APPENDIX V

Effluent Study

TECHNICAL MEMORANDUM

GRATON RANCHERIA

EFFECTS OF HIGH-QUALITY WASTEWATER EFFLUENT ON AQUATIC HABITATS

OCTOBER 2004

Prepared For:

Federated Indians of Graton Rancheria
P.O. Box 14428
Santa Rosa, CA 95402

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AES

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1.0 INTRODUCTION AND PROJECT SETTING

The National Indian Gaming Commission (NIGC) is the Lead Agency for the preparation of an Environmental Impact Statement (EIS) for a casino/hotel project proposed by the Graton Rancheria (Tribe). The project would be located in Sonoma County, California west of the City of Rohnert Park (**Figure 1**). Operation of the casino/hotel complex would generate wastewater, which would be treated and discharged to an onsite channel.

The Tribe intends to construct a state-of-the-art wastewater treatment plant to treat wastewater from the project. The treatment plant would employ microfiltration technology to treat the wastewater to a tertiary level. During the driest months of the year, tertiary wastewater would be applied on spray fields located on trust land. During the remainder of the year, excess tertiary treated wastewater would be discharged into an existing drainage, thence the Wilfred-Bellevue Channel, which is a tributary to the Laguna de Santa Rosa (**Figure 2**). Both the Wilfred-Bellevue Channel and the Laguna de Santa Rosa are flood control channels operated and regulated by the Sonoma County Water Agency (SCWA).

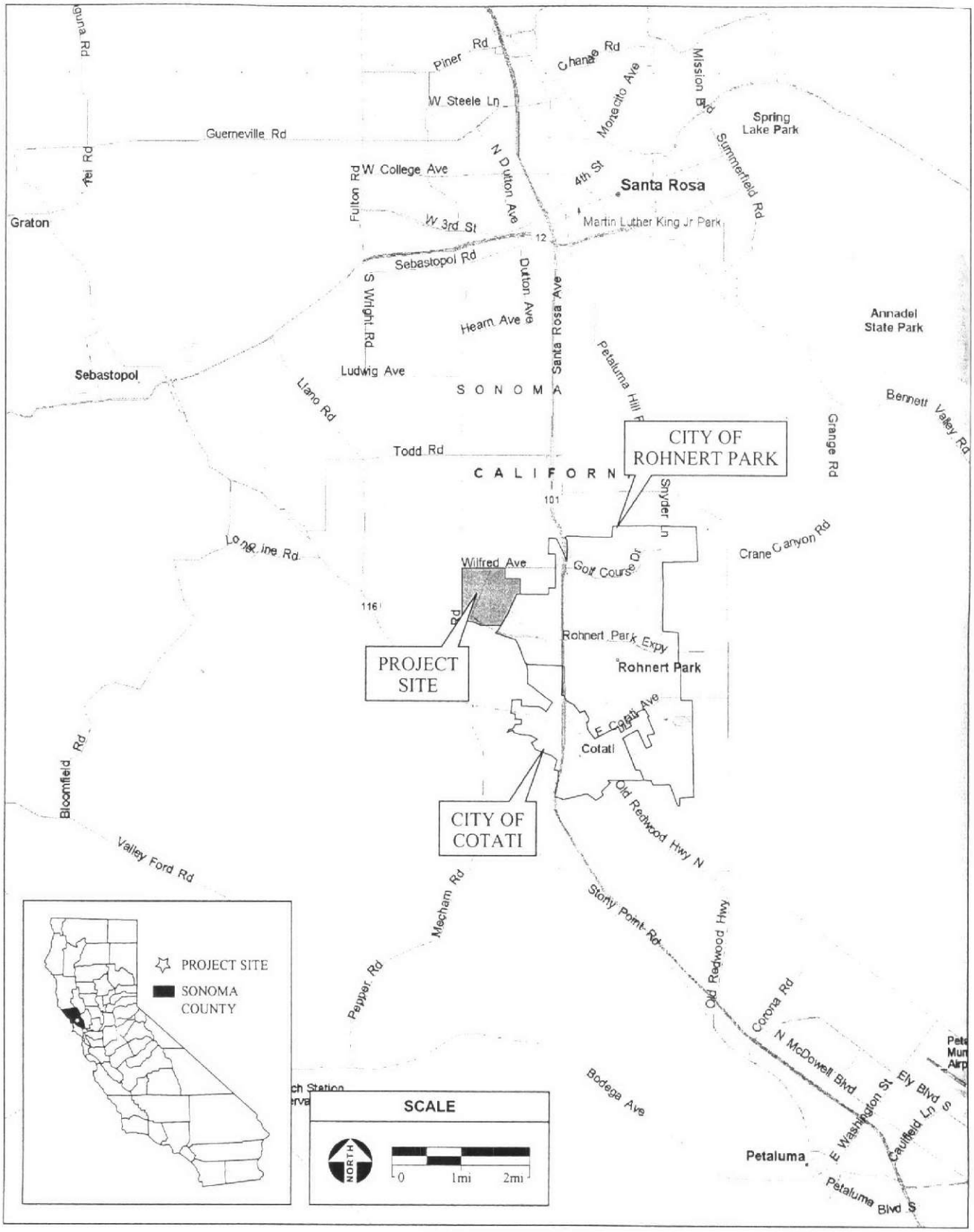
The discharge of tertiary treated wastewater into a surface water on trust land would require a National Pollutant Discharge Elimination System (NPDES) Permit by the U. S. Environmental Protection Agency (USEPA). In processing the NPDES permit application, the USEPA will consider the potential effects of the discharge of treated effluent on the beneficial uses of the receiving water.

The purpose of this technical memorandum is to provide an analysis of potential impacts from the proposed discharge on aquatic life. This report will be used to support the Tribe's NPDES application to the USEPA and the EIS being prepared for the NIGC.

