communities). Red-legged frogs on site will be captured and relocated to the mitigation site.

Impact: 9.5.2. Will the storage reservoir component cause loss of populations of CNPS List 2, 3, or 4 aquatic plant species?

Table 4.9-11

Aquatic Biological Resources Impacts by Component - Storage Reservoirs

Criterion #2

Evaluation Criteria	Point of Significance	Impact		Type of Impact[1]	Level of Significance[2]
2. Will the storage reservoir component cause loss of individuals of CNPS List 2, 3, or 4 aquatic plant species?	Greater than 15 percent of known occurrences in Sonoma and Marin counties				
Lobb's aquatic buttercup		**Species Occurrences**	**% of known occurrences**		
• Huntley		1	3%	C	❍
• All other reservoirs		0	0	C	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
C Construction

2. Level of Significance codes:
❍ Less than significant impact; no mitigation proposed
== No impact

Analysis: *Less than Significant; Alternative 3E.*

Construction of the Huntley storage reservoir and associated facilities (including dams, access roads, pump stations, and diversion channels) will result in the loss of one population of Lobb's aquatic buttercup. Map C-7 of the *Biological Resources, Volume 4C* illustrates the Lobb's aquatic buttercup occurrence identified for the Huntley storage reservoir site (Harland Bartholomew & Associates, Inc. 1996e). Lobb's aquatic

Table 4.9-12

Aquatic Biological Resources Impacts by Component - Storage Reservoirs
Criterion #3

Evaluation Criteria	Point of Significance	Impact		Type of Impact[1]	Level of Significance[2]
Northwestern pond turtle habitat		**Linear Feet and Acres**	**% of Habitat**		
• Tolay Extended		a. 15,300 lf b. 1.3 acres	29% 100%	C, P	⦿
• Adobe Road		0.0 acres	0%	C, P	==
• Tolay Confined		a. 10,600 lf b. 1.3 acres	14% 100%	C, P	⦿
• Lakeville Hillside		0.0 acres	0%	C, P	==
• Sears Point		0.0 acres	0%	C, P	==
• Two Rock		a. 3,000 lf b. 3.9 acres	4% 7%	C, P	❍
• Bloomfield		a. 5,200 lf b. 0.0 acres	9% 0%	C, P	❍
• Carroll Road		a. 1,500 lf b. 2.6 acres	6% 9%	C, P	❍
• Valley Ford		a. 2,000 lf b. 2.0 ac	6% 12%	C, P	❍
• Huntley		a. 4,000 lf b. 0.5 acres	4% 0%	C, P	❍
Northern red-legged frog		Acres	% of Habitat		
• Two Rock		8.7 acres	100%	C, P	⦿
• Bloomfield		2.7 acres	100%	C, P	⦿
• Huntley		1.5 acres	100%	C, P	⦿
• Valley Ford		3.4 acres	100%	C, P	⦿
• All other reservoirs		0.0 acres	0%	C, P	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
1. Type of Impact:
C Construction
P Permanent

2. Level of Significance codes:
⦿ Significant impact before mitigation; less than significant impact after mitigation
❍ Less than significant impact; no mitigation proposed
== No impact

Analysis: *Significant; Alternatives 2A, ~~and~~ 2C, **3A, 3B, 3**D, and 3E.*

Construction of either of the Tolay storage reservoirs will result in the loss of up to 15,300 lf (warmwater) and 1.3 acres (pond) of occupied northwestern pond turtle habitat (*Biological Resources, Volume 4B,* Maps B-3 and B-4, [Harland Bartholomew & Associates, Inc. 1996d]). The northwestern pond turtle is listed as a species of special concern by the California Department of Fish and Game. Although the species of special concern designation does not warrant any formal protection under the state Endangered Species Act, populations are monitored closely by the California Department of Fish and Game. A loss of 20 percent of potential habitat in the local watershed at any one storage reservoir site will seriously threaten the survival of the turtle populations living there. Reservoir construction and inundation will cause a 29 percent loss of warmwater habitat and 100 percent loss of pond habitat in the local watershed at Tolay Extended or 14 percent loss of warmwater habitat and 100 percent loss of pond habitat at the Tolay Confined site. Therefore this impact is considered significant.

Construction of Two Rock, Bloomfield, Valley Ford, and Huntley reservoirs will result in the loss of less than 20 percent of potential northwestern pond turtle habitat in the local watershed of any one of the proposed storage reservoir sites (*Biological Resources*, *Volume 4B*, Maps B1, B6, and B7 [Harland Bartholomew & Associates, Inc. 1996d]). These impacts would be considered less than significant. However, each of these storage reservoir sites support northern red-legged frog, which is listed as a species of special concern by the California Department of Fish and Game. Although the species of special concern designation does not warrant any formal protection under the state Endangered Species Act, populations are monitored closely by the California Department of Fish and Game. A loss of 20 percent of potential habitat in the local watershed at any one storage reservoir site will seriously threaten the survival of the northern red-legged frog populations living there. Reservoir construction and inundation will cause a 100 percent loss of occupied northern red-legged frog habitat at Bloomfield, Huntley, Two Rock, and Valley Ford respectively. Therefore this impact is considered significant.

Less than Significant; Alternative 3C.

Construction of Carroll Road reservoir will result in the loss of less than 20 percent of potential northwestern pond turtle habitat in the local watershed of any one of the proposed storage reservoir sites (*Biological Resources*, *Volume 4B*, Maps B1, B6, and B7 [Harland Bartholomew & Associates, Inc. 1996d]). This impact would be considered less than significant.

~~Construction of Two Rock, Bloomfield, Carroll Road, Valley Ford, and Huntley reservoirs will result in the loss of less than 20 percent of potential habitat in the local watershed of any one of the proposed storage reservoir sites (Biological Resources, Volume 4B, Maps B1, B6, and B7 [Harland Bartholomew & Associates, Inc. 1996d]).~~

Construction of the Two Rock, Bloomfield, Carroll Road, Valley Ford, and Huntley reservoirs will result in the loss of occupied western pond Construction of the Two Rock , Bloomfield, Carroll Road, Valley Ford, and Huntley reservoirs will result in the loss of turtle habitat. The loss of habitat at each reservoir will be less than 20 percent of potential habitat for western pond turtle in the local watershed of any one of the proposed storage reservoir sites (Biological Resources, Volume 4B, Maps B1, B6, and B7 [Harland Bartholomew & Associates, Inc. 1996d]).

No other species of special concern were identified within the reservoir construction zones.

No Impact; Alternatives 1, 2B, 2D, 4, and 5.

Results of special-status aquatic wildlife and plant surveys indicate that there is no occupied habitat of state species of special concern or state fully protected aquatic wildlife species on the Adobe Road, Lakeville Hillside, and Sears Point reservoir sites. Construction of these storage reservoirs will therefore not result in a loss of occupied habitat of state species of special concern or state fully protected aquatic wildlife species nor impact these species. Note: the loss of California red-legged frog (federally-threatened) at the Lakeville Hillside and Sears Point storage reservoir sites is covered under Impact 9.5.1.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: *Alternatives 2A, ~~and~~ 2C, **3A, 3B, 3**D, and 3E.*

2.3.11. Sensitive Biological Resources Conservation Program

Alternatives 1, 2B, 2D,~~3,~~ 4, and 5. No mitigation is proposed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2A, ~~and~~ 2C, **3A, 3B, 3D, and 3E.***

Both northern red-legged frog and northwestern-pond turtle habitat will be created or degraded habitat will be restored. Each linear foot or acre of northwestern pond turtle habitat or northern red-legged frog habitat will be replaced by the restoration or creation of one linear-foot or acre. This mitigation will be conducted in conjunction with mitigation proposed for other biological resources impacts (e.g. aquatic habitat and jurisdictional wetlands).

Table 4.9-13

Aquatic Biological Resources Impacts by Component - Storage Reservoirs
Criterion #4

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
9.5.4. Will the storage reservoir component cause loss of sensitive aquatic plant communities?	Greater than 0 acres			
Freshwater marsh				
• Two Rock		0.41 acres	C	⊙
• All Other Reservoirs		0	C	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
C Construction

2. Level of Significance codes:
⊙ Significant impact before mitigation; less than significant impact after mitigation
== No impact

Impact: **9.5.4. Will the storage reservoir component cause permanent loss of sensitive native aquatic plant communities?**

Analysis: *Significant; Alternative 3A.*

Construction of the Two Rock storage reservoir and associated facilities will result in the loss of approximately 0.4 acres of freshwater marsh (*Biological Resources, Volume 4C*, Map C-1 [Harland Bartholomew & Associates, Inc. 1996e]). This plant community has undergone tremendous reduction in distribution and acreage over the last 100 years and is considered sensitive by the California Department of Fish and Game. Any loss of this plant community will be a significant impact.

No Impact; Alternatives 1, 2, 3B, 3C, 3D, 3E, 4, and 5.

Construction of all other storage reservoir components will not result in the loss of sensitive aquatic plant communities and therefore there is no impact.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: *Alternative 3A.*

2.3.11. Sensitive Biological Resources Conservation Program

Alternatives 1, 2, 3B, 3C, 3D, 3E, 4, and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternative 3A.*

Measures of the program will require creation of an equivalent acreage of freshwater marsh or restoration of two times the acreage impacted in conjunction with other biological resources mitigation (e.g. aquatic habitat and jurisdictional wetlands).

Table 4.9-14

Aquatic Biological Resources Impacts by Component - Storage Reservoirs

Criterion #5

Evaluation Criteria	Point of Significance	Impact		Type of Impact[1]	Level of Significance[2]
9.5.5. Will the storage reservoir component cause loss of aquatic habitat?					
a) Coolwater Type A stream habitat	**Greater than 0% of habitat locally ~~linear feet~~**	**Linear Feet**	**Percent**		
• All reservoirs		0	0%	C, P	==
(b) Coolwater Type B stream habitat	**Greater than 0% of habitat locally ~~linear feet~~**	**Linear Feet**	**Percent**		
• Carroll Road		2,700	100%	C, P	⊙
• All Other Reservoirs		0	0%	C, P	==
(c) Warmwater Type A stream habitat	**Greater than 15% of habitat locally ~~habitat in watershed~~**	**Linear Feet**	**Percent**		

Table 4.9-14

Aquatic Biological Resources Impacts by Component - Storage Reservoirs
Criterion #5

Evaluation Criteria	Point of Significance	Impact		Type of Impact[1]	Level of Significance[2]
• Tolay Extended		1,850	29%	C, P	⊙
• Adobe Road		0	0%	C, P	==
• Tolay Confined		1,850	29%	C, P	⊙
• Lakeville Hillside		0	0%	C, P	==
• Sears Point		5,200	53%	C, P	⊙
• Two Rock		6,000	6%	C, P	❍
• Bloomfield		0	0%	C, P	==
• Carroll Road		3,400	6%	C, P	❍
• Valley Ford		5,300	9%	C, P	❍
• Huntley		4,100	4%	C, P	❍
d) Warmwater Type B stream habitat	**Greater than 25% of habitat locally~~in watershed~~**	**Linear Feet**	**Percent**		
• Tolay Extended		27,300	31%	C, P	⊙
• Adobe Road		7,000	18%	C, P	❍
• Tolay Confined		12,500	17%	C, P	❍
• Lakeville Hillside		10,100	54%	C, P	⊙
• Sears Point		13,100	17%	C, P	❍
• Two Rock		7,700	4%	C, P	❍
• Bloomfield		14,500	14%	C, P	❍
• Carroll Road		6,900	7%	C, P	❍
• Valley Ford		4,000	4%	C, P	❍
• Huntley		7,000	3%	C, P	❍
e) Pond habitat	**Greater than 25% of habitat locally ~~in watershed~~**	**Acres**	**Percent**		
• Tolay Extended		1	6%	C, P	❍
• Adobe Road		3	67%	C, P	⊙
• Tolay Confined		1	6%	C, P	❍
• Lakeville Hillside		1	100%	C, P	⊙
• Sears Point		< 1	3%	C, P	❍

The Adobe Road and Lakeville Hillside Reservoirs and associated facilities will result in the loss of greater than 25 percent of pond habitat in each watershed.

Less than Significant; Alternatives 2A, 2C, and 3.

All other reservoirs will result in the loss of less than 25 percent of Pond habitat in each watershed.

No Impact; Alternatives 1, 4, and 5.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Maps B-1 through B-7 of the *Biological Resources, Volume 4B* (Harland Bartholomew & Associates, Inc. 1996d) illustrate all of the aquatic habitat types mapped for each storage reservoir site that are described in the aforementioned analysis.

Mitigation: *Alternatives 2 and 3C.*

2.3.11. Sensitive Biological Resources Conservation Program

Alternatives 1, 3A, 3B, 3D, 3E, 4, and 5. No mitigation is proposed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3C.*

Implementing the measures of the Sensitive Resource Conservation Program will result in creation of aquatic habitat and habitat function (one acre created to one acre lost) or restoration of habitat and function (two acres restored to one acre lost). Mitigation will be completed in association with other biological resource mitigation (e.g. jurisdictional wetlands, aquatic habitat, and red-legged frog habitat). Interception of seepage per Mitigation 2.5.3 would slightly increase the magnitude of the flow reduction that would be caused by the dam, but would not create additional significant impacts.

Table 4.9-15

Aquatic Biological Resources Impacts by Component - Storage Reservoirs
Criterion #6

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
9.5.6. Will the Project cause a change in the physical condition of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary?	Greater than 0 ppt salinity change			
• South County Reservoirs		0 ppt	C, P	==
• West County Reservoirs		Greater than 0 ppt	C, P	●

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
P Permanent
C Construction
ppt parts per thousand

2. Level of Significance codes:
● Significant impact before and after mitigation
== No impact

Impact: **9.5.6. Will the storage reservoir component cause a change in the physical conditions of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary?**

Analysis: *Significant; Alternative 3.*

West County reservoirs may affect salinity in the Estero Americano and Estero de San Antonio through subflow entering streams. Changes in salinity may result in potential adverse effects to aquatic life found within the Estero Americano and Estero de San Antonio. For example, tidewater goby have been found in both of the Esteros. The tidewater goby can tolerate salinity ranges from 0 to over 50 parts per thousand (Swift et al. 1989). Based on this wide range of tolerance with regard to salinity, it is not expected that the Project would adversely impact the tidewater goby. However, based on the status of both the Estero Americano and Estero de San Antonio as part of a National Marine Sanctuaries, a strict evaluation criterion has been developed which establishes zero change in salinity as the point of significance. Therefore, this will be considered a significant impact. As discussed on page 4.6-66 and 4.6-89, the impact on salinity is considered significant due to the Sanctuary's interpretation of Sanctuary regulations, but may not result in adverse impacts to aquatic life.

No Impact; Alternatives 1, 2, 4, and 5.

Alternative 2 storage reservoir components are located in the South County and not located in watersheds that will contribute to the flows of the esteros.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Table 4.9-16

Aquatic Biological Resources Impacts by Component - Storage Reservoirs, Criterion #7

Evaluation Criteria	Point of Significance	Impact (corridors)	Type of Impact[1]	Level of Significance[2]
9.5.7. Will the storage reservoir component substantially block or disrupt major fish or aquatic wildlife migration or travel corridors?	Greater than 0 corridors		C, P	==
• Alternative 3C		None	C	❍
• All others		None		==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
P Permanent
C Construction

2. Level of Significance codes:
== No impact
❍ Less than significant impact; no mitigation proposed

Impact: **9.5.7. Will the storage reservoir component substantially block or disrupt major fish or aquatic wildlife migration or travel corridors?**

Analysis: *Less than Significant; Alternative 3C.*

During aquatic habitat assessments, three steelhead trout were found in the Carroll Road storage reservoir site. The steelhead trout may exhibit anadromy or fresh water residency. Anadromous strains migrate as juveniles from fresh water tributaries to the ocean, then return to the tributaries to spawn. Fresh water residency means that steelhead live out their entire life cycle in fresh water. Though presence of three individuals of a migratory species may indicate a migration corridor in the vicinity, the steelhead trout observed at the Carroll Road site are considered fresh water residents because of the lack of suitable spawning habitat. The Carroll Road tributary does possess gravel beds which were historically suitable spawning areas for salmonid species. However, these gravel beds have become overlain with muddy sediment from upstream erosion. These areas are now too laden with silt to provide for successful spawning habitat (Page 11, Appendix L-4, Volume XIII of the Draft EIR/EIS) and t~~T~~here are no known corridors or breeding sites ~~known~~ in this tributary. ~~The origin of this specimen is unknown. If a migration corridor is present in this stream system, it is not a major corridor.~~ Therefore, this impact is considered less than significant.