1.1 REGIONAL SETTING

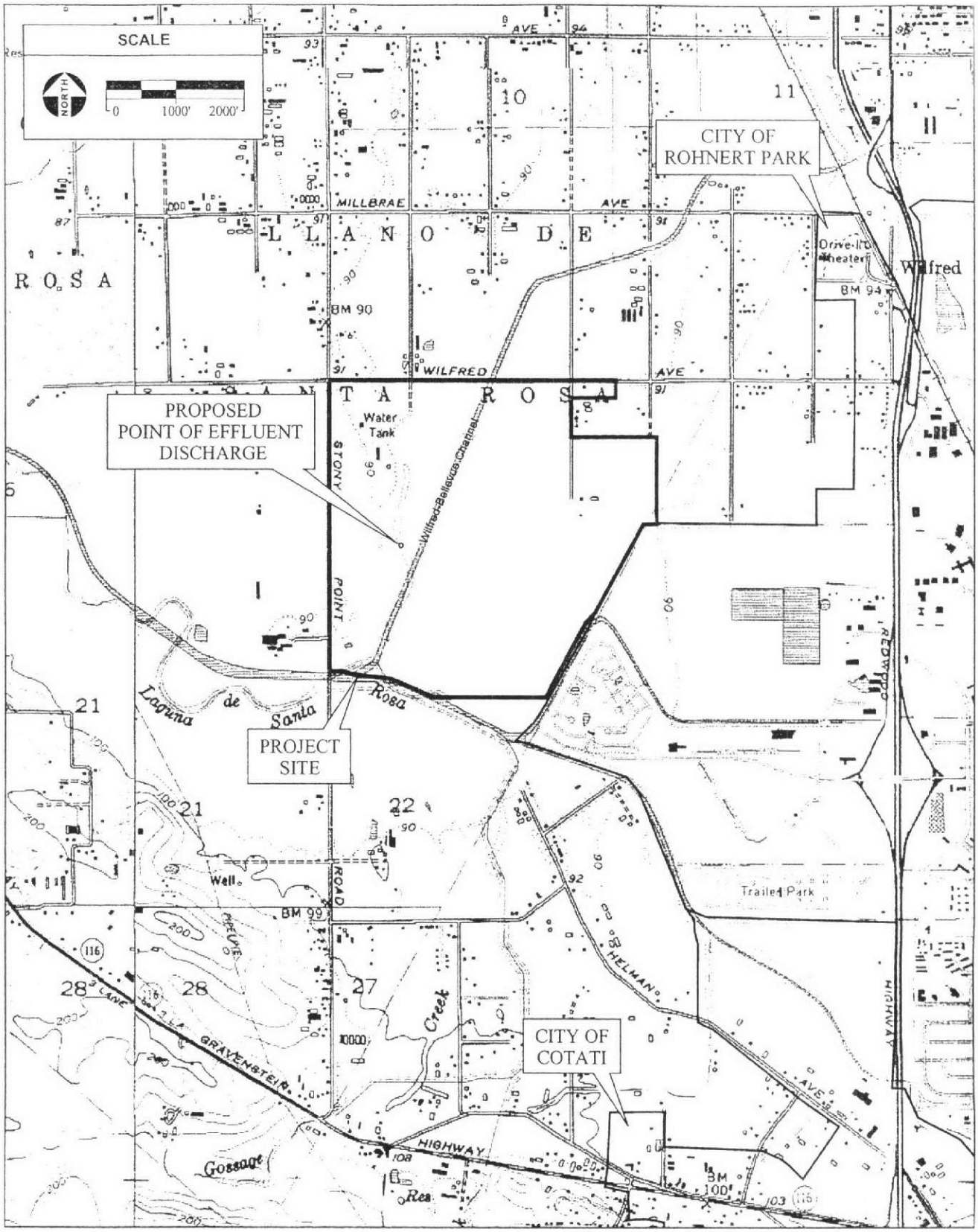
1.1.1 HYDROLOGY

The proposed Graton Rancheria casino and hotel facility is located in the basin of the Russian River within the Laguna de Santa Rosa watershed (**Figure 3**). The Laguna de Santa Rosa is the Russian River's largest tributary and one of the larger freshwater wetlands in northern California (Sonoma Land Trust and Laguna de Santa Rosa Foundation, 2003).



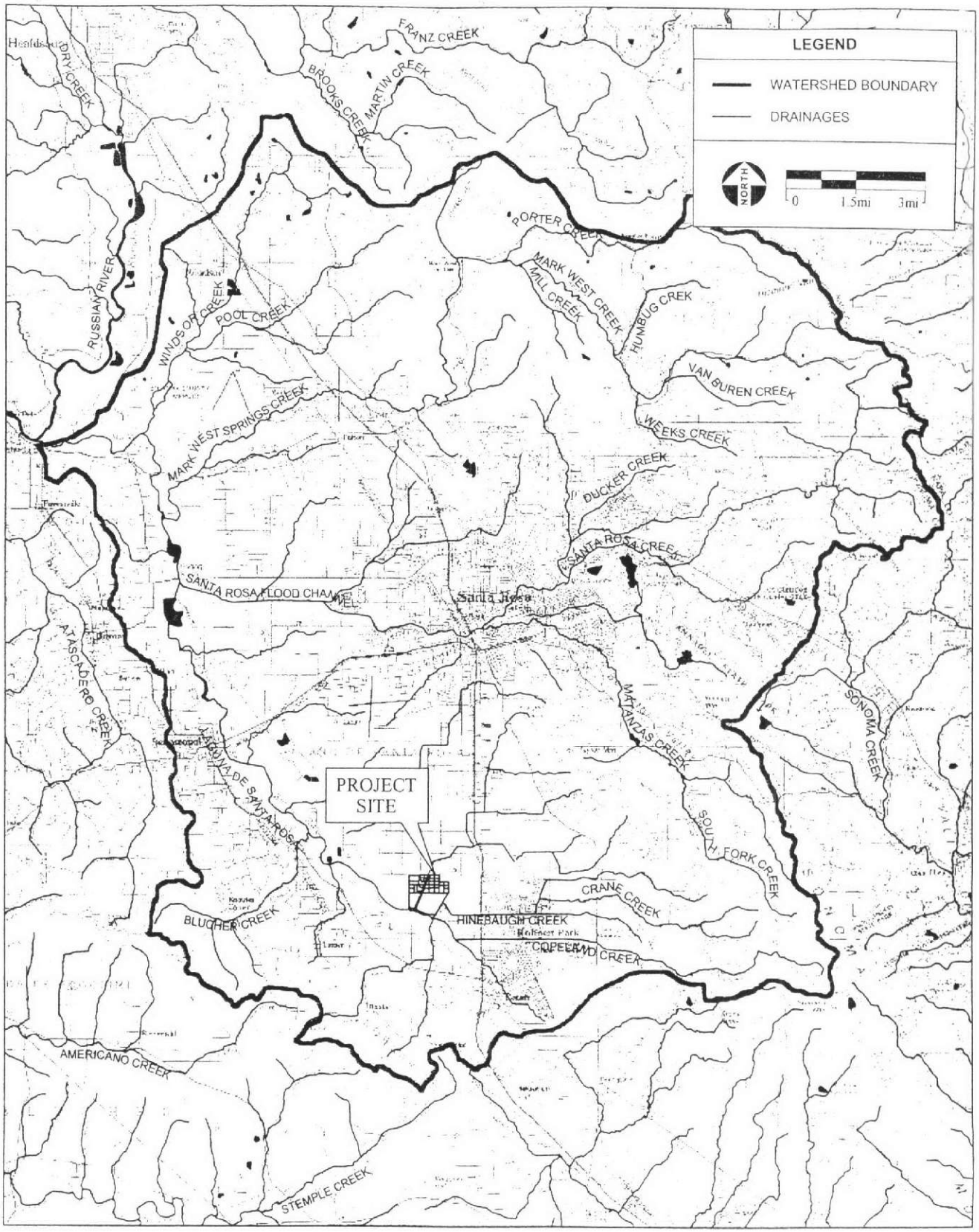
SOURCE: Microsoft Streets & Trips, 2003 ; AES, 2004

Figure 1
Regional Location



SOURCE: "Cotati, CA" USGS 7.5 Minute Topographic Quadrangle, Un-sectioned Area "Llano De Santa Rosa", T6N, R8W, Mt. Diablo Baseline and Meridian ; AES, 2004

Figure 2
Site and Vicinity



SOURCE: Napa, CA & Healdsburg, CA 1:100,000 USGS Quadrangles : (1983, Laguna de Santa Rosa Foundation ; AES, 2004

Figure 3
Watershed Area

The proposed casino would be built immediately west of the Wilfred-Bellevue Channel, which drains into the Laguna de Santa Rosa flood control channel south of the site.