No Impact; Alternatives 1, 2, 3A, 3B, 3D, 3E, 4, and 5.

FINAL EIR

All other reservoir sites will not be expected to act as barriers to the movement of migratory fish, because migratory fish species are not known to use any of those stream systems. There will be no impacts.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: No mitigation is needed.
Alternatives 1, 2, 3A, 3B, 3D, 3E, 4, and 5. No mitigation is needed.

Table 4.9-17

Aquatic Biological Resources Impacts by Component - Storage Reservoirs
Criterion #8

Evaluation Criteria	Point of Significance	Impact (percent)	Impact (linear feet)	Type of Impact	Level of Significance
9.5.8. Will the storage reservoir component cause a decrease in streamflows, affecting aquatic habitat or aquatic life downstream from dam structures?	Greater than 0 linear feet ~~of warmwater stream habitat where 50 percent decrease in wet season streamflow or any decrease in dry season streamflow occurs.~~				
• Tolay Extended		53% decrease in wet season flows	38,150 lf (18,150 lf of warmwater A and 20,000 lf of warmwater B habitat)	C, P	⦿
• Adobe Road		less than 50% decrease in wet season flows	0 lf	C, P	❍
• Tolay Confined		53% decrease in wet season flows;	38,150 lf (18,150 lf of warmwater A and 20,000 lf of warmwater B habitat)	C, P	⦿
• Lakeville Hillside		60-69% decrease in wet season flows	5,600 lf (all warmwater B habitat)	C, P	⦿

Agricultural Irrigation Component

Table 4.9-19

Aquatic Biological Resources Impacts by Component - Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact	Level of Significance
9.7.1. Will the agricultural irrigation component cause loss of individuals or occupied endangered threatened or rare aquatic wildlife or plant species?	a) Greater than 0 ~~species~~ individuals and b) Greater than 0 acres	None None	C, O&M, O&M-CP C, O&M, O&M-CP	== ==
9.7.2. Will the agricultural irrigation component cause loss of individuals of CNPS List 2, 3, or 4 aquatic plant species?	Greater than 15 percent of ~~presumed extant~~ known occurrences ~~or populations~~ in Sonoma and Marin counties	None	C, O&M, O&M-CP	==
9.7.3. Will the agricultural irrigation component cause loss of potential or occupied habitat of aquatic species of concern?	Greater than 20 percent of potential habitat in local watershed ~~mapped occupied habitat in all Project components~~	None	C, O&M, O&M-CP	==
9.7.4. Will the agricultural irrigation component cause a permanent loss of sensitive native aquatic plant communities and associated wildlife habitats.	Greater than 0 acres	None	C, O&M, O&M-CP	==
9.7.5. Will the agricultural irrigation component cause permanent loss of aquatic habitat?	Greater than 15% of Warmwater Type A habitat locally ~~in local watershed~~, or Greater than 25% of Warmwater Type B habitat locally ~~in local watershed~~.	None	C, O&M, O&M-CP	==

Table 4.9-19

Aquatic Biological Resources Impacts by Component - Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact	Level of Significance
9.7.6. Will the agricultural irrigation component cause a change to the physical condition of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary?	Greater than 0 ppt salinity change			
• West County irrigation areas		Greater than 0	C, O&M, O&M-CP	●
• South County irrigation areas		None	C, O&M, O&M-CP	==
9.7.7. Will the agricultural irrigation component substantially block or disrupt major fish or aquatic wildlife migration or travel corridors?	Greater than 0 corridors	None	C, O&M, O&M-CP	==
9.7.8. Will the agricultural irrigation component cause a decrease in streamflows, affecting aquatic habitat or aquatic life downstream from proposed dam sites?	Greater than 0 linear feet ~~of affected stream habitat~~	None	C, O&M, O&M-CP	==
9.7.9. Will the agricultural irrigation component result in ecological risk to aquatic plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	EQ >10	EQ values range from 0.0 to 6.90	C, O&M, O&M-CP	❍

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:	1. Type of Impact:		2. Level of Significance:
C	Construction	==	No impact
O&M	Operation and Maintenance	❍	Less than significant impact; no mitigation proposed
O&M-CP	Operation and Maintenance - Contingency Plan	●	Significant impact before and after mitigation

Impact: 9.7.1-5, 7, 8. Will the agricultural irrigation component impact aquatic biological resources based on evaluation criteria 1, 2, 3, 4, 5, 7, and 8.

Analysis: *No Impact; All Alternatives.*

Results of habitat assessments for special-status plant and wildlife species within proposed agricultural irrigation areas indicate that some of the agricultural irrigation areas support special-status aquatic wildlife or plant species (see Table 4.9-1 for a list of these species). Several special-status species, including California red-legged frog, northwestern pond turtle, and Sebastopol meadowfoam, were observed within proposed agricultural irrigation areas. In addition, CNDDB record searches identified the following species within proposed agricultural irrigation areas: Sonoma alopecurus, Sebastopol meadowfoam, Swamp harebell, California freshwater shrimp, foothill yellow-legged frog, California tiger salamander, and northwestern pond turtle. More specific information about these occurrences is provided in *Biological Resources, Volume I, and Volume 4D* (Harland Bartholomew & Associates, Inc. 1996a,f). However, a determination of the presence of special-status species cannot be made in the absence of species-specific surveys. In addition, over the life of a reclamation Project, additional species may receive protective status that do not currently have special-status, but occupy theses lands. Therefore, there is potential for special-status species to occur on agricultural sites when they receive irrigation waters. Implementation of Project description measures will ensure that all impacts to special-status species are avoided.

The City has adopted Project measures (Measure 2.2.2 and Measure 2.2.5) that will require a resource map for every potential irrigation parcel, ensure that biological surveys are verified, and protect sensitive areas within agricultural irrigation areas by establishing buffers for all sensitive biological resources located on all parcels brought into agricultural production with Project reclaimed water. Exclusionary buffers will be established around any identified sensitive plant species habitat, the riparian corridor of all linear waterways and occupied burrows of sensitive ground-dwelling species (including California tiger salamander). Therefore, agricultural irrigation will not result in the loss of individuals or populations or occupied habitat. Table 4.9-20 presents the sensitive native aquatic plant communities in agricultural irrigation areas. Table 4.9-21 presents the aquatic habitat in the proposed agricultural areas. See *Aquatic Habitat Survey Results* (Merritt Smith 1996b) for mapping of aquatic habitat in agricultural areas. <u>Exclusionary buffers will be established around any identified waterways, including jurisdictional wetlands, streams, creeks, rivers, and ponds.</u> Therefore, there will be no impact to aquatic special status-species, sensitive plant communities, or aquatic habitat.

Results of literature review and discussions with agency experts indicate that no major migration corridors or travel corridors are located within the proposed agricultural irrigation areas. Therefore, there is no impact to migration corridors.

Under various water quality models, small sub-surface wastewater flows from irrigation field leaching may discharge to reaches of the esteros, resulting in small alterations in the salinity distribution in certain reaches. See *Aquatic Biological Resources Impact Analysis Report* for more detailed analysis (Merritt Smith Consulting 1996e). These small changes in salinity are not expected to adversely affect the tidewater goby, a species which can tolerate salinity ranges from 0 to over 50 parts per thousand (Swift et al. 1989).

Table 4.9-21

Aquatic Habitat in Agricultural Irrigation Areas

Agricultural Irrigation Area	Coolwater A (linear feet)	Coolwater B (linear feet)	Warmwater A (linear feet)	Warmwater B (linear feet)	Ponds (Acres)
Sebastopol	0	25,100	9,300	5,300	10.5
South County					
Adobe Road	0	0	600	20,000	2.0
Bay Lands	0	0	0	16,300	2.5
East of Rohnert Park	0	5,000	0	68,000	8.0
Lakeville	0	0	0	40,800	23.5
North Petaluma Valley	0	0	12,500	3,400	0.5
West County					
Americano	0	0	61,800	23,500	26.0
Miscellaneous	0	0	0	8,300	7.5
Stemple	0	2,900	68,000	50,600	71.0

Source: Harland Bartholomew & Associates, Inc., 1996

Winter irrigation may occur in all irrigation areas as needed. Normal summer irrigation will lead to a salinity change in the esteros and was determined to be a significant impact. Due to its infrequency and limited duration of application, winter irrigation is expected to create a lesser alteration to the salinity in the esteros than dry season irrigation. However, significance of the impact is defined by any change and therefore winter irrigation impacts the esteros significantly. As discussed on page 4.6-66 and 4.6-89, the impact on salinity is considered significant because of the Sanctuary's interpretation of the Sanctuary regulations, but may not result in adverse impacts to aquatic life.

No Impact; Alternatives 1, 2, 4, and 5.

Alternative 2 agricultural irrigation areas do not drain into the esteros or their watersheds.

Alternatives 1, 4, and 5 do not have an agricultural irrigation component.

Mitigation: *Alternative 3.* No feasible mitigation has been identified.

Alternatives 1, 2, 4, and 5. No mitigation is needed.

Table 4.9-22

Aquatic Biological Resources Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
9.9.1. Will the discharge component cause loss of individuals or occupied habitat of endangered, threatened, or rare candidate aquatic wildlife or plant species?	a) Greater than 0 ~~species~~ individuals b) Greater than 0 acres	None	P	==
9.9.2. Will the discharge component cause loss of individuals of CNPS List 2, 3, or 4 aquatic plant species?	Greater than 15 percent of ~~presumed extant~~ known occurrences ~~or populations~~ in Sonoma and Marin counties	None	P	==
9.9.3. Will the discharge component cause loss of potential or occupied habitat of aquatic species of concern?	Greater than 20 percent of potential habitat in local watershed ~~mapped occupied habitat in all project components~~	None	P	==
9.9.4. Will the discharge component cause a permanent loss of sensitive native aquatic plant communities?	Greater than 0 Acres	None	P	==
9.9.5. Will the discharge component cause a permanent loss of aquatic habitat?	Greater than 0 linear feet	None	P	==

Table 4.9-22

Aquatic Biological Resources Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
9.9.6. Will the discharge component cause a change to the physical condition of habitat or aquatic life in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary?	Greater than 0 ppt salinity change	None	P	==
9.9.7. Will the discharge component substantially block or disrupt major fish or aquatic wildlife migration or travel corridors?	Greater than 0 corridors	None	P	❍
9.9.8. Will the discharge component cause a decrease in streamflows, affecting aquatic habitat or aquatic life downstream from proposed dam sites?	Greater than 0 linear feet ~~of affected stream habitat~~	None	--	==
9.9.9. Will the discharge component result in ecological risk to aquatic plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	EQ Greater than 10	EQ values range from 0.0 to 9.28	O&M, O&M-CP	❍

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:	1. Type of Impact:		2. Level of Significance:
P	Permanent	==	No impact
O&M	Operation and Maintenance	❍	Less than significant impact; no mitigation proposed
O&M-CP	Operation and Maintenance - Contingency Plan		

Impact: **9.9.1-6, and 8. Will the discharge component impact aquatic biological resources based on evaluation criteria 1 through 6, and 8?**

Analysis: *No Impact; All Alternatives.*

Project Measure 2.2.5 serves to avoid environmentally sensitive areas along pipelines, pump stations, and electrical systems and establishes procedures for avoidance of construction impacts to sensitive aquatic wildlife or plant species and habitats.

Construction of a Russian River outfall will be restricted to the low flow period when the water level is below the construction area. Therefore, potential loss of individuals or occupied habitat of aquatic wildlife or plant species will be avoided.

Mitigation: No additional mitigation is proposed.

Impact: 9.9.7. Will the discharge component substantially block or disrupt major fish or aquatic wildlife migration or travel corridors?

Analysis: *Less than Significant; All Alternatives.*

The Russian River and Laguna de Santa Rosa have been the subject of numerous studies in recent years, sponsored by California Department of Fish and Game, Sonoma County Water Agency, and the Subregional System.

A five-year study of the effects of reclaimed water discharge on steelhead trout and coho salmon migration and production in the Laguna de Santa Rosa watershed is summarized in Merritt Smith Consulting (1995, 1996f). This study involved the evaluation of the number of adults migrating upstream to spawn, the number of juvenile produced, habitat factors affecting juvenile production, and the number of adults and juveniles returning to the sea. The number of captured migrating fish was compared to the concentration of reclaimed water in the migration corridor as one means of evaluating for potential reclaimed water impacts. Juvenile production was also evaluated relative to reclaimed water discharge.

A general conclusion of these studies is that the mainstem of the river is warmwater Type A habitat for at least five months of each year. During the winter, the river serves as a migration corridor for anadromous fishes (i.e., steelhead trout and coho salmon) moving to or from the Laguna drainage and other spawning and juvenile resting areas. The overall conclusion of the Russian River and Laguna studies summarized in the above-referenced document is that the discharge of reclaimed water into the migration corridor in Santa Rosa and Mark West creeks does not constitute impairment of these streams with respect to migration, reproduction, or rearing of anadromous fish. Therefore, this impact is less than significant.

Mitigation: No mitigation is proposed.

Impact: 9.9.9. Will the discharge component result in ecological risk to aquatic plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?

Analysis: *Less than Significant;* ~~***All Alternatives***~~ ***Alternatives 2, 3, and 5***.

Potential ecological risks were evaluated for a 20 percent design discharge to the River. The maximum contribution of reclaimed water to the

Russian River flow is likely to occur only during very dry-weather conditions. Under typical flow conditions, reclaimed water concentrations in the Russian River will be considerably smaller than those indicated by the design discharge values.

In the Laguna de Santa Rosa, reclaimed water contributions vary considerably depending on the reach of the Laguna. At the discharge point at Delta Pond on Santa Rosa Creek, the contribution will be the highest. For the purposes of the ecological risk assessment the contribution of reclaimed water in the Laguna has been chosen as the median value of an average rainfall year near the Delta Pond discharge -- 35 percent (35 percent of the Laguna is reclaimed water).

Three transfer pathways were considered for the potential exposure of Russian River and Laguna de Santa Rosa organisms to effluent constituents: direct exposure of aquatic organisms, water ingestion from the stream by wildlife species; and exposure by fish consumption by piscivorous birds and mammals. In addition, risk assessment was analyzed for chronic exposure of endangered, threatened, or other special-status aquatic species to the treated effluent. Results of cumulative ecological quotient calculations for 20 percent design discharge into the Russian River (directly to the Russian River or via the Laguna de Santa Rosa) indicate that the direct exposure of aquatic organisms ($0.00 \leq EQ \leq 2.82$), aquatic life exposure by fish ingestion ($0.00 \leq EQ \leq 9.28$), aquatic life exposure by water intake ($0.00 \leq EQ \leq 0.02$), and risk to freshwater endangered species ($0.00 \leq EQ \leq 0.17$), are less than significant. Impacts to aquatic organisms in the Laguna are assessed at 100 percent effluent exposure. EQs for the Laguna are less than 8.4. All ecological quotient values for discharge less than the threshold value of 10 and so the impacts are less than significant. See the *Ecological Risk Assessment* for more detailed analysis (Parsons Engineering Science, Inc. 1996). Impacts of lower levels of discharge for other alternatives will be less.

During dry winters, discharge to the Russian River may be restricted by low Russian River flows. During these periodic events, contributions of reclaimed water to the Russian River or Laguna will increase substantially. However, these discharges will last for very short periods,~~ a maximum of four days~~. Because of such a brief exposure, it is not appropriate to apply the same chronic risk factors as for the previous risk assessment. No bioaccumulation will occur during such short exposures. Impacts will be the same as non-contingency discharge.

No Impact; Alternatives 1 and 4.

Alternatives 1 and 4 do not have a contingency plan for discharge.

Mitigation: No mitigation is proposed.

CUMULATIVE IMPACTS

There are eight impacts -- either less than significant or significant -- identified in the Aquatic Biological Resources section:

Impact: **9.1C. Will the Project plus cumulative projects cause loss of individuals or occupied endangered, threatened, or rare wildlife plant species?**

Analysis: The Project impacts are to alternatives 2~~,~~ and 3C ~~3A, 3B, 3D, and 3E~~.

Construction of storage sites will result in the loss of 1.4 to 4.8 ~~8.7~~ acres of California red-legged frog habitat associated with Lakeville Hillside, Sears Point, Tolay Confined, and Tolay Extended storage reservoirs. ~~(except Carroll Road and Adobe Road).~~ All habitat losses are considered significant and will be fully mitigated through habitat creation, restoration and preservation and red-legged frog translocation. Both the red-legged ~~All~~ frogs and steelhead trout were found in marginal habitats. Mitigation will not only fully compensate for the losses, but will provide long-term preservation of their habitats.

Construction of the Carrol Road storage reservoir would result in the loss of 2,700 linear feet of steelhead trout habitat (Coolwater B). This impact is considered to be significant due to the loss of Coolwater B stream habitat and the loss of habitat for a species that is considered rare or endangered under CEQA, whether or not it is ultimately federally-listed as endangered. Mitigation Measure 2.3.11 - Sensitive Biological Resources Conservation Program will be implemented to address this issue. This program provides for restoration of degraded habitat that supported sensitive species historically, but is no longer occupied by the species. There are oppurtunities for restoration of degraded streams in the project area to compensate for the loss of the 2,700 linear feet of Coolwater B stream habitat associated with the Carroll Road storage reservoir.

The cumulative projects list (Appendix D-31) identifies 504 projects which are undergoing some level of review by the U.S. Army Corps of Engineers for wetlands fill in the cumulative project area. Many of these projects may impact both red-legged frog ~~habitat~~ and steelhead trout habitat. Since the impacts associated with the project will be fully mitigated, the project does not contribute to the cumulative effects of the projects in the region that affect these species. Therefore, no additional mitigation is proposed.~~The protection of the California red-legged frog habitat potentially affected by these projects is guaranteed through the Endangered Species Act which requires federal agencies insure that their actions (including permitting) are not likely to jeopardize the continued existence of listed species. Therefore, mitigated impacts to red-legged frogs should be minimal.~~

~~Since the impacts of the Project will be fully mitigated as well as the cumulative projects, no additional cumulative effect is identified for this impact. No additional mitigation is proposed.~~

Impact: **9.2C. Will the Project plus cumulative projects cause loss of individuals of CNPS List 2, 3, or 4 aquatic plants species?**

Analysis: The Project impacts are to alternative 3E.

The loss of one population of Lobb's aquatic buttercup at the Huntley storage site represents 3 percent of the known populations in Sonoma and Marin counties. This is less than the 15 percent point of significance and therefore is considered less than significant.

Loss of four additional populations from cumulative projects will result in a significant effect. Though it is unknown if the implementation of the projects identified on the cumulative project list will result in the loss of four additional populations of Lobb's aquatic buttercup, it is probable. Lobb's aquatic buttercup is associated with vernal pools and valley foothill grasslands. Valley foothill grasslands are a common habitat in the region and the site of many projects on the cumulative project lists. Therefore cumulative projects are considered to have a significant effect on Lobb's aquatic buttercup.

Mitigation: 2.4.15. Sensitive Plant Relocation Program. Seeds from the Lobb's aquatic buttercup population will be collected and reestablished in mitigation sites developed as a result of the Sensitive Resource Conservation Plan.

Impact: 9.3C. Will the Project plus cumulative projects cause loss of potential occupied habitat of aquatic species of concern?

Analysis: The Project impacts are to alternatives 2A, 2C, 3A, 3B, 3D, and 3 E.

Loss of northwestern pond turtle habitat exceeds 20 percent of the potential habitat present in the local watershed at Tolay Extended, and Tolay Confined and is therefore a significant Project impact. Loss of northwestern pond turtle habitat ranges from 4-14 percent on the remaining storage sites (except Adobe Road, Lakeville Hillside, and Sear Point), and is a less than significant impact. The significant impacts at the Tolay storage sites will be fully mitigated through northwestern pond turtle habitat creation, restoration, and preservation in conjunction with other elements of the Sensitive Resource Conservation Program.

Loss of northern red-legged frog habitat exceeds 20 percent of the potential habitat present in the local watersheds at Two Rock, Bloomfield, Huntley, and Valley Ford and is therefore a significant Project impact. The significant impacts at the Two Rock, Bloomfield, Huntley, and Valley Ford storage reservoirs will be fully mitigated through northern red-legged frog habitat creation, restoration, and preservation in conjunction with other elements of the Sensitive Resource Conservation Program.

All pond turtle habitat and northern red-legged frog habitat is also identified as Corps jurisdictional wetlands. Under criteria developed in the Jurisdictional Wetlands Section, all jurisdictional wetlands impacts will be mitigated to result in no net loss of function or acreage. Therefore there will be no net loss of northwestern pond turtle habitat or northern red-legged frog habitat function and acreage associated with the Project.

Though projects in the cumulative projects lists may affect both north western pond turtles and northern red-legged frogs, there will be no net effect from the Project. Therefore no cumulative effects to western pond turtles will occur. No change in the finding of significance or mitigation is proposed.

Impact: **9.4C. Will the Project plus cumulative projects cause loss of potential occupied habitat of aquatic species of concern?**

Analysis: The Project impacts are to alternative 3A.

Loss of any sensitive plant community is considered significant for this analysis. The loss of 0.41 acres of freshwater marsh at Two Rock storage site is therefore a significant impact. This impact will be fully mitigated through the creation, restoration and preservation of 0.41-1.23 acres of freshwater marsh, resulting in no net loss of community acreage or function.

Freshwater marsh is a jurisdictional wetland and therefore is a resource regulated by the Corps. In keeping with the no net loss of wetlands policy set by the executive branch of the federal government, the Corps will require mitigation for freshwater marsh losses associated with any project identified as undergoing Corps review on the cumulative project lost.

Effects of projects in the cumulative project lists on freshwater marsh will be minimal and all impacts associated with the Project are mitigated. Therefore there are no additional cumulative effects. No change in the findings of significance or mitigation is proposed.

Impact: **9.5C. Will the Project plus cumulative projects cause permanent loss of aquatic habitat?**

Analysis: The Project impacts are to alternatives 2 and 3.

~~All south county (Alternative 2) and~~ The Carroll Road (Alternative 3C) storage reservoir ~~sites~~ and all South County (Alternative 2) storage reservoirs will result in significant loss of aquatic habitat (greater than 25 percent loss of the habitat type in the local watershed). All other storage sites will result in less than significant loss of aquatic habitat. The portions of these habitats identified as waters of the U.S. will be mitigated as jurisdictional wetlands (see Jurisdictional Wetlands Resources Section) on all reservoir sites irrespective of the findings of significance in this section. Impacts to aquatic habitat significantly affected will be completely mitigated through creation of new or restoration of existing habitats proximal to the impact area resulting in no net loss of acreage or function.

Many of the projects included in the cumulative project list will impact aquatic habitat but none will affect the local watersheds associated with the storage sites of the Project. In addition, all cumulative projects affecting waters of the U.S. will be subject to Corps review and should be required to mitigate as an element of the federal no net loss policy. All aquatic habitat in streams will, in addition, require California Department of Fish and Game review and issuance of a Section 1601-1603 Streambed Alteration Agreement. Therefore, though there will be small losses of aquatic habitat associated with the Project after mitigation, they are restricted to local watersheds and are not additive to cumulative projects.

Impact: **9.6C. Will the Project plus cumulative projects cause a change to the physical condition of aquatic habitat on the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary?**

Analysis: The Project impacts are to alternative 3.

Operation of the west county storage facilities and irrigation system will result in additional freshwater flows to the esteros resulting in an alteration to the salinity in the Gulf of the Farallones National Marine Sanctuary. This impact is unavoidable and no feasible mitigation has been identified.

The cumulative project list includes many projects in the watershed of Stemple and Americano creeks. Even though these projects are limited in size, they have the potential to contribute pollutants to the creeks, and thence to the esteros. Some of these pollutants may overlap with the impacts of the Project, and total impacts to the esteros will be greater than those for the Project alone. Impacts for the project have already been determined to be significant and mitigation has been found to be infeasible. Mitigation for cumulative impacts will also be infeasible.

Impact: **9.8C. Will the Project plus cumulative projects cause a decrease in stream flows, affecting aquatic habitat or aquatic life downstream from proposed dam sites?**

Analysis: The Project impacts are to alternatives 2 and 3.

The impoundment of stream flows associated with the drainages in each storage site watershed of the Project will diminish stream flows seasonally downstream of the dam sites. Dams of the Tolay Extended, Tolay Confined, Lakeville Hillside, Bloomfield, Carroll Road, and Valley Ford storage sites will block at least 50 percent of the flow during the wet season resulting in significant impacts. Dams at Sears Point, Two Rock, Adobe Road, and Huntley storage sites will not significantly block flows (less than 50 percent in the wet season). Significant impacts will be mitigated through restoration of existing off-site stream habitat.

The cumulative project list contains four new storage sites (see above analysis). Of these potential storage sites only the City of Petaluma Wastewater facilities projects are placed close enough to the Project storage facilities to have a cumulative effect. Storage sites identified in the City of Petaluma Wastewater facilities projects Revised Draft EIR are in neighboring watersheds to the Tolay, Adobe Road, and Lakeville Hillside storage sites (Alternative 2). Both potential sites of the Petaluma reservoir will diminish stream flows downstream of the dam sites at Higgins and Wheat Creeks. These creeks are not confluent with either the

Although cumulative projects in the Russian River watershed may increase the concentration of some chemicals evaluated in the risk assessment, contributions from cumulative projects will not be able to increase pollutants in the River sufficient to increase the EQ to 10 or greater (Parsons Engineering Science, Inc. 1996). This is because the concentration of chemicals of concern will need to increase several fold in order to increase risk levels to that extent.

Mitigation: 2.4.16. Ecological Risk Monitoring and Source Control Program. A monitoring plan shall be undertaken to collect additional toxicity data (Kelley Ponds, Russian River) over a two-year period. The data shall be used in an ecological risk assessment to determine if the existing system the Project, and cumulative project discharges will result in an EQ exceeding 10 for harbor seals in the Russian River. If it is determined that the EQ for harbor seal exceeds 10, then the City shall undertake a program to identify sources of aluminum and to reduce the cumulative EQ for aluminum to less than 10.

Aluminum in effluent may be derived from the addition of alum sulfate during wastewater treatment to enhance solids removal and disinfection. Options for reducing aluminum in effluent include substituting ferric chloride or an organic polymer during treatment, identifying primary sources (aside from treatment), and implementing a control program.

SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Table 4.9-23

Summary of Significant Impacts and Mitigation Measures - Aquatic Biological Resources

Impact	Level of Significance	Mitigation Measure
Storage Reservoir Component		
9.5.1. The storage reservoir component may cause loss of individuals or occupied habitat of endangered, threatened, or rare aquatic wildlife or plant species.	Alt 2 - ⊙ ~~Alt 3A - ⊙~~ ~~Alt 3B - ⊙~~ Alt 3C - ⊙ ~~Alt 3D - ⊙~~ ~~Alt 3E - ⊙~~	2.3.11. Sensitive Resource Conservation Program 2.4.4. California Red-legged Frog Capture and Relocation Program
9.5.3. The storage reservoir component may cause loss of potential or occupied habitat of aquatic species of concern.	Alt 2A - ⊙ Alt 2C - ⊙ Alt 3A - ⊙ Alt 3B - ⊙	2.3.11. Sensitive Resource Conservation Program

Table 4.9-23

Summary of Significant Impacts and Mitigation Measures -

Aquatic Biological Resources

Impact	Level of Significance	Mitigation Measure
	Alt 3D - ⦿ Alt 3E - ⦿	
9.5.4. The storage reservoir component may cause permanent loss of sensitive aquatic plant communities and associated wildlife habitats.	Alt 3A - ⦿	2.3.11. Sensitive Resource Conservation Program
9.5.5. The storage reservoir component may cause permanent loss of aquatic habitat.	Alt 2 - ⦿ Alt 3C - ⦿	2.3.11. Sensitive Resource Conservation Program
9.5.6. The storage reservoir component may cause a change in the physical condition of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary.	Alt 3 - ●	No feasible mitigation has been identified.
9.5.8. The storage reservoir component may cause a change in stream flows, affecting aquatic habitat or aquatic life downstream from proposed dam sites.	Alt 2 - ⦿ Alt 3B - ⦿ Alt 3C - ⦿ Alt 3D - ⦿	2.3.11. Sensitive Resource Conservation Program
Agricultural Irrigation Component		
9.7.6. The agricultural irrigation component may cause a change in the physical condition of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary.	Alt 3 - ●	No feasible mitigation has been identified.
Cumulative Impacts		
9.2C. The Project plus cumulative projects may cause loss of individual of CNPS List 2, 3, or 4 aquatic plant species.	Alt 3E - ⦿	2.4.15. Sensitive Plant Relocation Program.
9.9C. The Project plus cumulative projects may result in ecological risk to aquatic plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation).	Alt 1 - ● Alt 5 - ⦿	2.4.16. Ecological Risk Monitoring and Source Control Program.

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: Level of Significance:

⦿ Significant impact before mitigation; less than significant impact after mitigation

● Significant impact before and after mitigation

PREPARERS, REFERENCES, AND CONSULTATION AND COORDINATION

Preparers

Kevin Gusé, Harland Bartholomew & Associates, Inc.
Joyce Hunting, Harland Bartholomew & Associates, Inc.
Wirt Lanning, Harland Bartholomew & Associates, Inc.

Reviewers

Dave Smith, Ph.D., Merritt Smith Consulting
Michael Bumgardner, Harland Bartholomew & Associates, Inc.
Patricia I. Collins, Harland Bartholomew & Associates, Inc.
Robin P. Cort, Ph.D., Parsons Engineering Science, Inc.
Anders J. Hauge, Harland Bartholomew & Associates, Inc.
Jim Buell, Ph.D., Peer Review Committee
John Cummings, Ph.D., Peer Review Committee
David Ziegler, Peer Review Committee

References

HBA Team Documents

Dames and Moore. 1995. *Dam Break Inundation Analysis.* (Appendix J-1).

Harland Bartholomew & Associates, Inc. 1996a. *Biological Resources, Volume 1.* (Appendix K-1).

Harland Bartholomew & Associates, Inc. 1996b. *Biological Resources, Volume 2*, Special Status Species Accounts. (Appendix K-2).

Harland Bartholomew & Associates, Inc. 1996c. *Biological Resources, Volume 4A - Terrestrial Wildlife Habitat and Special Status Wildlife Occurrences on Storage Reservoirs.* (Appendix K-5).

Harland Bartholomew & Associates, Inc. 1996d. *Biological Resources, Volume 4B - Aquatic Habitat and Special Status Aquatic Species Occurrences on Storage Reservoirs.* (Appendix K-5).