The Laguna de Santa Rosa serves to reduce flood levels in the Russian River. When the Russian River is flooding, the Laguna reverses flow and floodwater moves south away from the Russian River into the tributary Laguna de Santa Rosa.

Two areas of the site, the southwestern portion west of the Wilfred-Bellevue Channel and irrigated pastures, contain several depressions that retain water until late in the season (**Figure 4**). These depressions contain standing water in the winter and spring. The Wilfred-Bellevue Channel contains gently flowing water at a constant level year-round.

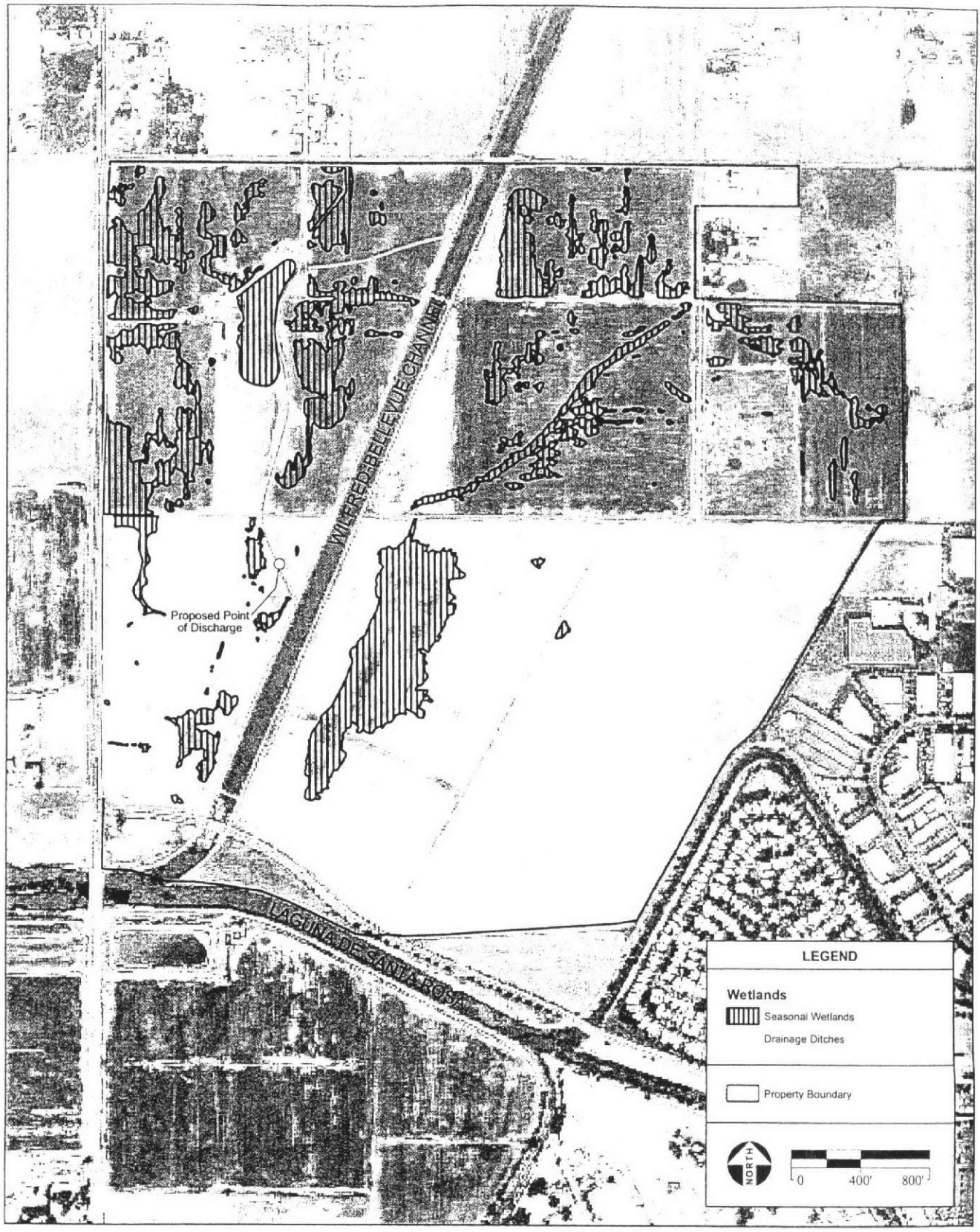
1.1.2 BENEFICIAL USES

The Laguna de Santa Rosa provides habitat for wildlife including 250 species of birds; supports special-status plant and animal species; functions as a reservoir and overflow basin for winter floodwater; furnishes water for irrigating a rich agricultural region; offers opportunity for one of the largest wastewater agricultural reclamation programs in the country; and constitutes a greenbelt, scenic, recreational, and educational resource (Sonoma Land Trust and Laguna de Santa Rosa Foundation, 2003).

California's Porter-Cologne Water Quality Control Act protects the "Beneficial Uses" of waters of the State from water quality degradation. Some of these uses include use of water for municipal and domestic supply, groundwater recharge, navigation, hydropower, recreation, fishing; wildlife habitat such as rare, threatened, or endangered species habitat; floodwater attenuation and storage, wetland habitat, and native American culture. The North Coast Region of the California Regional Water Quality Control Board (RWQCB), has determined the "Beneficial Uses" for the major hydrologic units and drainage features within its jurisdiction, including the Laguna de Santa Rosa and its tributaries.

The "Beneficial Uses" (including potential and existing uses) of the Laguna Hydrologic Sub-area, which includes the Laguna de Santa Rosa and Wilfred-Bellevue Canal, and the site of the Graton Rancheria's project, are:

1. Municipal and Domestic Supply
2. Water for Agriculture
3. Industrial Activities
4. Groundwater Recharge
5. Freshwater Replenishment
6. Navigation
7. Hydropower
8. Recreation
9. Fishing
10. Wildlife Habitat (including cold- and warm water; rare, Threatened, or Endangered Species; wildlife migration and spawning)



SOURCE: Aerial Photography August 2002 ; AES, 2004

Figure 4
Wetlands of the Project Site

The Laguna de Santa Rosa holds back floodwater and attenuates flood-flow in the wet season and is considered to be an important factor in lowering the water surface elevation in the lower Russian River floodplain during flood events (Sonoma County Water Agency [SCWA], 2003).

1.1.2 SURFACE WATER QUALITY

The Laguna de Santa Rosa is currently on the list of Clean Water Act 303(d) impaired waterbodies. Its water is affected by nutrient loading and runoff, elevated water temperature, erosion, sedimentation, and urban encroachment. The State of California has been studying ways to reduce loading in the Laguna de Santa Rosa for at least 10 years (Morris, 1995). In 1995 the RWQCB waste reduction strategy was to reduce total Nitrogen (N) in the Laguna to levels not conducive to rapid algal growth. Concentrations of 3.7 milligrams per liter (mg/l) with an annual loading of 116,000 pounds per year of total N from all sources was thought to be the allowable load (equivalent to the modern "Total Maximum Daily Load" [TMDL] at that time) (Morris, 1995).

Since 1995, the City of Santa Rosa has been studying and analyzing the impacts of regional wastewater discharges into the Laguna. These studies include the Santa Rosa Sub-regional Wastewater Reclamation Project EIR (Santa Rosa, 1997), the Incremental Recycled Water Program Draft EIR (Santa Rosa, 2003), and the Santa Rosa Sub-regional Water Reclamation System Incremental Recycled Water Program Draft Program EIR (Santa Rosa, 2004). The RWQCB has placed limitations on the discharge of treated wastewater into the Laguna de Santa Rosa by the Santa Rosa Sub-regional Wastewater Treatment Plant based upon flows in the Russian River.