Harland Bartholomew & Associates, Inc. 1996e. *Biological Resources, Volume 4C - Vegetation Communities and Special Status Plant Occurrences on Storage Reservoirs.* (Appendix K-5).

REPLACEMENT PAGES

SECTION 4.10

JURISDICTIONAL WETLANDS RESOURCES

Other federal agencies may be involved in the review process depending upon the particular Project. Federal laws and Executive Orders that may affect the processing of a permit application include NEPA, the Coastal Zone Management Act, the Fish and Wildlife Coordination Act, the Federal Endangered Species Act, the National Historic Preservation Act, the Deepwater Port Act, the Federal Power Act, the Marine Mammal Protection Act, the Wild and Scenic Rivers Act, Executive Order 1198 (Floodplain Management), Executive Order 11990 (Protection of Wetlands), Section 6(f) of the Land and Water Conservation Act, the Farmland Protection Policy Act, the Migratory Bird Treaty Act, the Food Security Act, and the National Fishing Enhancement Act of 1984.

Other Regulatory Requirements

Although this section discusses waters of the U.S. from the perspective of the Corps' regulatory authority, there are other federal and state regulations that influence activities in wetlands and other waters of the U.S. The following section provides a brief overview of additional state and federal regulations involving wetlands and other waters of the U.S.

State agencies with permitting or review authority over jurisdictional wetlands, and other waters of the U.S. include the California Department of Fish and Game (CDFG), Regional Water Quality Control Boards, State Lands Commission, and the California Coastal Commission. Although not discretionary, Streambed Alteration Agreements (Section 1601/1603 CCR), issued by the California Department of Fish and Game, are required for alterations to rivers, streams, or lakes. These agreements stipulate measures that must be taken to mitigate the impact of construction activities in potentially affected waterways. Restrictions may be placed on the timing, duration, and extent of activities to minimize the potential disturbance to fish and wildlife resources.

A Land Lease permit would be required if project activities were to occur within lands under the jurisdiction of the State Lands Commission. The State Lands Commission has jurisdiction over navigable waterways and school lands (former federal lands which were granted to the state school system). Typical activities regulated by the State Lands Commission include placement of fill or structures in navigable waterways or Section 16 or Section 36 lands (California Resources Code, Section 6000 et seq.). The State Lands Commission has established a two-step process for authorizing use of state-owned land. The first step entails submittal of a location map for a Status Determination. The State Lands Commission would identify any existing leases in the proposed location and, if the uses are compatible, would coordinate an agreement for shared use with existing leases. After an acceptable location is identified, a Status Determination Letter is issued by the State Lands Commission. Receipt of this letter is required prior to submittal of an application for a Land Use Lease. Submittal and review of an application is the final step in the process.

A Coastal Zone Development Permit must be obtained for any structures built in the Coastal Zone. The Local Coastal Plan designates the Coastal Zone, the width of which varies considerably. Portions of the Coastal Zone included in the Local Coastal Plan for Sonoma County are the Valley Ford area and the Esteros Americano and de San Antonio. The Sonoma County Board of Supervisors grants Coastal Zone Development Permits. This permit would be required for all Project facilities proposed within the Coastal Zone. Decisions made by the County Board of Supervisors may be appealed to the California Coastal Commission.

Freshwater Seeps

Freshwater seep wetlands form where high seasonal groundwater reaches the surface, and they are easily identified because they stay green into the summer long past the surrounding upland annual grasses. Freshwater seeps are typically inundated or saturated longer than annual grassland wetlands. Spring boxes have been installed in many seeps within the Project area for livestock watering.

Mixed Riparian Woodland

Mixed riparian woodlands are associated with perennial or intermittent streams and contain broad-leaved, closed canopied deciduous trees and an extensive understory of shade tolerant shrubs.

Many areas of woody riparian vegetation, especially where degradation of the channel has lowered the groundwater level, do not meet the mandatory wetland hydrology criterion and therefore are not under Corps 404 jurisdiction. The upper edges of riparian corridors, are non-wetlands and commonly support California bay, live oak, valley oak, and buckeye which intergrade into annual grasslands.

Non-wooded Riparian Wetlands

These are well defined channels, generally wider than ten feet, that once supported riparian shrubs or trees that have since been eliminated by grazing or other disturbance. Non-wooded riparian wetlands are most often vegetated with a scattering of annual herbaceous species much like those that are found in annual grassland wetlands.

Seasonally Wet Vegetation Wetlands

Seasonally wet vegetation wetlands are an intermediate classification between vernal pools and annual grassland wetlands. The period of inundation separates the three types of seasonally inundated wetlands. Vernal pools hold water the longest and contain the highest diversity of native, endemic species, and annual grassland wetlands hold water for a shorter length of time and contain more non-native species. Seasonally wet vegetation is found in depressions in the landscape such as swales and basin floors that briefly pond water in the winter and spring or that become saturated by perched near-surface groundwater.

many-flowered navarretia (*Navarretia leucocephala* ssp. *plientha*), and Burke's goldfields (*Lasthenia burkei*).

West County

The West County geographic area is defined as north of San Antonio Creek/Petaluma, south of a line between Salmon Creek and Sebastopol, and east of U.S. Highway 1 with a western limit approximately ten miles west of U.S. Highway 1 along Americano Creek (see Figure 4.8-1 (c) of the Terrestrial Biological Resources Section).

Watersheds

The main watersheds in the West County area are Americano Creek(Estero de Americano)~~,~~ and Stemple Creek(Estero de San Antonio). ~~, Estero de Americano, and Estero de San Antonio.~~ However, other smaller perennial and intermittent creeks are present within the geographical area.

Jurisdictional Wetlands and Other Waters of the U.S.

The most extensive salt marsh communities in the Area of Indirect Impacts are located at the mouths of the Estero Americano and Estero de San Antonio. Salt marshes, mudflats, perennial freshwater marshes, and salt ponds are found near the mouth of the Estero Americano (Smith 1988). The Estero de San Antonio also supports salt marshes and perennial freshwater marshes, with smaller acreage of salt ponds, mud flats, and eelgrass beds (Smith 1988). Both esteros are protected under the National Marine Sanctuaries Act (16 U.S.C 1436) as part of the Gulf of Farallones National Marine Sanctuary. Seeps and intermittent streams are present on the hillsides surrounding both esteros (Madrone Associates 1977). Livestock grazing has affected the wetlands present in the Esteros Americano and de San Antonio, reducing vegetative cover and degrading water quality (Smith 1988).

In contrast to the primarily saline environment of the esteros, other wetlands in the West County area are emergent freshwater systems on the floors of Coast Range valleys associated with seasonally flooded low gradient stream systems. These habitats develop in gentle swales between small ridges. Some willow riparian habitat is present in areas that have not been heavily grazed.

The Two Rock reservoir site possesses a deeply-incised ephemeral tributary drainage discharging to a perennial, intermittently impounded unnamed mainstem creek. Potential jurisdictional wetlands present at the proposed Two Rock site are narrow swales in gully bottoms, bottom-land wet meadows, broad low-gradient hillside swales, hillside freshwater seeps, and emergent marsh habitat associated

Pipeline Component

Table 4.10-3

Jurisdictional Wetlands and Waters of the U.S. Component Impacts - Pipelines

Evaluation Criteria	Point of Significance	Impact (acres)	Type of Impact[1]	Level of Significance[2]
10.4.1. Will the pipeline component ~~Project~~ destroy wetlands or other waters of the U.S.?	Greater than 0 acre of permanent discharge or placement of fill			
• Alt 2A		9.4	C	⊙
• Alt 2B		8.2	C	⊙
• Alt 2C		9.6	C	⊙
• Alt 2D		8.4	C	⊙
• Alt 3A		14.8	C	⊙
• Alt 3B		16.3	C	⊙
• Alt 3C		15.8	C	⊙
• Alt 3D		14.3	C	⊙
• Alt 3E		14.5	C	⊙
• Alt 4		3.1	C	⊙
• Alt 5A		.002	C	⊙
• Alt 5B		--	C	--
• All alternatives			O&M	==

Source: Harland Bartholomew & Associates, Inc. 1996

1. Type of Impact
   - C Construction
   - O&M Operation & Maintenance

2. Level of Significance
   - ⊙ Significant impact before mitigation; less than significant impact after mitigation
   - == No Impact
   - -- Not applicable

Impact: 10.4.1. Will the pipeline component destroy wetlands and other waters of the U.S.?

Analysis: ***Construction***

Significant; Alternatives 2, 3, 4, and 5A.

Though impacts to jurisdictional waters will be minimized through construction practices outlined in Section 2.2, Measures Included in the Project, impacts will still occur.

Storage Reservoir Component

Table 4.10-5

Jurisdictional Wetlands Resources Impacts - Storage Reservoirs

Evaluation Criterion	Point of Significance	Impact (acres)	Type of Impact[1]	Level of Significance[2]
10.5.1. Will the storage reservoir component ~~Project~~ destroy wetlands or other waters of the U.S.?	Greater than 0 acre of permanent discharge or placement of fill			
• Tolay Extended		248	P	⊙
• Adobe Road		30	P	⊙
• Tolay Confined		87	P	⊙
• Lakeville Hillside		24	P	⊙
• Sears Point		53	P	⊙
• Two Rock		64	P	⊙
• Bloomfield		57	P	⊙
• Carroll Road		69	P	⊙
• Valley Ford		102	P	⊙
• Huntley		48	P	⊙

Source: Harland Bartholomew & Associates, Inc. 1996

Notes:

1. Type of Impact
   P Permanent
2. Level of Significance Codes
   ⊙ Significant impact before mitigation; less than significant impact after mitigation

Impact: 10.5.1. Will the storage reservoir component destroy wetlands or other waters of the U.S.?

Analysis: *Significant; Alternatives 2 and 3.*

Storage reservoirs and associated facilities (including dams, access roads, pump stations, and diversion channels) will result in the loss of potential jurisdictional wetland and other waters of the U.S. (including farmed wetlands) for each reservoir site. For all reservoir sites, both the direct fill of jurisdictional waters (as a consequence of reservoir construction) and inundation with reclaimed water will result in significant impacts to this wetlands resource. The affected acreage for each wetland type is provided in Table 4.10-6. See Figures 4.10-1 through 4.10-10 for the distribution of wetlands on storage reservoir sites.

minimum 5~~3~~0-foot exclusionary buffer from irrigation application and a minimum 30-foot setback from new cultivation and construction will be established around all jurisdictional waters, including isolated wetlands, and a minimum 50-foot exclusionary buffer from agricultural irrigation application will be established around the upland riparian corridor of all linear waterways, including streams, creeks, and rivers. Agricultural irrigation would not result in discharge or fill to wetlands, and therefore there is no impact. The Contingency Plan would allow winter irrigation of agricultural areas, which would be subject to the same limitations described above. Therefore, no impacts to jurisdictional wetland or waters of the U.S. would occur.

Pipe rupture or leakage will not result in greater than one acre of permanent wetland fill.

Alternatives 1, 4, and 5 do not have an agricultural irrigation component.

Mitigation: No further mitigation is needed.

PREPARERS, REFERENCES, AND CONSULTATION AND COORDINATION

Preparers

Joyce Hunting, Harland Bartholomew & Associates, Inc.
Mona Robison, Harland Bartholomew & Associates, Inc.

Reviewers

Adrian Juncosa, Ph.D., Harland Bartholomew & Associates, Inc.
Patricia I. Collins, Harland Bartholomew & Associates, Inc.
Robin P. Cort, Ph.D., Parsons Engineering Science, Inc.
Anders J. Hauge, Harland Bartholomew & Associates., Inc.
John Cummings, Ph.D., Peer Review Committee
David Ziegler, Peer Review Committee
Robert Gearhart, Ph.D., Peer Review Committee

References

HBA Team Documents

Harland Bartholomew & Associates, Inc. 1996a. *Biological Resources, Volume 1*. (Appendix K-1).

Harland Bartholomew & Associates, Inc. 1996b. *Biological Resource, Volume 4A.* (Appendix K-4).

Harland Bartholomew & Associates, Inc. 1996c *Biological Resource, Volume 4B.* (Appendix K-5).

Harland Bartholomew & Associates, Inc. 1996d *Biological Resource, Volume 4D.* (Appendix K-5).

Harland Bartholomew & Associates, Inc. 1996e *Biological Resource, Volume 4C.* (Appendix K-5).

Harland Bartholomew & Associates, Inc. 1996f. *Biological Resource, Volume 4E.* (Appendix K-5).

Parsons Engineering Science, Inc. 1996a. *Agricultural Irrigation Areas Wetlands Determination*. (Appendix M-1).

REPLACEMENT PAGES

SECTION 4.11

TRANSPORTATION

Table 4.11-1

Affected Roadway Segments and Existing Traffic Volumes

			Peak Hour			**ADT**
Roadway Segment	**Type**	**Lanes**	**Weekday a.m.**	**Weekday p.m.**	**Saturday Mid-day**	**Peak Month**
Petaluma-Valley Ford Road west of Bloomfield Road	Arterial	2	217	337	618	4,341
Petaluma-Valley Ford Road north of Bodega Avenue	Arterial	2	230	328	574	4,371
Pepper Road south of Walker Road	Arterial	2	203	235	219	2,663
Spring Hill Road south of Bodega Avenue	Collector	2	71	89	74	806
Old Redwood Hwy. south ~~north~~ of Railroad Ave.	Arterial	2	696	1,081	762	11,867
Petaluma Hill Rd. north of Adobe Road~~Railroad Ave~~.	Arterial	2	1,338	1,815	923	17,727
Petaluma Hill Road south of Crane Canyon Road	Arterial	2	886	1,508	633	12,647
Redwood Highway south of Ely Road	Arterial	4	1,226	1,702	1,080	18,929
Adobe Road south of Corona Road	Arterial	2	855	1,075	577	10,572
East Washington Street east of Ely Road	Arterial	2	463	642	610	8,220
Frates Road west of Adobe Road	Arterial	2	578	860	492	8,590
Ely Blvd. south of Frates Road	Arterial	2	305	572	287	4,953
Lakeville Highway north of Highway 37	Arterial	4	1,065	1,636	877	16,664
Llano Road South of Highway 12	Arterial	2	177	217	NA	2,079
State Highway 1 north of Two Rock Road	Arterial/State Highway	2	NA	200	NA	1,300
State Highway 1 west of Petaluma-Valley Ford Road	Arterial/State Highway	2	NA	650	NA	4,600
State Highway 1 east of Valley Ford-Freestone Road	Arterial/State Highway	2	NA	1,100	NA	4,650
State Highway 12 along Farmers Lane	Arterial/State Highway	4	NA	2,450	NA	30,000

Table 4.11-1

Affected Roadway Segments and Existing Traffic Volumes

Roadway Segment	Type	Lanes	Peak Hour Weekday a.m.	Peak Hour Weekday p.m.	Peak Hour Saturday Mid-day	ADT Peak Month
State Highway 37 east of Lakeville Highway	Arterial/State Highway	4	NA	3,350	NA	35,500
State Highway 116 west ~~east~~ of Stony Point Road	Arterial/State Highway	2	NA	1,650	NA	18,100
State Highway 116 north of Lakeville Highway	Arterial/State Highway	2	NA	1,300	NA	15,600
State Highway 116 south of Adobe Road`	Arterial/State Highway	2	NA	250	NA	3,000
State Highway 121 north of State Highway 37	Arterial/State Highway	4	NA	1,700	NA	16,300
State Highway 128 south of Pine Flat Road	Arterial/State Highway	2	NA	250	NA	2,450
Proposed Reservoir Access Roads						
Cannon Lane at Lakeville Road	Rural	2	6	7	7	70
Private Driveway off of Stage Gulch Road (SR 116) south of Adobe Road	Rural	1	1	1	1	10
Old Lakeville Road No. 3 (north) at Lakeville road	Local	2	8	10	9	95
Private Driveway off of Highway 121 at Tolay Creek	Rural	1	1	1	1	10
Access Roads (2) onto Sonoma Mountain Road	Rural	2	12	15	13	145
Private Driveway (Ielmorini Road) off of Adobe Road aligned with East Washington Street	Rural	1	1	1	1	10
Walker Road Access Road	Local	2	4	5	4	50

REPLACEMENT PAGES

SECTION 4.12

AIR QUALITY

(THERE ARE NO REPLACEMENT PAGES FOR THIS SECTION)

REPLACEMENT PAGES

SECTION 4.13

NOISE

Table 4.13-3

Marin County Allowable Noise Exposure From Stationary Noise Sources

	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
Hourly, L_{eq}, dBA	50	45
Maximum Noise Level, dBA	70	65
Maximum Noise Level, dBA (Impulsive Noise)	65	60

Source: County of Marin, Marin Countywide Plan Noise Element, 1994

Sonoma County

The Noise Element of the Sonoma County General Plan contains a goal (Goal NE-1): "to protect people from the harmful effects of exposure to excessive noise and to achieve an environment in which people and land uses may function without impairment from noise." Noise level performance standards in Table 4.13-4 are to be applied as performance standards for noise producing land uses which may affect noise sensitive land uses and vice versa.~~The Sonoma County General Plan states that the "noise level resulting from new sources and ambient noise shall not exceed the standards in Table 4.13-5 as measured at the exterior property line of any affected residential land uses."~~ These standards also apply to other sensitive receptors such as schools, hospitals, rest homes, and long-term medical or mental care facilities. To implement the Noise Element, Sonoma County requires special permit review procedures to be established for projects that involve significant noise level generation, or that are located in noise impacted areas. The Noise Element of the County's General Plan includes the following policy (Policy NE-1C):

Control non-transportation related noise from new projects. The total noise level resulting from new sources and ambient noise shall not exceed the standards in Table 4.13-4 as measured at the exterior property line of any affected residential land use. Limit expectations to the following:

> If the ambient noise level exceeds the standards in Table 4.13-4, adjust the standards to equal the ambient level.
>
> Reduce the applicable standards in Table 4.13-4 by five dBA for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

Reduce the applicable standards in Table 4.13-4 by 5 decibels if they exceed the ambient level by 10 or more decibels.