The established TMDLs for total nitrogen and ammonia for the Laguna de Santa Rosa are 265,700 lbs per year and 35,100 lbs per year, respectively (Santa Rosa, 2004). According to a letter from USEPA Region 9 to the SWQCB, the USEPA standard in surface water is 1 mg/L total N (USEPA, 2003). Baseline data and the affected beneficial use (numbered 1-10 from the list above) are presented in **Table 1**. Based upon the data, the Laguna de Santa Rosa exceeds the USEPA standard of 1 mg/L for total nitrogen.

The history of water quality impacts to the Laguna de Santa Rosa was summarized in 1995 (Morris, 1995), and more recently in the Russian River Fisheries Restoration Plan (California Department of Fish & Game [CDFG], 2002). In past years, nutrients in the Laguna de Santa Rosa came from several sources including lawns, landscapes, vineyards, dairy farms, and the Santa Rosa Sub-regional Wastewater Treatment Plant.

More than 50 water quality monitoring stations exist in the Russian River system including the Mark West Creek and Laguna de Santa Rosa subsystem. These stations are operated by the City of Santa Rosa, California Department of Fish & Game, California Division of Water Resources, Mendocino County Water Agency, the North Coast Regional Water Quality Control Board, SCWA, and United States Geological Survey. These stations have amassed data on temperature, dissolved oxygen, pH, and specific conductivity. The SCWA is currently compiling these data (Entrix, 2004).

The current State Water Resources Control Board (SWRCB) Water Quality Order No. 2000-02 for the City of Santa Rosa's Laguna Sub-regional Wastewater Treatment Plant prohibits discharge of tertiary treated "Title 22" reclaimed water from May 14 to September 30 each year. In addition, discharges of advance treated wastewater (tertiary-treated, Title 22 reclaimed water) are not generally allowed until the Russian River flow reaches 1000 cubic feet per second (cfs) measured at the Hacienda Bridge (SWRCB, 2000).

The beneficial uses of the Laguna de Santa Rosa may be affected by changes in the quality of surface water it conveys. Baseline data for the Wilfred-Bellevue Channel on the site are presented in Table 1.

TABLE 1
LAGUNA DE SANTA ROSA REPORTING LIMITS, BASELINE WATER QUALITY AVERAGES, AND AFFECTED BENEFICIAL USE

Parameter	Units	Reporting Limit	Average*	Affected Beneficial Use
Temperature	Degrees Celsius	--	--	9, 10
Total Coliforms	MPN/100 ml	2.2	910	1,8
Fecal Coliforms	MPN/100 ml	2.2	787	1,8
Total Alkalinity	mg CACO3/L	120	202	1,2,3,4,5,8,9,10
Bicarbonate Alkalinity	mg CACO3/L	120	202	1,2,3,4,5,8,9,10
Ammonia	mg-N/L	0.05	0.27	1,3,4,5,8,9,10
Hardness	mg CACO3/L	10	220	1,3,5
Nitrate	mg-N/L	0.10	0.82	1,5
Nitrite	mg-N/L	0.05	0.06	1,5
Hydrogen Ion Concentration	pH	--	7.3	10
Orthophosphate	mg-P/L	0.05	0.42	1,3,4,5,8,9,10
Phosphorous	mg/L	0.05	0.50	1,3,4,5,8,9,10
TDS	mg/L	10	450	1,5
TSS	mg/L	10	56	1,5
TKN	mg/L	0.5	1.9	1,5
Turbidity	NTU	1	25.8	1,8,10
Specific Conductance	umho/cm	1	552	1,3,5
Oil & Grease	mg/L	5	--	1,3,5,8,9,10
Mercury	ng/L	0.50	3.69	1,3,5,8,9,10
Aldrin	ug/L	3.0	0.006	1,3,5,8,9,10
Heptachlor	ug/L	0.01	0.007	1,3,5,8,9,10
Arsenic	ug/L	5.0	4.6	1,3,5,8,9,10
Cadmium	ug/L	0.50	0.15	1,3,5,8,9,10

Parameter	Units	Reporting Limit	Average*	Affected Beneficial Use
Copper	ug/L	10	3.1	1,3,5,8,9,10
Nickel	ug/L	10	6.3	1,3,5,8,9,10
Antimony	ug/L	5.0	2.7	1,3,5,8,9,10
Acetone	ug/L	10	2.6	1,3,5,8,9,10

SOURCE: HydroScience, 2004

NOTE: * = An average of six grab samples between January and May 2004

-- = No Data, pH = Hydrogen Ion Concentration, TDS = Total dissolved solids, TKN = Total Kjeldahl Nitrogen, TSS = Total suspended solids, 1 = Municipal and Domestic Supply, 2 = Water for Agriculture, 3 = Industrial Activities, 4 = Groundwater Recharge, 5 = Freshwater Replenishment, 6 = Navigation, 7 = Hydropower 8 = Recreation, 9 = Fishing, 10 = Wildlife Habitat (including cold- and warm water; rare, Threatened, or Endangered Species; wildlife migration and spawning)

1.1.3 AQUATIC HABITATS AND BIOTA

AQUATIC HABITAT

Laguna de Santa Rosa and its tributary flood control channels and ditches have been characterized as low gradient, and at times, intermittent waterbodies. However, when the Russian River floods and backs-up the Laguna de Santa Rosa functions to retain water. The Laguna de Santa Rosa is the second largest freshwater marsh in northern California. Agriculture is common on the Santa Rosa Plain adjacent to the Laguna, and agricultural runoff has a major impact on Laguna water quality. A general lack of canopy cover results in high water temperature (Entrix, 2004).

FISH

The Laguna channel and its tributary streams provide vital habitat, forage, and migration corridors for species from salmonid fishes and California freshwater shrimp, to otters and bald eagles (Sonoma Land Trust and Laguna de Santa Rosa Foundation 2003). However, the Wilfred-Bellevue Channel was recently surveyed and found not to contain threatened and/or endangered fish (The Huffman-Broadway Group, Inc., 2004).

The National Marine Fisheries Service (NMFS) reports that steelhead migrate upstream and downstream through the Laguna as they move into Santa Rosa and Mark West creeks, which join the Laguna de Santa Rosa downstream from the Wilfred-Bellevue Channel. In addition the NMFS survey reports juvenile steelhead in Copeland Creek, which joins the Laguna de Santa Rosa upstream from the Wilfred-Bellevue Channel (Jones, 2000). Based upon unpublished 1994 field work by CDFG, NMFS, and others, a recent Biological Assessment of the Russian River (Entrix, 2004) reported Coho salmon in the Laguna de Santa Rosa. In addition to the reports of endangered Coho salmon, and steelhead in its tributaries, the Laguna de Santa Rosa supports several warm water fish species including Sacramento pikeminnow, which feeds on Coho salmon minnows (Entrix, 2004).

Salmonid smolts outmigrate to the Russian River and Pacific Ocean primarily during the winter and spring with fish movements tapering off in the middle of May. Adult steelhead migrate up the Russian River into its tributaries with the first heavy rains in November and December, and continue their upstream migration into March and April (Entrix, 2004).