Table 4.13-4

Sonoma County Noise Level Performance Standards

Category	Cumulative Duration of Noise Event in Any 1-Hour Period	Maximum Exterior Noise Level Standards, dBA	
		Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30-60 minutes	50	45
2	15-30 minutes	55	50
3	5-15 minutes	60	55
4	1-5 minutes	65	60
5	0-1 minutes	70	65

Source: County of Sonoma, Sonoma County General Plan Noise Element, 1989 revised 1991 were used for the evaluation criteria, to represent the worst-case noise impacts. Sensitive receptors can be assumed to be residences.

Table 4.13-8

Evaluation Criteria with Point of Significance - Noise

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will construction of the Project expose the public to high noise levels?	Projected noise levels at property line or "yard" line	Greater than L_{eq} of 60 dBA	California Office of Noise Control recommended construction noise limits
2. Will operation and maintenance of the Project expose the public to high noise levels?	Projected noise levels at property line or "yard" line	a. Greater than L_{eq} of 45 dBA, OR Greater than L_{eq} of 50 dBA b. Greater than 5 dBA increase in noise, L_{eq}	General Plan of Sonoma County and Noise Element of Marin County City of Santa Rosa Municipal Code An increase of 5 dBA or more will be readily noticeable.
3. Will construction of the Project cause high noise levels from construction traffic?	Projected traffic volume due to construction	Greater than 10 % increase in traffic volume	A 10 % increase in traffic volume will increase the noise by less than 1 dBA, which normally will not be noticeable.

Source: Parsons Engineering Science, Inc., 1996

Notes:
1 - The property or yard line of the affected receptor whichever is closer to the affected structure.

METHODOLOGY

Noise Calculations

Outdoor sound transmission is influenced by three types of natural effects: distance effects, atmospheric effects, and terrain effects. For point sources, sound levels drop off with distance in accordance with the "inverse square law", which yields a 6 dB sound level reduction for each doubling of the distance from the source. A sound source can be treated as a "point source" when the distance from the source is large compared to the dimensions of the source.

In addition to the drop in noise levels as distance increases, noise also drops due to the atmospheric absorption and losses due to a barrier. Atmospheric absorption is dependent upon temperature and relative humidity. A barrier is a solid structure that intercepts the direct sound path from a source. It provides a reduction in sound level within its "shadow zone." A barrier can be a hill, earth berm, a wall, or a building. The noise analysis for this study is conservative because atmospheric absorption and barrier noise reduction were not considered in the calculation.

Table 4.13-18

Summary of Construction Noise Impacts for Pump Stations

Pump Station	Distance to Nearest Sensitive Receptor, feet[1]	Construction Noise Levels, L_{eq} (dBA) at 50 feet	Construction Noise Levels, L_{eq} (dBA) at Nearest Sensitive Receptor	Jurisdiction
SBPS-11 - Adobe Road	Greater than 1,000	87	61 or less	Sonoma Co.
SBPS-12 - Lakeville Road	600	87	65	Sonoma Co.
WBPS-1 - Martinoni Road	Greater than 1,000	87	61 or less	Marin Co.
WBPS-3 - Seavey Road	400	87	69	Sonoma Co.
WBPS-4 - Spring Hill Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-5 - Pepper Road	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-6 - Valley Ford Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-7 - Canfield Road	200	87	75	Sonoma Co.
WBPS-8 - Valley Ford Rd.	700	87	64	Sonoma Co.
WBPS-9 - Valley Ford Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-10 - Bloomfield Rd.	300	87	71	Sonoma Co.
WBPS-11 - Carroll Road	600	87	65	Sonoma Co.
WBPS-12 - Hwy 1	Greater than 1,000	87	61 or less	Marin Co.
WBPS-13 - Valley Ford Rd,	Greater than 1,000	87	61 or less	Sonoma Co.
WBPS-16 - Meachum Rd.	Greater than 1,000	87	61 or less	Sonoma Co.
LBPS-1 - Green Valley	Greater than 1,000	87	61 or less	Sonoma Co.
LBPS-2 - Graton Road	500	87	67	Sonoma Co.
LBPS-3 - Bodega Hwy.	400	87	69	Sonoma Co.
LBPS-4 - Burnside Road	Greater than 1,000	87	61 or less	Sonoma Co.

Source: Parsons Engineering Science, Inc., 1996

Notes:
1: The property or yard line of the affected receptor whichever is closer to the affected structure.

No Impact; Alternatives 1 and 5.

These alternatives have no new pump station component.

Mitigation: *Alternatives 2, 3, and 4.*

2.4.9. Construction Noise Control Measures

Alternatives 1 and 5. No mitigation is needed.

REPLACEMENT PAGES

SECTION 4.14

VISUAL RESOURCES

structures to the roadway will occur. View obstruction from public viewpoints will be minimal due to the small size of the structures (typically 20 feet by 20 feet or smaller), except for pump stations G-1 and G-2, which have larger structures (a 30 feet by 60 feet pump station building, and, for pump station G-2, an electrical substation along with a 24 ~~50~~ foot high storage tank ~~and, for pump station G-2, an electrical substation~~). In addition, the proposed electrical service to Pump Station G-2 will introduce another overhead electrical line on the north side of Highway 128. (The other pump stations will have short [approximately 100-200 feet] connections to existing electrical service lines). Refer to photo simulations Figures 4.14-19 and 4.14-20 at the end of the pump station component evaluation.

No specific scenic resources have been identified which will be impacted by any of these pump station sites.

Pump Stations ARSW, AR, L, and SEB.

Pump stations ARSW AR and L which are at the Adobe Road and Lakeville Hillside reservoir sites will be several hundred feet from a public viewpoint, and due to the distance will not create a strong visual contrast. The proposed 12 kV electrical line from the existing service on Sonoma Mountain Road to Pump Station ARSW also will not be visible from public view except where it joins the existing line. (The other pump stations will have short [approximately 100-200 feet] connections to existing electrical service lines.)

Pump station SEB is located behind the Delta Pond south of Guerneville Road and screened from public view by the pond itself. It will also be served by a short underground connection from an existing electrical line. No specific scenic resources have been identified which will be impacted by any of these pump station sites.

All other pump stations.

None of the other pump stations are located in a designated Scenic Landscape Unit.

No Impact; Alternatives 1 and 5.

These alternatives do not have a new pump station component.

Mitigation: *Alternatives 2, 3, and 4.*

2.4.6. Screen Concrete Diversion Channels, Pump Stations, and Other Facilities.

Alternatives 2 and 3.

2.3.17 Pump Station Noise Control

Alternatives 1 and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternative 4 (Pump Stations G-1 and G-2)*

Less Than Significant after Mitigation; Alternatives 2 and 3 (Pump Stations SBPS-3, SBPS-11, SBPS-12, WBPS-6, LBPS-2, LBPS-3 and LBPS-4)

Mitigation Measure 2.3.17 would result in Pump Stations SBPS-3, SBPS-11, WBPS-6, LBPS-3 and LBPS-4 being placed entirely underground, and therefore all permanent visual impacts would be eliminated. Except for Pump Stations G-1 and G-2, ~~this~~ Mitigation M~~m~~easure 2.4.6 will reduce the visual contrast of the pump stations by introducing vegetation to screen the structure from public view. The use of vegetation, will also blend the site with the surrounding landscape. The scale of structures at Pump Stations G-1 and G-2 is such that screening with vegetation will only partially eliminate views of the structures from public viewpoints. The ~~24~~50-foot ~~feet~~ high storage tanks, in particular, will not be able to be screened from view by vegetation due to the proximity to the roadway. In addition, the proposed electrical service to Pump Station G-2 on the north side of Highway 128 could not effectively be screened from view.

Impact: **14.6.3. and 4. Will the pump station component be inconsistent with the Sonoma County General Plan Open Space Element regarding Scenic Corridors or with minimum building setbacks along Scenic Corridors?**

Significant. Alternatives 2, 3, and 4.

Pump Stations G1, G2, SP, SBPS-2, SBPS-3, SBPS-7, SBPS-8, SBPS-10, SBPS-11, SBPS-12, WBPS-5, WBPS-6, WBPS-8, LBPS-1, and LBPS-3. Except for Pump Station SP, these sites are located within a designated Sonoma County Scenic Corridor, and strong visual contrast due to the proximity of the structures to the roadway will occur. View obstruction from public viewpoints will be minimal due to the small size of the structures (typically 20 feet by 20 feet or smaller), except for pump stations G-1 and G-2, which have larger structures (a 30 feet by 60 feet pump station building, and, for pump station G-2, an electrical substation along with a 24 ~~50~~ foot high storage tank~~ and, for pump station G-2, an electrical substation~~).

To provide service to Pump Station SP at the Sears Point reservoir, a new 115 kV line will be constructed along Highway 121. This will introduce additional service with 70 foot high poles in a rural area. In addition, the proposed electrical service to Pump Station G-2 visual contrast from another overhead electrical line on the north side of Highway 128 and a proposed 115 kV line along Railroad Avenue and Petaluma Hill Road to Pump Station SBPS-10 will introduce additional service with 70 feet high~~of~~ poles along these roads. (The other pump stations will have short [approximately 100-200 feet] connections to existing electrical service lines.)

All of these pump stations, except Pump Station SP, will have structures located within the 200 feet minimum setback required along Sonoma

County Scenic Corridors. No specific scenic resources have been identified which will be impacted by any of these pump station sites.

Pump Stations SEB, T, AR, B, CR, and VF. Pump stations located on the Tolay, Adobe Road, Bloomfield, Carroll Road and Valley Ford reservoir sites will be several hundred feet from a public viewpoint, and due to the distance will not create a strong visual contrast. The extension of the existing 12 kV electrical line on the Bloomfield site from its present terminus approximately 2,500 feet north of Valley Ford Road to Pump Station B will be in the middleground viewed from Valley Ford road and will not represent an additional contrasting visual element. The proposed new 12 kV electrical line from the east end of Cannon Lane to Pump Station T at the Tolay Dam site will not be visible from public view, except where it joins the existing line. (The other pump stations will have short [approximately 100-200 feet] connections to existing electrical service lines.)

Pump station SEB is located behind the Delta Pond south of Guerneville Road and screened from public view by the pond itself. No specific scenic resources have been identified which will be impacted by any of these pump station sites. None of these pump stations will be located within the required setback along Scenic Corridors.

All other pump stations. None of the other pump stations are located in a designated Scenic Corridor.

No Impact; Alternatives 1 and 5.

These alternatives do not have a new pump station component.

Mitigation: *Alternatives 2, 3, and 4. (Pump Stations G1, G2, SP, SBPS-2, SBPS-3, SBPS-7, SBPS-8, SBPS-10, SBPS-11, SBPS-12, WBPS-5, WBPS-6, WBPS-8, LBPS-1, and LBPS-3).*

2.4.6. Screen Concrete Diversion Channels, Pump Stations, and Other Facilities.

Alternatives 2 and 3.

2.3.17 Pump Station Noise Control

Alternatives 1 and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternatives 2, 3, and 4.*

Mitigation Measure 2.3.17 would result in Pump Stations SBPS-2, SBPS-3, SBPS-11, WBPS-6, WBPS-8, LBPS-1 and LBPS-3 being placed entirely underground, and therefore all permanent visual impacts would be eliminated. Except for Pump Stations G-1, G-2, SP, and SBPS-10, ~~this~~ Mitigation M~~m~~easure 2.4.6 will reduce the visual contrast of the pump stations by introducing vegetation to screen the structure from public view. The use of vegetation, will also blend the site with the surrounding landscape. The scale of structures at Pump Stations G-1 and G-2 is such that screening with vegetation will only partially eliminate views of the structures from public viewpoints. The 24 ~~50 -~~-foot high storage tank at Pump Station G-2, in particular, will not be able to be screened from view by vegetation due to the proximity to the roadway, and the proposed electrical lines north of Highway 128, and along Railroad Avenue and Petaluma Hill Road cannot be screened from view.

The impact related to the location of structures within the required 200 foot setback along scenic corridors cannot be mitigated. The location of the structures cannot feasibly be changed and providing a greater setback will create additional intrusions on agricultural land, potential natural habitat and residential areas. The structures will be subject to design review under Sonoma County policies for Scenic Corridors.

Impact: **14.6.5. Will the pump station component cause an adverse effect on foreground or middleground views from a high volume travelway (excluding scenic corridors), recreation use area, or other public use area?**

Analysis: *Significant; Alternatives 2, 3, and 4.*

Pump Stations S, G3, G4, FGB, BVB, SBPS-9, WBPS-3, WBPS-4, WBPS-7, LBPS-2, and LBPS-4. These sites are along frequently traveled roads, and strong visual contrast due to the proximity of the structures to the roadway will occur. View obstruction from public viewpoints will be minimal due to the small size of the structures (typically 20 feet by 20 feet or smaller), except for pump stations G-3 and G-4, which have larger structures (a 30 feet by 60 feet pump station building, along with a 24 ~~50~~ foot high storage tank ~~and, for pump station G-2,~~ an electrical substation). A new electrical service along Pine Flat Road to Pump Stations G-3 and G-4 (and extending to Pump Station G-2 at the west end of Pine Flat Road as well) will introduce a new visual element. While this line at least in part will parallel the existing 230 kV line to the Geysers, it will create additional visual contrast in an otherwise undeveloped area.

Although the proposed electrical line Pump station S is located among other structures at the Laguna Treatment Plant, and will not present any visual contrast with its surroundings, the proposed 115 kV electrical line with 70 foot high poles along the Laguna de Santa Rosa to serve Pump Station S will introduce a new contrasting visual element along the Laguna. The other pump stations will have short (approximately 100-200 feet) connections to existing electrical service lines.