CRUSTACEANS

The Wilfred-Bellevue Channel was subject to a habitat evaluation for California freshwater shrimp (*Syncaris pacifica*), a federal and State endangered species, by Richard Arnold, Entomological Consulting Services. According to Dr. Arnold's report, the channel did not contain suitable habitat for this species (The Huffman-Broadway Group, Inc., 2004).

AMPHIBIANS AND REPTILES

The project site and surrounding area has been studied recently by Wildlife Research Associates with focus on California tiger salamander (CTS). The study reported that highly suitable aquatic larval habitat in the smaller drainage ditches of the site. The biologists concluded that the tributary to the Laguna de Santa Rosa that bisects the site (the Wilfred-Bellevue Channel) might provide suitable breeding habitat for CTS (The Huffman-Broadway Group, Inc., 2004).

Suitable habitat for other amphibians, specifically the California red-legged frog and foothill yellow-legged frog does not occur on the site according to the Wildlife Research Associates survey (The Huffman-Broadway Group, Inc., 2004).

Northwestern pond turtles may occur on the site. The turtles need upland areas for basking and aquatic habitat for swimming and foraging. The Huffman-Broadway Group, Inc. report concluded that the Wilfred-Bellevue Channel and surrounding wetlands provide habitat for this reptilian species.

1.2 PROJECT-SPECIFIC SETTING AND AMBIENT WATER QUALITY

1.2.1 HYDROLOGY

The U. S. Geological Survey (USGS) maintains gauging station No. 11465680 near the confluence of the north fork (Wilfred-Bellevue Channel) and the main stem of the Laguna de Santa Rosa. Average flows at USGS gauging station No. 11465680 ranged from 0 cfs to 122 cfs between 1998 and 2003.

1.2.2 AMBIENT WATER QUALITY

HydroScience, Inc. has obtained baseline data for the Wilfred-Bellevue Channel on the site, which reflects on the quality of the Laguna de Santa Rosa at gauging station No. 11465680 near

the confluence of the north fork (Wilfred-Bellevue Channel) and the main stem of the Laguna de Santa Rosa (HydroScience, 2004a). Samples were secured monthly or bimonthly from January through May 2004. Ambient water quality data are presented in **Table 1**.

1.2.3 AQUATIC HABITATS

LAGUNA DE SANTA ROSA

Physical Characteristics

The Laguna de Santa Rosa at the south end of the project site is a broad, shallow, excavated channel more than 300-feet wide and less than 40-feet deep (**Figure 4**). Flow as observed on June 9, 2004 was negligible and the water depth was about 4-feet. According to a recent Biological Assessment, the Laguna de Santa Rosa is seasonally eutrophic (Entrix, 2004). A TMDL for ammonia and dissolved oxygen (DO) was proposed in 1995 (Morris, 1995), and was established by the RWQCB and USEPA (for total nitrogen and ammonia) in 2004 (Santa Rosa, 2004). However, the nutrient rich bottom deposits in the Laguna de Santa Rosa continues to adversely affect DO (Entrix, 2004).

Biological Characteristics

The channel is currently clogged with rooted, emergent vegetation dominated by the water evening primrose (*Ludwigia hexapetala*), and small trees and shrubs of yellow willow (*Salix lutea*). Agricultural fertilizers, runoff from dairies, nitrates and phosphates from spray irrigation, and excrement from geese that frequent the banks of the channel, washes into the Laguna following winter rains.

Several species of wetland plant species colonize the Laguna de Santa Rosa at the southern end of the site. These species include California bulrush (*Scirpus californicus*), heart-stemmed bulrush (*Scirpus acutus* ssp. *occidentalis*), three-square (*Scirpus americanus*), alkali bulrush (*Scirpus robustus*), small-fruited bulrush (*Scirpus microcarpus*), spikerush (*Eleocharis macrostachya*), narrow-leaved cattail (*Typha angustifolia*), broad-leaved cattail (*Typha latifolia*), red-rooted sedge (*Cyperus erythrorhizos*), and eragrostoid sedge (*Cyperus eragrostis*).

WILFRED-BELLEVUE CHANNEL

Physical Characteristics

The Wilfred-Bellevue Channel bisects the Graton Rancheria property running from the northeast to the southwest where is meets the Laguna de Santa Rosa just downstream of the Rohnert-Park Expressway bridge. The earthen, trapezoidal channel is about 200 feet across. Flow as observed on June 9, 2004 was negligible and the water depth was about 4-feet (**Figure 4**; **Figure 5**).

Biological Characteristics

The channel was clogged with rooted, emergent vegetation dominated by the water evening primrose (*Ludwigia hexapetala*), and no open water was visible on June 9, 2004. Restorative plantings of nursery grown container stock line the banks of the Wilfred-Bellevue Channel.

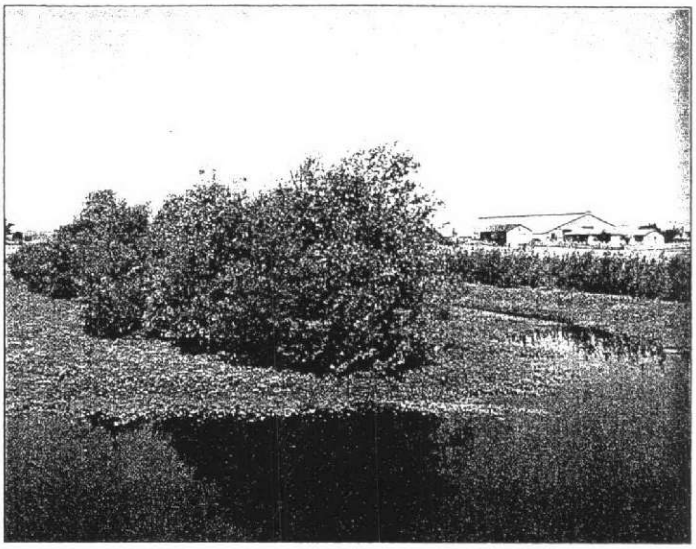
TRIBUTARY DITCHES

Physical Characteristics

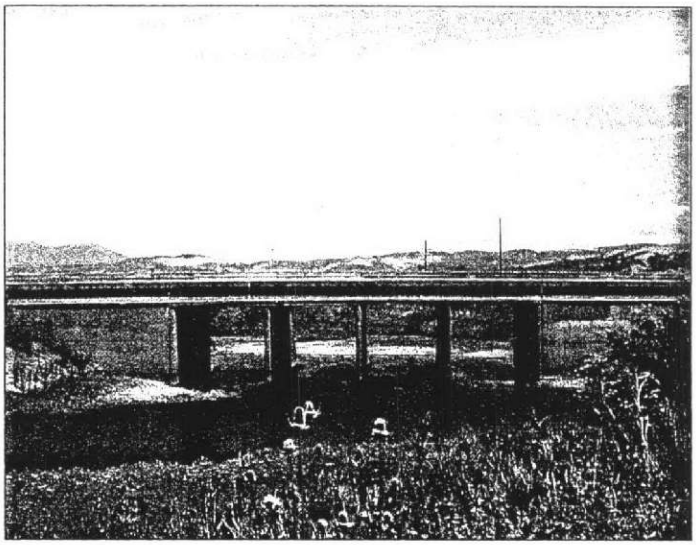
The agricultural ditches on the site are relatively narrow excavated features typically a few feet wide and deep. The ditch at the site of the proposed discharge of excess recycled water is earthen, about 10-feet wide and five-feet deep. There was no flow in any of these channels on June 9, 2004 (**Figure 5**). Agricultural fertilizers, nitrates and phosphates from spray irrigation, and excrement from cattle that frequent the floor and banks of the ditches, washes into the Laguna de Santa Rosa following winter rains.