No specific scenic resources have been identified which will be impacted by any of these pump station sites.

Pump Stations L and H. Pump stations L and H are at the Lakeville Hillside and Huntley reservoir sites several hundred feet from a public viewpoint, and due to the distance will not create a strong visual contrast. These pump stations will have short (approximately 100 feet) connections to existing electrical service lines which will not introduce a new contrasting visual element.

All other pump stations. None of the other pump stations are located along a high volume travelway (excluding scenic corridors), recreation use area, or other public use area.

No Impact; Alternatives 1 and 5.

These alternatives do not have a new pump station component.

Mitigation: *Alternatives 2, 3, and 4.*

2.4.6. Screen Concrete Diversion Channels, Pump Stations, and Other Facilities.

Alternatives 2 and 3.

2.3.17 Pump Station Noise Control

Alternatives 1 and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternative 2, 3, and 4. (Pump Stations G3, G4 and S).*

Mitigation Measure 2.3.17 would result in Pump Stations BVB, SBPS-9, WBPS-3, WBPS-7, and LBPS-4 being placed entirely underground, and therefore all permanent visual impacts would be eliminated. Except for Pump Stations G-3, G-4 and S, ~~this~~ Mitigation M~~m~~easure 2.4.6 will reduce the visual contrast of the pump stations by introducing vegetation to screen the structure from public view. The use of vegetation, will also blend the site with the surrounding landscape. The scale of structures at Pump Stations G-3 and G-4 is such that screening with vegetation will only partially eliminate views of the structures from public viewpoints. The 24 ~~50~~ foot high storage tanks, in particular, will not be able to be screened from view by vegetation due to the proximity to the roadway. The new electrical service lines to Pump Stations G-3, G-4 and S cannot be effectively screened from public view.

Impact: 14.6.6. Will the pump station component may an adverse effect on foreground views from one or more private residences (not subject to relocation as a result of the Project)?

Analysis: *Significant; Alternatives 2, 3 and 4.*

Pump Stations G-2, S, T, SP, TR, B, SBPS-2, SBPS-3, SBPS-7, SBPS-8, SBPS-9, SBPS-10, SBPS-11, SBPS-12, WBPS-1, WBPS-3, WBPS-4, WBPS-5, WBPS-6, WBPS-7, WBPS-8, LBPS-1, LBPS-2, LBPS-3 and LBPS-4. Pump Station G-2 and all of the agricultural irrigation booster pump stations are within the potential foreground view of one or more residences, and due to the small size of the parcels (approximately one acre), and proximity of the structures to the roadway, strong visual contrast with the residential character will occur. However, view obstruction from residences will be minimal due to the small size of the structures (typically 20 feet by 20 feet or smaller), except for pump station

G-2, which has larger structures (a 30 feet by 60 feet pump station building, along with a 24 ~~50~~ foot high storage tank and~~, for pump station G-2,~~ an electrical substation). The new electrical services to Pump Stations S, T, SP, TR, B and SBPS-10 will be visible to residences in the foreground view and will introduce new visual contrast in these views. (The other pump stations will have short [approximately 100-200 feet] connections to existing electrical service lines.)

No specific scenic resources have been identified which will be impacted by any of these pump station sites.

Pump Stations L, AR, CR, VF and H. These pump stations are at the proposed reservoir sites several hundred feet from the nearest residence, and while they will be in the foreground view (less than 2,000 feet) will not create a strong visual contrast or block any scenic views, due to the distance from the residence. These pump stations will have short (approximately 100-200 feet) connections to existing electrical service lines.

No specific scenic resources have been identified which will be impacted by any of these pump station sites.

All other pump stations. None of the other pump stations are visible in a foreground view from any residence.

No Impact; Alternatives 1 and 5.

These alternatives do not have a new pump station component.

Mitigation: *Alternatives 2, 3, and 4.*

2.4.6. Screen Concrete Diversion Channels, Pump Stations, and Other Facilities.

Alternatives 2 and 3.

2.3.17 Pump Station Noise Control

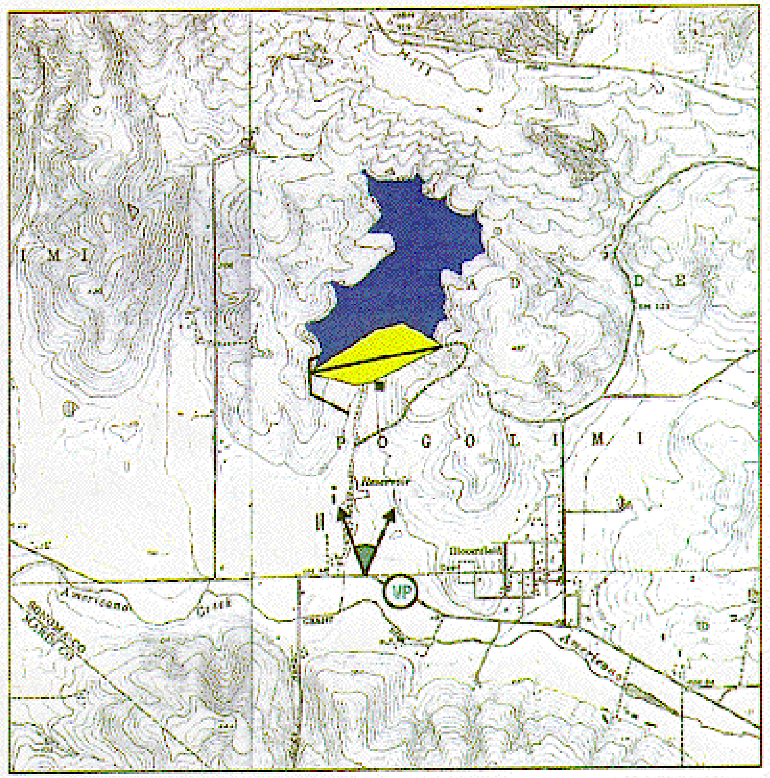
Alternatives 1 and 5. No mitigation is needed.

After Mitigation: *Significant after Mitigation; Alternatives 2, 3 and 4.*

Mitigation Measure 2.3.17 would result in Pump Stations SBPS-2, SBPS-3, SBPS-9, SBPS-11, WBPS-1, WBPS-3, WBPS-6, WBPS-7, WBPS-8, LBPS-1, LBPS-3 and LBPS-4 being placed entirely underground, and therefore all permanent visual impacts would be eliminated. Except for Pump Stations G-2, S, T, SP, TR ,B and SBPS-10, ~~this~~ Mitigation M~~m~~easure 2.4.6 will reduce the visual contrast of the pump stations by introducing vegetation to screen the structure from public view. The use of vegetation, will also blend the site with the surrounding landscape. The scale of structures at Pump Station G-2 is such that screening with vegetation will only partially eliminate views of the structures from public viewpoints. The 24 ~~50~~ foot high storage tanks, in particular, will not be able to be screened from view by vegetation due to the proximity to the roadway. The new electrical service lines to Pump Stations G-2, S, T, SP, TR , B and SBPS-10 cannot feasibly be screened from the view of nearby residences.


Existing view from Highway 1.


Computer model of dam one year after construction.


Viewpoint Location

Source: USGS


Computer model of dam

Source: DAMES & MOORE

VISUAL SIMULATION
BLOOMFIELD RESERVOIR SITE

REPLACEMENT PAGES

SECTION 4.15

CULTURAL RESOURCES AND PALEONTOLOGY

considered to be significant if they are found in large numbers and/or over a large geographic area (Reynolds 1988).

The Project area contains the following six main geologic units: Franciscan Complex, Wilson Grove Formation (previously the Merced Formation), Petaluma Formation, Sonoma Volcanics, Glen Ellen Formation, and Pliocene and Quaternary alluvial/colluvial deposits (Rust Environment and Infrastructure 1995). The Franciscan Complex contains a variety of rock types, including shale, clay, graywacke, sandstone, greenstone, and chert. The majority of these rocks are not fossiliferous (fossil-bearing). Chert within the Franciscan Complex may contain marine microfossils which are abundant and widespread throughout coastal northern California and are therefore not considered to be a significant paleontologic resource (Reynolds 1988).

The Wilson Grove Formation comprises marine sediments, including sandstone, conglomerate, and tuff. It is fossiliferous and contains many marine invertebrate species such as clams, snails, brachiopods, sand dollars, sea urchins, crabs, and polychaete tubes, as well as plant fossils. Vertebrate fossils have also been identified in the Wilson Grove Formation, but museum collections are from few localities and there is very little published information regarding these sites.

A wide range of species of invertebrate and vertebrate fossils, including bison, horse, deer, and turtle~~, and birds,~~ have been recovered from the Petaluma Formation. The Petaluma Formation consists primarily of non-marine claystone, siltstone, sandstone, and mudstone. The Sonoma Volcanics which consist of basalt, andesite, rhyolite, t~~r~~uff, and other pyroclastic rocks are ~~not~~ considered to be fossiliferous.

The Glen Ellen Formation consists of fluvial gravel, silt, sand, and clays eroded from the adjacent highlands. Recent fossils have been recovered from Quaternary alluvial/colluvial deposits in the Glen Ellen Formation within Sonoma County.

Cultural Resources and Paleontology Goals, Objectives, and Policies

Table 4.15-1 identifies goals, objectives, and policies which provide guidance for development in relation to cultural resources in the Project area. The table also indicates which evaluation criteria are responsive to each set of policies. There are no goals, objectives, and policies related to Paleontology in the Project area.

environment if Project activities disrupt or adversely affect a paleontologic site (CEQA, Appendix G).

The California Public Resources Code, Section 5097.5, prohibits the excavation or removal of any "vertebrate paleontological site, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands." Public lands are defined as lands owned by or under the jurisdiction of the state or any city, county, district, authority, or public corporation. Any unauthorized disturbance or removal of archaeological, historic, or paleontologic materials or sites located on public lands is considered a misdemeanor.

The Archaeological and Historic Data Preservation Act of 1974, as amended, provides for the survey, recovery, and preservation of significant scientific, prehistoric, historic, archaeological, or paleontologic data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded Project.

According to standard procedures published by the Society of Vertebrate Paleontology (1991), sedimentary rock units with a high potential for containing significant nonrenewable paleontologic resources are those within which vertebrate or significant invertebrate fossils have been determined by previous studies to be present or likely to be present (Society of Vertebrate Paleontology 1991). Significant paleontologic resources are fossils or assemblages of fossils which are unique, unusual, rare, uncommon, diagnostically or stratigraphically important, and those which add to an existing body of knowledge in specific areas, stratigraphically, taxonomically, or regionally (Reynolds 1988).

The Wilson Grove Formation, the Petaluma Formation, ~~and~~ the Glen Ellen Formation, and the Sonoma Volcanics are ~~sedimentary~~ rock units in which important vertebrate, invertebrate, or plant paleontologic resources have been documented, although no known sites are in the Project area. A Project effect on any of these units is considered a potentially significant impact (Table 4.15-2).

Table 4.15-2

Evaluation Criteria with Point of Significance - Cultural Resources and Paleontology

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project disturb known, potentially-eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Number of sites affected by Project facilities	Greater than 0 sites	National Historic Preservation Act, Section 106; CEQA, Appendix K; PRC Section 5020-5024, 21084.1

Table 4.15-2

Evaluation Criteria with Point of Significance -
Cultural Resources and Paleontology

Evaluation Criteria	As Measured by	Point of Significance	Justification
2. Will the Project disturb unknown archaeological resources?	Sensitivity analysis	Greater than 0 Projected locations	National Historic Preservation Act, Section 106; CEQA, Appendix K; PRC Section 5020-5024, 21084.1
3. Will the Project disturb unknown important ~~vertebrate~~ paleontologic resources.	Underground construction within geologic units with the potential to contain ~~unknown~~ important ~~vertebrate~~ fossils, i.e., Wilson Grove, Petaluma, ~~or~~ Glen Ellen Formation, or Sonoma Volcanics	Greater than 0 occurrences	CEQA, Appendix G; PRC Section 5097.5 The Archeological and Historic Data Preservation Act of 1974

Source: Harland Bartholomew & Associates, Inc. 1996

METHODOLOGY

Cultural Resources

The goal of the cultural resources study for this Project is to identify prehistoric and historic archaeological sites, architectural and historical sites, historic landscapes, traditional cultural properties (including Native American heritage resources), and heritage trees that might be affected by implementation of the Project. The study was performed by the Anthropological Studies Center, Sonoma State University, Academic Foundation, Inc.

The study used the definitions for prehistoric and historic archaeological sites in National Register Bulletin 15 (*How to Apply the National Register Criteria for Evaluation*, National Park Service 1991), for historic landscapes in Preservation Briefs 36 (*Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes*, Birnbaum 1994), for traditional cultural properties in Bulletin 38 (*Guidelines for Evaluating and Documenting Traditional Cultural Properties*) and CRM 16 (*Traditional Cultural Properties: What You Do and How We Think*, Parker 1993), and Heritage and/or Landmark Trees as stated in Chapter 26D of the Sonoma County Code.

Environmental Consequences (Impacts) and Recommended Mitigation

No Action (No Project) Alternative

Impact: **15.1.1-2. Will the No Action Alternative impact cultural resources based on evaluation criteria 1 and 2?**

Analysis: *No Impact; Alternative 1.*

The No Action Alternative will not involve any construction and therefore will not result in an impact to cultural resources.

Mitigation: No mitigation is needed.

Impact: **15.1.3. Will the No Action (No Project) Alternative disturb unknown** important ~~vertebrate~~ **paleontologic resources?**

Analysis: *No Impact*

The No Action Alternative does not involve underground construction, therefore there will be no impact on paleontologic resources.

Mitigation: No mitigation is needed.

Headworks Expansion Component

Impact: **15.2.1-3. Will the headworks expansion component impact cultural and paleontologic resources based on evaluation criteria 1 through 3?**

Analysis: *No Impact; All Alternatives.*

The expansion of the headworks will not result in an impact to cultural or paleontologic resources because all of the expanded facilities will be contained within the existing Laguna Plant site. No ground disturbance is expected. The recommendations presented in previous cultural resource studies for the original Laguna Plant construction and improvements should be followed.

Alternative 1 does not have a headworks expansion component.

Mitigation: No mitigation is needed.

Urban Irrigation Component

Impact: **15.3.1-3. Will the urban irrigation component impact cultural and paleontological resources based on evaluation criteria 1 through 3?**

Analysis: *No Impact; All Alternatives.*

No cultural resources field survey has been conducted for the urban irrigation component; the analysis was based on records on file at the

Table 4.15-3

Cultural Resources and Paleontology Component Impacts - Pipelines

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
15.4.1. Will the pipeline component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Alt 2A - Tolay Extended		97	C, O&M	⊙
• Al 2B - Adobe Road		97	C, O&M	⊙
• Alt 2C - Tolay Confined		97	C, O&M	⊙
• Alt 2D - Lakeville/Sears Point		100	C, O&M	⊙
• Alt 3A - Two Rock		97	C, O&M	⊙
• Alt 3B - Bloomfield		98	C, O&M	⊙
• Alt 3C - Carroll Road		95	C, O&M	⊙
• Alt 3D - Valley Ford		95	C, O&M	⊙
• Alt 3E - Huntley		96	C, O&M	⊙
• Alt 4 - Geysers		19	C, O&M	⊙
• Alt 5A - Russian River Discharge		2	C, O&M	⊙
• Alt 5B - Laguna Discharge		--	C, O&M	--
15.4.2. Will the pipeline component disturb unknown archaeological resources?	Greater than 0 Projected locations	Greater than 0	C, O&M	⊙
15.4.3. Will the pipeline component disturb unknown important ~~vertebrate~~ paleontologic resources?	Greater than 0 occurrences	Greater than 0	C	⊙

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

1. Type of Impact:
   - C — Construction
   - O&M — Operation and Maintenance
   - P — Permanent

2. Level of Significance codes:
   - ⊙ — Significant impact before mitigation; less than significant impact after mitigation

lead agency obligation under Section 106 to take into account the effects to historic properties (cultural resources) for a federal undertaking. Following these measures will reduce impacts to a less than significant level.