Biological Characteristics

The ditch at the proposed point of discharge was lined with upland weeds such as wild oats (*Avena sativa*), hayfield tarplant (*Hemizonia congesta* ssp. *luzulifolia*), and Mediterranean barley (*Hordeum marinum*). The floor of this ditch was colonized by eragrostoid sedge (**Figure 6**).



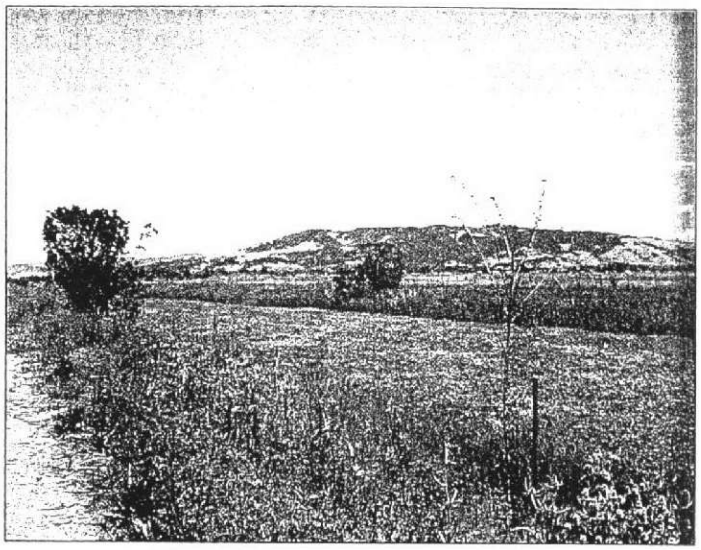
Photograph A
Laguna de Santa Rosa as viewed from the Stony Point Road bridge. Willow and water evening primrose plants are visible.



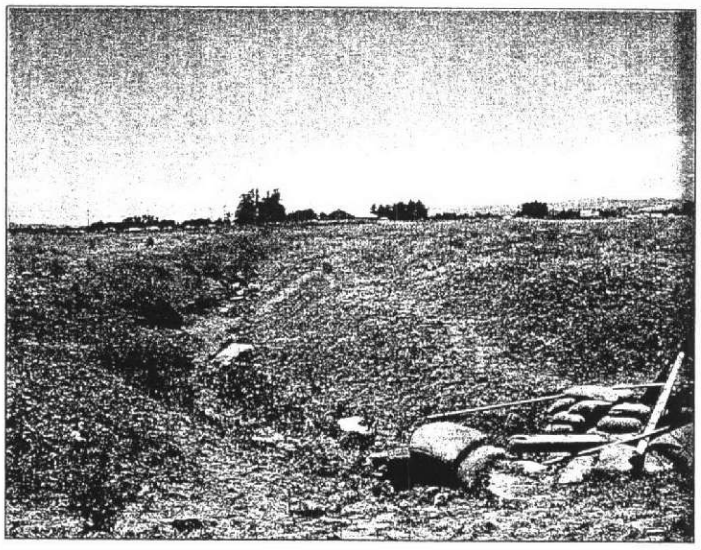
Photograph B
Wilfred-Bellevue Channel at the Rohnert Park Expressway bridge. Teasel plants are in the foreground.

SOURCE: AES, 2004

Figure 5
Aquatic Habitats of the Project Area



Photograph A
Wilfred-Bellevue Channel at project site looking northeast.



Photograph B
Agricultural ditch near the proposed point of discharge, looking upstream (northwest).

SOURCE: AES, 2004

Figure 6
Aquatic Habitats of the Project Area

2.0 SUMMARY OF PROPOSED TREATMENT PROCESS AND EFFLUENT QUALITY

Graton Rancheria proposes to construct an onsite tertiary wastewater treatment plant. The facility would include the following components:

- Influent Pump Station
- Headworks
- Immersed Membrane Bioreactors
- UV Disinfection and Chlorination Equipment
- Sludge Stabilization Basins
- Plant Drain and Supernatant Return Pump Station
- Effluent Pump Station
- Operations Building

The wastewater treatment plant would provide nitrification and denitrification, oxidation, filtration, and disinfection. The ammonia in the wastewater would be converted to nitrates and then to Nitrogen gas (HydroScience, 2004b). The casino project is estimated to discharge an average of 6 kg/day of total N, which is .01% of the total recommended load published in the 1995 report (Morris, 1995). Projected wastewater discharge rates appear in **Table 2**. While the holiday average discharge from the proposed casino and hotel facility would be 357,200 gallons per day (gpd), the Laguna Sub-regional Wastewater Treatment Plant yields 19.2 million gallons per day (mgd).

TABLE 2
PROJECTED WASTEWATER DISCHARGE RATES INTO THE LAGUNA DE SANTA ROSA FOR THE GRATON RANCHERIA CASINO AND HOTEL FACILITY

PARAMETER	PROJECTED AVERAGE DAILY FLOW (GPD)	DESIGN CAPACITY (GPD)
Weekdays	216,035	250,000
Weekends and Holidays	357,200	400,000

SOURCE: HydroScience, Inc., 2004

The established TMDLs for total nitrogen and ammonia for the Laguna de Santa Rosa are 265,700 lbs (120,772 kg) per year and 35,100 lbs (15,955 kg) per year, respectively (Santa Rosa, 2004). Based on the 2004 TMDL for total nitrogen, the projected discharge of 6 kg/day is 2%. The projected effluent quality of the tribal wastewater facility is given in **Table 3**. The USEPA standard for water is 1 mg/L total nitrogen.

TABLE 3
PROJECTED EFFLUENT QUALITY[1]

Parameter	Monthly Average Concentration (mg/L)
Ammonia	<1
Biochemical Oxygen Demand (BOD_5)	<5
Nitrogen	5
Total Phosphorus	6
Total Dissolved Solids (TDS)	970
Total Suspended Solids (TSS)	<1
Turbidity	<0.2 NTU

[1]Based on a similar MBR facility.
SOURCE: HydroScience, Inc., 2004

3.0 EFFECTS OF EFFLUENT RELEASE ON AQUATIC HABITATS

3.1 WATER QUALITY

Effects of effluent discharge on aquatic habitats has been the subject of debate during the process of USEPA formulation of TMDL limits on dissolved nutrients in California rivers and streams such as Calleagas [Ventura County], Coyote [Santa Clara County], and Malibu [Los Angeles] creeks, and the Russian [Sonoma County], and Santa Clara [Ventura County] rivers (Colbaugh, 2003; Santa Rosa, 1997; 2003, 2004).

Formulation of TMDLs for total nitrogen for example, is made difficult by the broad extent of non-point sources of pollution in the watershed being studied. In Sonoma County such as the Laguna de Santa Rosa watershed, the long history of dairying on the Santa Rosa Plain has exacerbated the already diminished water quality of tributary streams. Since the Laguna maintains low summer flow (or even reverse flows in the winter when the Russian River floods), soluble pollutants often bind to sediments that sink to the bottom of the creek. Despite these problems the established TMDLs for total nitrogen and ammonia for the Laguna de Santa Rosa are 265,700 lbs per year and 35,100 lbs per year, respectively (Santa Rosa, 2004).

Studies on the effects of effluent release on Coyote Creek in Santa Clara County and the Laguna de Santa Rosa in Sonoma County suggest that increased loading of nitrate-nitrogen followed by chemical transformation to ammonia could result in increased toxicity to organic life under conditions of elevated temperature and pH, but the effects on fish populations are insignificant at colder winter temperatures (Hopkins et al., 2002; Santa Rosa, 2003 [Merritt-Smith, 2003]). The effects of microcontaminants in wastewater (such as breakdown products of pharmaceuticals, Sedlak at al., 2000) on aquatic biota are not clearly understood and will not be discussed further.

3.2 AQUATIC BIOTA

3.2.1 ALGAE AND PHYTOPLANKTON

The main effects of nutrients on primary producers of the Laguna de Santa Rosa (algae, phytoplankton, and aquatic plants) would be biostimulatory. Biostimulation takes the form of increased growth and development of plants from an overabundance of dissolved phosphates and nitrates. Phosphorus in the form of the phosphate anion is sometimes the limited nutrient in freshwater aquatic systems. Typical levels of the anion range from 0.005 to 0.05 mg/l. As

phosphates become more available to plants, elevated concentrations of nitrates may lead to increased plant growth and development such as "algal blooms" (Santa Rosa, 2003 [Merritt-Smith, 2003]).

An important caveat however is that algal growth in California stream systems may be the result of several, unrelated variables, not just nutrient loading. For example, in other northern California streams e.g. the Coyote Creek study, growth of attached algae appeared limited by the availability of gravel and cobbles (these are absent in the Laguna de Santa Rosa reaches near the proposed project), and by sunlight. Many reaches of Coyote Creek are densely shaded by riparian forest, but the Laguna de Santa Rosa reaches near the proposed project are nearly devoid of trees which overhang the stream. The Coyote Creek system had higher concentrations of phytoplankton in reaches having low flow (Hopkins et al., 2002). In southern California streams such as Malibu Creek, algal problems in the watershed are a strongly seasonal phenomenon and may not be due to just nutrient loading (Colbaugh, 2003).

3.2.2 FISH

The temporal effects of effluent discharges into the Laguna de Santa Rosa on fish may be exacerbated by the flushing action of high flow in the stream. Salmonid smolts are present in the Laguna during the winter and spring with fish movements tapering off in the middle of May (Entrix, 2004; Santa Rosa, 2003 [Merritt-Smith, 2003]). In addition there are thermal barriers to the fish when temperatures in the Laguna increase due to low flow, higher air temperature, and discharges of warmer recycled water from the Santa Rosa Sub-regional Wastewater Treatment Plant. Since flow in the Laguna slows in early May (depending on April rainfall), temperatures may rise to increase numbers of straying smolts that do not make it to the Russian River in a timely manner (Entrix, 2004).

Wastewater effluent has been known to cause endocrine disruption in fish. Estrogenic hormones originating in human urine and from birth control pills can be the cause of metabolic disorders in fish, namely the feminizing of males.

Discharges of treated wastewater may also cause increases in stream temperature. Higher stream temperatures in the Laguna de Santa Rosa may lead to increases in the population of Sacramento pikeminnow, a known predator of salmonids (Entrix, 2004).

3.2.3 INVERTEBRATES

Populations of invertebrates in the Laguna de Santa Rosa are dependent in part on the availability of primary producers such as algae and phytoplankton. In turn, the cyclic growth of primary producers hinges on season, availability of light in the water column, water temperature, and nutrients. Invertebrates play an important role in the food chain ultimately furnishing a source of

food for non-native mosquito fish, predatory warm water fish, and cold-water fish, including Threatened and Endangered species of steelhead and coho salmon.

At least one study on the St. Croix River in Minnesota and Wisconsin produced evidence that aquatic invertebrate populations change in composition as a result of incremental phosphate and nitrate loading as one sampled species composition in each of several reaches below point and non-point sources of pollutants. When constituent loading was greatest the aquatic community composition indicated disturbance (Payne et al., 2002).

The Wilfred-Bellevue Channel was subject to a habitat evaluation for California freshwater shrimp (*Syncaris pacifica*), a federal and State endangered invertebrate species, by Richard Arnold, Entomological Consulting Services. According to Dr. Arnold's report, the channel did not contain suitable habitat for this species (The Huffman-Broadway Group, Inc., 2004a).