Impact: **15.4.2. Will the pipeline component disturb unknown archaeological resources?**

Analysis: *Significant; Alternatives 2, 3, 4, and 5A.*

There is the possibility that surface or subsurface cultural resources not identified during the field survey of the pipeline routes or from the review of records at the Northwest Information Center will be encountered during construction or operation/management of the pipelines, or that there are unexpected effects on known cultural resources. There is the possibility of unknown resources occurring along the pipeline components for each of the alternatives.

No Impact; Alternatives 1 and 5B.

These alternatives do not have a pipeline component.

Mitigation: *Alternative 2, 3, 4, and 5A.*

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternative 1 and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2, 3, 4, and 5B.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: **15.4.3. Will the pipeline component disturb unknown** important ~~vertebrate~~ **paleontologic resources?**

Analysis: *Significant; Alternatives 2, 3, 4, and 5A.*

Pipeline construction for Alternatives 2, 4 and 5A may result in disturbance to paleontologic resources because trenching could disturb important ~~vertebrate~~ fossil-bearing rock units (Petaluma, Wilson Grove, Sonoma Volcanics and/or Glen Ellen formations). The pipeline component for Alternative 2 traverses the Petaluma Formation and the Sonoma Volcanics in the southern part of Sonoma County, while the pipeline component for Alternative 3 passes through the Wilson Grove Formation in the western portion of the county. The Geysers (Alternative 4) pipeline component will disturb potential fossiliferous deposits (Glen

Ellen Formation). The Russian River pipeline (Alternative 5A) briefly traverses Wilson Grove Formation deposits.

No Impact; Alternatives 1 and 5B.

These alternatives do not have a pipeline component.

Mitigation: *Alternatives 2, 3, 4, and 5A.*

2.4.13 Protect Important ~~Vertebrate~~ Paleontologic Resources.

Alternatives 1 and 5B. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2, 3, 4, and 5A.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Storage Reservoir Component

Table 4.15-5

Cultural Resources and Paleontology Component Impacts - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact (sites)	Type of Impact[1]	Level of Significance[2]
15.5.1. Will the storage reservoir component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Tolay Extended		34	C, P, O&M	⊙
• Adobe Road		23	C, P, O&M	⊙
• Tolay Confined		21	C, P, O&M	⊙
• Lakeville Hillside		10	C, P, O&M	⊙
• Sears Point		18	C, P, O&M	⊙
• Two Rock		46	C, P, O&M	⊙
• Bloomfield		16	C, P, O&M	⊙
• Carroll Road		13	C, P, O&M	⊙
• Valley Ford		7	C, P, O&M	⊙
• Huntley		11	C, P, O&M	⊙

No Impact; Alternatives 1, 3, 4, and 5.

There are no known prehistoric or historic archaeological sites identified at the Valley Ford reservoir site.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Historic Architectural Sites

Significant; Alternatives 2, 3C, 3D, and 3E.

Operation and maintenance of the storage reservoir component will result in disturbance to historic architectural resources at 7 of the 10 reservoir sites. The effect on the historic architectural resources may consist of destruction or alteration by construction earth-moving and associated heavy equipment or physical and chemical alterations of faunal, botanical, and historic remains as a result of inundation by the storage waters. In addition, the operation and maintenance of the reservoirs might lead to such activities as ground disturbance, access to cultural resources by personnel, heavy equipment activity, filling and drawdowns of reservoirs, repairs to pipelines, and installation of new facilities, all of which can result in the damage to or destruction the historic architectural resources. Table 4.15-6 shows the number of historic architectural resources occurring within each proposed storage reservoir.

No Impact; Alternatives 1, 3A, 3B, 4, and 5.

No historic architectural sites have been identified at the Lakeville Hillside, Two Rock, and Bloomfield reservoir sites.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Historic Architectural Settings

Significant; Alternatives 2 and 3.

Construction, operation, and maintenance of the storage reservoirs may introduce visual, audible, or atmospheric elements that alter the setting, integrity of locations, or feeling associated with cultural resources. The introduction of such features as dams and reservoirs can affect the integrity of architectural sites by altering the setting in which such cultural resources are situated and by altering cultural landscapes themselves. For example, large dams and bodies of water that dominate the landscape will be at a scale not in keeping with the elements of the architectural sites or cultural landscapes.

An estimate for the numbers of historic architectural settings that might be affected by each storage reservoir location was made using historic data, maps, field checks, or a combination of the techniques. ~~Table 4.15-5~~ Table 4.15-6 shows the number of historic architectural site settings that may be affected for each proposed storage reservoir. In particular, the Two Rock

Impact: **15.5.3. Will the storage reservoir component disturb unknown important ~~vertebrate~~ paleontologic resources?**

Analysis: *Significant; Alternatives 2 and 3.*

Storage Reservoir construction under Alternatives 2 and 3 may result in disturbance to paleontologic resources because the grading and trenching required for construction of the reservoirs, access roads, and diversion ditches could disturb important ~~vertebrate~~ fossil-bearing rock units (Petaluma and/or Wilson Grove formations). The storage reservoirs in South County (Tolay, Adobe Road, Lakeville, and Sear Point) are underlain by rocks of the Petaluma Formation, which is common in the southern part of Sonoma County. Within all of the West County storage reservoir sites (Two Rock, Bloomfield, Carroll Road, Valley Ford, and Huntley), the Wilson Grove Formation, common in the western portion of the County, is present.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternatives 2 and 3.*

2.4.13. Protect Important ~~Vertebrate~~ Paleontologic Resources.

Alternatives 1, 4 and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Pump Station Component

Construction of the intermediate pump stations along the transmission lines will potentially disturb cultural and paleontological resources, specifically buried resources and the setting of historic architectural resources. No cultural resources field survey has been conducted for the pump station component; number of resources per alternative was derived from records on file at the Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park. The information is presented by alternative rather than by specific pump station in order to protect the sensitive nature of cultural resource locations.

Table 4.15-7

Cultural Resources and Paleontology Impacts by Component - Pump Stations

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
15.6.1. Will the pump station component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Alt 2 - South County		33	C, P, O&M	⊙
• Alt 3 - West County		18	C, P, O&M	⊙
• Alt 4 - Geysers Recharge		24	C, P, O&M	⊙
15.6.2. Will the pump station component disturb unknown archaeological resources?	Greater than 0 projected locations	Greater than 0	C, P, O&M	⊙
15.6.3. Will the pump station component disturb unknown important ~~vertebrate~~ paleontologic resources?	Greater than 0 occurrences			
• Alternative 2A		3	C	⊙
• Alternative 2B		3	C	⊙
• Alternative 2C		3	C	⊙
• Alternative 2D		4	C	⊙
• Alternative 3A		4	C	⊙
• Alternative 3B		4	C	⊙
• Alternative 3C		4	C	⊙
• Alternative 3D		4	C	⊙
• Alternative 3E		4	C	⊙
• Alternative 4		0	C	==

Source: Harland Bartholomew & Associates, Inc., 1995

Notes:

1. Type of Impact:
   - C Construction
   - O&M Operation and Maintenance
   - P Permanent

2. Level of Significance:
   - ⊙ Significant impact before mitigation; less than significant impact after mitigation
   - == No impact

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternatives 1 and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2, 3, and 4.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: **15.6.3. Will the pump station component disturb unknown important ~~vertebrate~~ paleontologic resources?**

Analysis: *Significant; Alternatives 2 and 3.*

Pump station construction for Alternatives 2 and 3 may result in disturbance to paleontologic resources because the ground disturbance required for the construction of the pump stations and installation of the pumps could disturb important ~~vertebrate~~ fossil-bearing rock units (Petaluma and/or Wilson Grove formations). Table 4.15-9 lists each of the pump stations that might impact fossiliferous deposits.

Table 4.15-9

Fossiliferous Rock Units Affected by Pump Stations

Pump Station	Alternative	Affected Rock Unit
FGB	2, 3	Petaluma Formation
SBPS-9	2D	Petaluma Formation
SBPS-10	2	Petaluma Formation
LBPS-1	2, 3	Wilson Grove Formation
LBPS-2	2, 3	Wilson Grove Formation
LBPS-3	2, 3	Wilson Grove Formation
LBPS-4	2, 3	Wilson Grove Formation

Source: Harland Bartholomew & Associates, Inc., 1996

No Impact; Alternatives 1, 4, and 5.

Pump stations for the geysers alternative are not located on fossil bearing rock formations.

Alternatives 1 and 5 do not have a pump station component.

Mitigation: *Alternatives 2 and 3.*

2.4.13. Protect Important ~~Vertebrate~~ Paleontologic Resources.

Alternatives 1, 4 and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Agricultural Irrigation Component

No cultural resources field survey has been conducted for the agricultural irrigation component; Number of resources per area was derived from records on file at the Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park and are listed under criterion #1. A sensitivity model was used to predict the number and kinds of cultural resources present on previously unsurveyed parcels of each irrigation area and they are listed under criterion #2.

Table 4.15-10

Cultural Resources and Paleontology Impacts by Component - Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
15.7.1. Will the agricultural irrigation component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Adobe Road		4	C, P, O&M	⊙
• Lakeville		29	C, P, O&M	⊙
• Bay Flats		4	C, P, O&M	⊙
• East of Rohnert Park		13	C, P, O&M	⊙
• North Petaluma Valley		20	C, P, O&M	⊙
• Americano		49	C, P, O&M	⊙

Table 4.15-10

Cultural Resources and Paleontology Impacts by Component - Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
• Stemple		4	C, P, O&M	⊙
• Sebastopol		14	C, P, O&M	⊙
• Miscellaneous		4	C, P, O&M	⊙
15.7.2. Will the agricultural irrigation component disturb unknown archaeological resources?	Greater than 0 projected locations			
• Adobe Road		Greater than 19	C, P, O&M	⊙
• Lakeville		Greater than 34	C, P, O&M	⊙
• Bay Flats		Greater than 6	C, P, O&M	⊙
• East of Rohnert Park		Greater than 15	C, P, O&M	⊙
• North Petaluma Valley		Greater than 6	C, P, O&M	⊙
• Americano		Greater than 52	C, P, O&M	⊙
• Stemple		Greater than 72	C, P, O&M	⊙
• Sebastopol		Greater than 28	C, P, O&M	⊙
• Miscellaneous		Greater than 0	C, P, O&M	⊙
15.7.3. Will the agricultural component disturb unknown important ~~vertebrate~~ paleontologic resources?	Greater than 0 occurrences	Greater than 0	C	⊙

Source: Harland Bartholomew & Associates, 1995

Notes: 1. Type of Impact:
C Construction
O&M Operation and Maintenance
P Permanent

2. Level of Significance codes:
⊙ Significant impact before mitigation; less than significant impact after mitigation

Impact: **15.7.1. Will the agricultural irrigation component disturb known potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources?**

Impact: **15.7.3. Will the agricultural irrigation component disturb unknown important ~~vertebrate~~ paleontologic resources?**

Analysis: *Significant; Alternatives 2 and 3.*

Within Alternative 2, the Petaluma Formation occurs, as does a small area of the Wilson Grove Formation near Sebastopol. Alternative 3 agricultural irrigation areas contain Wilson Grove Formation rock units as well. Typically, a 6-inch-diameter main pipe may be installed in the agricultural areas and some ground disturbance will occur. Such disturbance will be minimal and occur within the top 2 feet of the ground surface. The lateral lines leading off the main line will be laid on the surface. There are, however, larger pipelines placed at depth leading from the distribution pipelines in public rights-of-way to individual parcels.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: *Alternatives 2 and 3.*

2.4.13. Protect Important ~~Vertebrate~~ Paleontologic Resources.

Alternatives 1, 4 and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternatives 2 and 3.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Geysers Steamfield Component

No cultural resources field survey has been conducted for the geysers steamfield component; number of resources was derived from records on file at the Northwest Information Center of the California Historical Resources Information System, Sonoma State University, Rohnert Park.

Table 4.15-12

Cultural Resources and Paleontology Impacts by Component - Geysers Steamfield

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
15.8.1. Will the geysers steamfield component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites	9	C, P, O&M	⊙
15.8.2. Will the geysers steamfield component disturb unknown archaeological resources?	Greater than 0 projected locations	Greater than 0	C, P, O&M	⊙
15.8.3. Will the geysers steamfield component disturb unknown important ~~vertebrate~~ paleontologic resources?	Greater than 0 occurrences	0	C	==

Source: Harland Bartholomew & Associates, Inc., October, 1995

Notes: 1. Type of Impact:
- C Construction
- O&M Operation and Maintenance
- P Permanent

2. Level of Significance codes:
- ⊙ Significant impact before mitigation; less than significant impact after mitigation
- == No impact

Impact: **15.8.1. Will the geysers steamfield component disturb known potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources?**

Analysis: ***Prehistoric and Historic Archaeological Sites***

Significant; Alternative 4.

Construction, operation and maintenance of the pipelines in the geysers steamfield component will result in disturbance to known prehistoric and historic archaeological sites. The effect on the cultural resources may consist of destruction or alteration of archaeological sites and components by construction earth-moving and associated heavy equipment. In addition, the operation and maintenance of the component might lead to such activities as ground disturbance, access to cultural resources by personnel, heavy equipment activity, and repairs to pipelines, all of which can result in damage to or destruction of prehistoric and historic archaeological sites. Table 4.15-13 shows the number of prehistoric and encountered during construction or operation/maintenance of the component, or that there are unexpected effects on known cultural resources. There is the possibility of unknown resources occurring within this component.

No Impact; Alternatives 1, 2, 3, and 5.

These alternatives do not have a geyser steamfield component.

Mitigation: *Alternative 4.*

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternatives 1, 2, 3, and 5. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternative 4.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: 15.8.3. Will the geysers steamfield component disturb unknown important ~~vertebrate~~ paleontologic resources?

Analysis: *No Impact; All Alternatives.*

No known paleontologic site is present in the geysers steamfield component. In addition, the geysers steamfield area is located in its entirety within the Franciscan Complex of rocks, of which the majority are not fossiliferous. Chert within the Franciscan Complex may contain marine microfossils, but these are not considered to be a significant paleontologic resource.

Alternatives 1, 2, 3 and 5 do not have a geyser steamfield component.

Mitigation: No mitigation is needed.

Discharge Component

No cultural resources field survey has been conducted for the discharge component; number of resources was derived from records on file at the Northwest Information Center (Northwest Information Center) of the California Historical Resources Information System, Sonoma State University, Rohnert Park.

Table 4.15-14

Cultural Resources and Paleontology Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact[1]	Level of Significance[2]
15.9.1. Will the discharge component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites			
• Russian River		0	C, P, O&M	==
• Laguna		--	--	--
15.9.2. Will the discharge component disturb unknown archaeological resources?	Greater than 0 projected locations			
• Russian River		Greater than 0	C, P, O&M	⊙
• Laguna		--	--	--
15.9.3. Will the discharge component disturb unknown important ~~vertebrate~~ paleontologic resources?	Greater than 0 occurrences			
• Russian River Discharge		Greater than 0	C	⊙
• Laguna Discharge		None	C	==

Source: Harland Bartholomew & Associates, Inc., October, 1995

Notes: 1. Type of Impact:
C Construction
O&M Operation and Maintenance
-- Not Applicable
P Permanent

2. Level of Significance codes:
⊙ Significant impact before mitigation; less than significant impact after mitigation
== No impact

Impact: **15.9.1. Will the discharge component disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?**

Analysis: *No Impact; All Alternatives.*

No cultural resource sites have been identified near the discharge outfall on the Russian River. No construction is proposed for alternatives 1, 2, 3, 4, and 5B, and therefore no impacts will result.

Mitigation: No mitigation is needed.

Impact: 15.9.2. Will the discharge component cause disturbance of unknown archaeological resources?

Analysis: *Significant; Alternative 5A.*

There is the possibility that surface or subsurface cultural resources not identified during the archival research for the Russian River discharge component will be encountered during construction or operation/maintenance of the component, or that there are unexpected effects on known cultural resources.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

The use of the existing facilities for the Laguna discharge will not result in an impact to cultural resources because no ground disturbance is expected and existing pipelines and connections will be used.

Mitigation: *Alternative 5A.*

2.4.12. Protect Undiscovered Cultural Resource Sites.

Alternatives 1, 2, 3, 4, and 5B. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternative 5A.*

Archaeological monitoring will serve to protect previously undiscovered cultural resources by early identification before extensive disturbance by construction activities. The Memorandum of Agreement provides for an evaluation of the resource by a qualified archaeologists, a determination of resource significance, and resulting management/mitigation recommendations that will bring the impact to a less than significant level.

Impact: 15.9.3. Will the discharge component disturb unknown important ~~vertebrate~~ paleontologic resources?

Analysis: *Significant; Alternative 5A.*

The discharge of treated water into the Russian River will not result in an impact to paleontologic resources. However, the outfall structure will be constructed in the Wilson Grove Formation and it is possible that fossiliferous deposits might be disturbed by this construction.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

Because the Laguna Discharge involves no construction, it will not impact paleontologic resources.

Mitigation: *Alternative 5A.*

2.4.13. Protect Important ~~Vertebrate~~ Paleontologic Resources.

Alternatives 1, 2, 3, 4, and 5B. No mitigation is needed.

After Mitigation: *Less than Significant after Mitigation; Alternative 5A.*

Paleontological monitoring will serve to protect previously undiscovered significant paleontologic resources by early identification before extensive disturbance by construction activities. The qualified paleontological monitor will evaluate any fossil find for significance and perform sampling/excavation and collection, if necessary, to bring the impact to a less than significant level.

Cumulative Impacts

There are three significant impacts identified in the Cultural Resources and Paleontology section:

Impact: 15.1C. Will the Project plus cumulative projects disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?

Analysis: Project impacts are for pipelines for alternatives 1, 2, 3, 4, and 5A; all storage reservoirs; pump stations for alternatives 2, 3, and 4; agricultural irrigation areas; and geysers steamfield.

Extensive cultural resources of all types have been identified throughout the Project area, both within urban and rural areas. Significant impacts to known resources could result from many different sources, for example, construction, demolition, or rehabilitation, and many of the cumulative projects identified could impact known cultural resources. For example, there is a trend in the Project area, irrespective of the Long-Term Project, to convert grazing land to vineyards. This conversion process will significantly impact the Historical Vernacular Landscapes present throughout the rural portions of both South County and West County. Although there are many cumulative projects which will increase the impacts identified in the Cultural Resources section, all Project impacts on known cultural resources have already been listed as significant and have been avoided or fully mitigated. The cumulative projects will not warrant a change in either the finding of significance or the mitigation proposed.

Table 4.15-15

Summary of Significant Impacts and Mitigation Measures - Cultural Resources and Paleontology

Impact	Level of Significance	Mitigation Measure
Pipeline Component		
15.4.3. The pipeline component may disturb unknown vertebrate paleontologic resources.	Alt 2 - ⊙ Alt 3 - ⊙ Alt 4 - ⊙ Alt 5A - ⊙	2.4.13 Protect Important ~~Vertebrate~~ Paleontologic Resources.
Storage Reservoir Component		
15.5.1. The storage reservoir component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 2 - ⊙ Alt 3 - ⊙	2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.
15.5.2. The storage reservoir component may disturb unknown archaeological resources.	Alt 2 - ⊙ Alt 3 - ⊙	2.4.12. Protect Undiscovered Cultural Resource Sites.
15.5.3. The storage reservoir component may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alt 2 - ⊙ Alt 3 - ⊙	2.4.13. Protect Important ~~Vertebrate~~ Paleontologic Resources.
Pump Station Component		
15.6.1. The pump station component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 2 - ⊙ Alt 3 - ⊙ Alt 4 - ⊙	2.3.18. Identification, Evaluation, and Avoidance of Cultural Resources.
15.6.2. The pump station component may disturb unknown archaeological resources.	Alt 2 - ⊙ Alt 3 - ⊙ Alt 4 - ⊙	2.4.12. Protect Undiscovered Cultural Resource Sites.
15.6.3. The pump station component may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alt 2 - ⊙ Alt 3 - ⊙	2.4.13. Protect Important ~~Vertebrate~~ Paleontologic Resources.

Table 4.15-15

Summary of Significant Impacts and Mitigation Measures - Cultural Resources and Paleontology

Impact	Level of Significance	Mitigation Measure
15.7.1. The agricultural irrigation component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 2 - ⦿ Alt 3 - ⦿	2.3.18. Identification, evaluation, and Avoidance of Cultural Resources.
15.7.2. The agricultural irrigation component may disturb unknown archaeological resources.	Alt 2 - ⦿ Alt 3 - ⦿	2.4.12. Protect Undiscovered Cultural Resource Sites.
15.7.3. The agricultural irrigation component may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alt 2 - ⦿ Alt 3 - ⦿	2.4.13. Protect Important ~~Vertebrate~~ Paleontologic Resources.
Geysers Steamfield Component		
15.8.1. The geysers steamfield component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.	Alt 4 - ⦿	2.3.18. Identification, Evaluation and Avoidance of Cultural Resources.
15.8.2. The geysers steamfield component may disturb unknown archaeological resources.	Alt 4 - ⦿	2.4.12. Protect Undiscovered Cultural Resource Sites.
Discharge Component		
15.9.2. The discharge component may disturb unknown archaeological resources.	Alt 5A - ⦿	2.4.12. Protect Undiscovered Cultural Resource Sites.
15.9.3. The discharge component construction may disturb unknown important ~~vertebrate~~ paleontologic resources.	Alt 5A - ⦿	2.4.13. Protect Important ~~Vertebrate~~ Paleontologic Resources.

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
⦿ Significant impact before mitigation; less than significant after mitigation.

REPLACEMENT PAGES

SECTION 4.16

PUBLIC SERVICES, UTILITIES, AND RECREATION

(THERE ARE NO REPLACEMENT PAGES FOR THIS SECTION)

REPLACEMENT PAGES

SECTION 4.17

ENERGY

(THERE ARE NO REPLACEMENT PAGES FOR THIS SECTION)

REPLACEMENT PAGES

SECTION 4.18

SOCIO-ECONOMICS

(THERE ARE NO REPLACEMENT PAGES FOR THIS SECTION)

REPLACEMENT PAGES

SECTION 4.19

INUNDATION DUE TO DAM FAILURE

Sears Point

The Sears Point dam would be sited on Tolay Creek northwest of the intersection of Highways 37 and 121. Discharge from the reservoir would flow down Tolay Creek to San Pablo Bay. The worst case scenario dam break would cause Tolay Creek to flood buildings in the vicinity of Sears Point and scattered buildings along Highway 121 and on Tubbs Island. State Highways 37 and 121, which are important transportation corridors, could be inundated. The estimated maximum water level at Sears Point would be less than 5 feet.

Two Rock

The Two Rock dam would be sited a on tributary of Stemple Creek north of Two Rock in the Roblar de la Miseria. Discharge from the reservoir would flow down the tributary into the main branch of Stemple Creek near Two Rock. From there, the water would flow through Marin County into the Estero de San Antonio to Bodega Bay. The worst case scenario dam break would cause Stemple Creek to flood the town of Two Rock. The flood waters would also back up Stemple Creek and would flood scattered buildings ~~buildings~~ near Two Rock School. The Two Rock School and the Two Rock Fire Station lie on the edge of the flood inundation. Portions of the Coast Guard Reservation and the Estero Mutual Water Company's water collection facilities also appear to lie in the flood inundation area of the Two Rock Reservoir. The flood waters would back up several tributaries to Stemple Creek and Estero de San Antonio and would flood several buildings between Two Rock and Bodega Bay, including the pump and pump house for the Estero Mutual Water Company's water collection facility. The estimated maximum water depth at Two Rock would be 80 feet.

Bloomfield

The Bloomfield dam would be sited on a tributary of Americano Creek northwest of the town of Bloomfield. Discharge from the reservoir would flow down the tributary to the main branch of Americano Creek. From there, the discharge would flow down past the town to Bodega Bay. The dam break scenario would cause Americano Creek to inundate the town of Valley Ford. The flood waters would also back up into Americano Creek, Bloomfield Creek, and Ebabias Creek, as well as several other tributaries to Americano Creek. The backup along Americano Creek and Bloomfield Creek would inundate most of the town of Bloomfield. The Valley Ford and Bloomfield Fire Stations are the major public facilities that lie within the flood inundation area. There are other buildings scattered along Americano Creek that would be inundated. The estimated maximum water depth would be 13 feet at Valley Ford and 20 feet at Bloomfield.

Carroll Road

The Carroll Road dam would be sited on a tributary of Americano Creek between the towns of Bloomfield and Valley Ford. Discharge from the reservoir would flow down the tributary to the main branch of Americano Creek. From there, the discharge would flow down past Valley Ford to Bodega Bay. The 15 minute dam break scenario would cause Americano Creek to inundate the town of Valley Ford. The flood waters would also back up Americano Creek, Bloomfield Creek, and Ebabias Creek, as well as several other tributaries to Americano Creek. The backup along Americano Creek and Bloomfield Creek would inundate most of the town of Bloomfield. The Valley Ford and Bloomfield Fire Stations are the major public facilities that lie within the flood inundation area. There are other buildings scattered along Americano Creek that would be inundated. The estimated maximum water depth would be 17 feet at Valley Ford and 26 feet at Bloomfield.

Valley Ford

The Valley Ford dam would be sited on a tributary of Americano Creek in the Canada de Pogolimi area northeast of Valley Ford. Discharge from the reservoir would flow down the tributary to the main branch of Americano Creek. From there, the discharge would flow down past Valley Ford to Bodega Bay. The 15 minute dam break scenario would cause Americano Creek to inundate the town of Valley Ford. The flood waters would also back up Estero Americano Creek, Bloomfield Creek, and Ebabias Creek, as well as several other tributaries to Estero Americano Creek. The backup along Estero Americano Creek and Bloomfield Creek would inundate part of the town of Bloomfield. The Valley Ford and Bloomfield Fire Stations are the major public facilities that lie within the flood inundation area. There are other buildings scattered along Americano Creek that would be inundated. The estimated water depth would be approximately 15 feet at Valley Ford and approximately 17 feet at Bloomfield.

Huntley

The Huntley dam would be sited on a tributary of Stemple Creek along Martinoni Road near the Sonoma-Marin County line. Discharge from the reservoir would flow down the tributary into Marin County and to the main branch of Stemple Creek. From there, the water would flow into Estero de San Antonio to Bodega Bay. The worst case scenario dam break would cause the Estero de San Antonio to back up to Fallon. The flood waters would also back up Stemple Creek and would flood scattered buildings ~~structures~~ ~~buildings~~ near Two Rock School including the Estero Mutual Water Company's water collection facilities. The flood waters would also back up several tributaries to Stemple Creek and Estero de San Antonio and would flood several buildings between the Huntley dam and Bodega Bay, including the pump and pump house for the Estero Mutual Water Company's water collection facility. Portions of the Coast Guard Reservation also appear to lie in the flood inundation area of the Huntley reservoir. The estimated maximum water depth would be 76 feet at Fallon - Two Rock Road and 61 feet near Fallon.

Additional information about the analyses conducted may be found in the Technical Memorandum, *Dam Break Inundation Analysis* (Dames & Moore 1995), contained in Appendix J-1.

Effects of Inundation

In the event of inundation from dam failure, significant and widespread damage to property is likely within the areas of inundation. Within this area there would also be the possibility of personal injury and loss of life, the magnitude of which would be dependent

REPLACEMENT PAGES

CHAPTER 5

NEPA/CEQA REQUIRED SECTIONS

- 100percent of the Project. It is therefore questionable to what extent these studies apply to the Project.

- *Certain types of infrastructure, notably transportation and communications, may have a more stimulating effect on growth than other types.* The quality of infrastructure has become extremely important in stimulating economic growth as the economy has become more service-based. In Sonoma County, as well as other sub-markets of the Bay Area, firms and households give higher weight to the quality of the transportation and communication systems than wastewater treatment systems when making location decisions.

There is not a clear agreement among experts nor does the analysis presented here provide a clear cut determination whether the Project Alternatives (excluding the No Action Alternative) are indeed growth inducing due to provision of infrastructure. Certainly, a primary obstacle to growth is being removed by provision of the infrastructure improvements. However, the Project is not driving the growth. The healthy regional economy, local resources, and existing labor force, together with the desire of the member communities as expressed in the General Plans, are responsible for the economic growth of the region. From this perspective, the Project accommodates existing growth trends rather than induces growth. <u>If the Project were considered growth-inducing, environmental impacts of this growth are disclosed in the EIR's for the general plans of the region.</u>

5.4 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS

Table 5.4-1 identifies impacts that will be significant even after mitigation. These impacts have been minimized to the extent possible, but will still exceed points of significance.

PREPARERS, REFERENCES, AND CONSULTATION AND COORDINATION

Preparers

Anders J. Hauge, Harland Bartholomew & Associates, Inc.
Patricia I. Collins, Harland Bartholomew & Associates, Inc.
Maile A. Deppe, Harland Bartholomew & Associates, Inc.
Chuck Teller, Economic & Planning Systems.

Reviewers

Robin P. Cort, Ph.D., Parsons Engineering Science, Inc.

References

HBA Team Documents

None.

Other References

Association of Bay Area Governments (ABAG). 1994. *Projections '94.*

Bamberger, Rita, William A. Blazar, and George E. Peterson. 1985. *Infrastructure Support for Economic Development.* Planning Advisory Service Reports. September.

<u>City of Cotati. 1990. City of Cotati General Plan 1985-2005. September.</u>

<u>City of Cotati. 1989. Draft EIR for the Cotati General Plan. August.</u>

<u>City of Rohnert Park. 1995. The General Plan for the City of Rohnert Park.</u>

<u>City of Rohnert Park. 1995. Final EIR for the City of Rohnert Park General Plan Amendment and Update. November.</u>

<u>City of Santa Rosa - Department of Community Development. 1995. Santa Rosa General Plan 2010. April.</u>

<u>City of Santa Rosa. 1990. Final EIR Santa Rosa 2010 General Plan. October.</u>

<u>City of Sebastopol. 1994. City of Sebastopol General Plan. May.</u>

<u>City of Sebastopol. 1994. Draft EIR, City of Sebastopol Final General Plan. May.</u>

Dahlenberg, Douglas, and Randall W. Eberts. 1988. *Public Infrastructure and Economic Development.* Economic Commentary, Federal Reserve Bank of Cleveland. January 15.

Hansen, Niles M.,ed. 1972. *Unbalanced Growth and Regional Development.* Western Economic Journal, Vol. 4.

Looney, Robert, and Peter Frederiksen. 1981. *The Regional Impact of Infrastructure Investment in Mexico.* Regional Studies, vol. 15, no. 4.

<u>Sonoma County Planning Department. 1986. Draft EIR, Sonoma County General Plan. December.</u>

<u>Sonoma County Planning Department. 1989. Sonoma County General Plan. March.</u>

Urban Systems Research & Engineering, Inc. 1976. Council on Environmental Quality.

Consultation and Coordination

Persons Contacted

None.