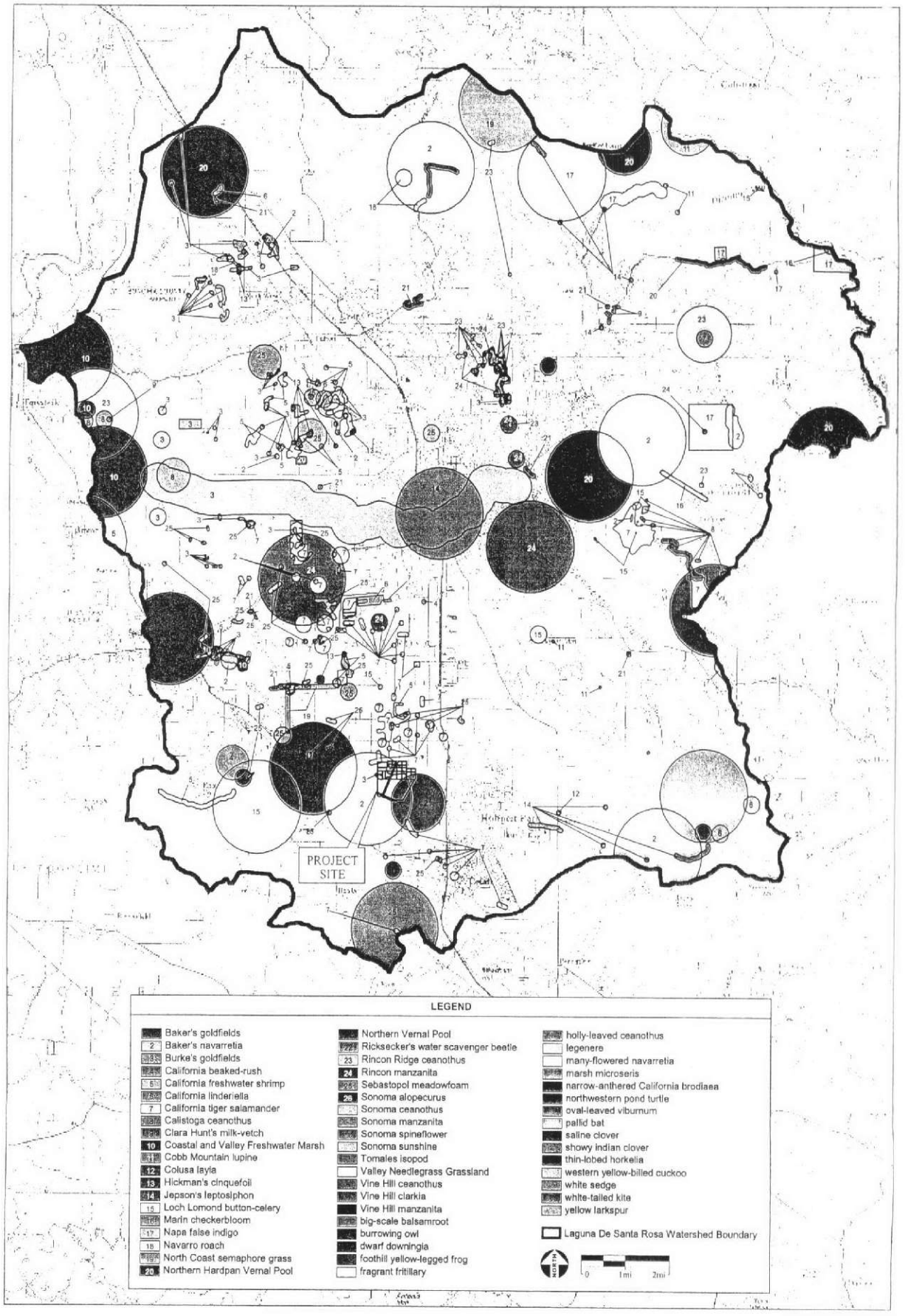
3.2.4 SPECIAL STATUS SPECIES

Figure 7 shows the known location of special status species of the Laguna de Santa Rosa watershed. Threatened and Endangered steelhead fish and Coho salmon populations are not mapped by the CNDDB but coincide with the distribution of white sedge along Mark West Creek just to the north of the Laguna de Santa Rosa watershed boundary, and in Coleman Creek located between Cotati and Rohnert Park. These data, together with the information on algae, phytoplankton, fish, and invertebrates, provide a basis upon which to analyze the impacts of effluent discharge to the Laguna de Santa Rosa system.

The City of Santa Rosa, in a recently completed 10-year study, concluded that two factors unrelated to wastewater discharge adversely affect survivorship of juvenile steelhead and Coho salmon in rearing areas:

1. Sedimentation of creeks causing pools to fill and microhabitats to be modified by silt; and,
2. Water diversions causing stranding of fish.

After five years of study, the fisheries biologists concluded that the discharge of reclaimed water during the wet season had no measurable impact on migrating Threatened and Endangered salmonids, including steelhead fish and Coho salmon (Merritt-Smith Consulting, 2003).



SOURCE: Napa, CA & Healdsburg, CA 1:100,000 USGS Quadrangles (1983); Laguna de Santa Rosa Foundation ; AES, 2004

Figure 7
Special Status Species

3.3 IMPACTS

3.3.1 CONSTRUCTION IMPACTS

Construction of the outfall structure has the potential to discharge sediments and construction related materials (concrete washings, oil, and grease into the agricultural ditch shown in **Figure 4**). This is a potentially significant impact.

However, impacts to native species would be less than significant as there is no significant ecological value to the weeds on the floor and sides of the ditch. Flowing water and aquatic life were absent at the proposed point of discharge as seen on June 9, 2004. The addition of a permanent water source along the ditch would stimulate the growth of hydrophytes and ultimately create conditions for the growth of riparian vegetation. This is a potentially significant but beneficial impact.

3.3.2 OPERATIONAL IMPACTS

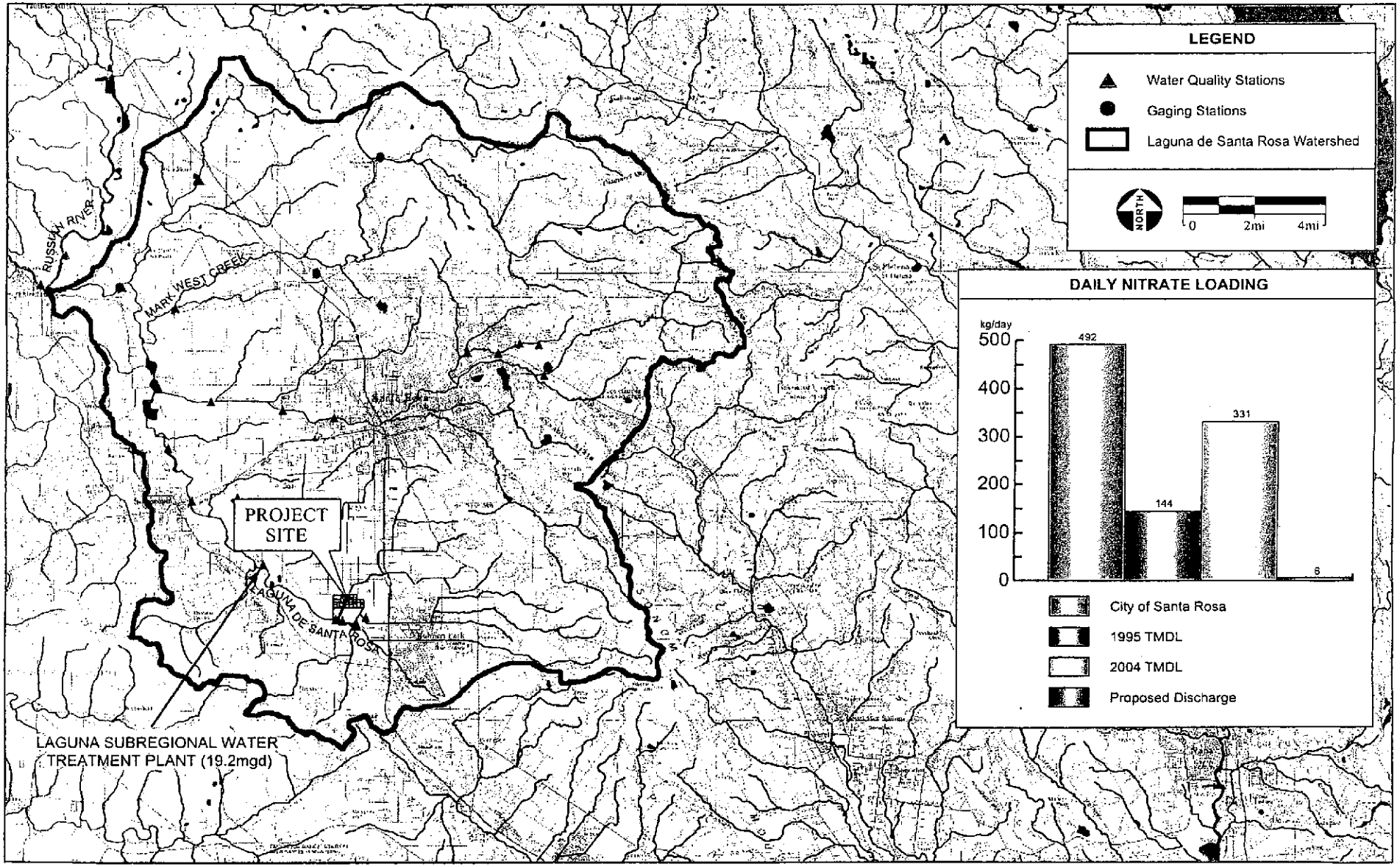
WATER QUALITY

Operation of the outfall would cause an incremental increase in the daily load of phosphates and nitrates, but the amount is insignificant when compared to TMDLs and the estimated daily output (in kilograms) discharged by the Laguna Sub-regional Water Treatment Plant (**Figure 8**). Incremental increases in phosphates and nitrates, while diluted with water, would exacerbate the negative effects of downstream discharges of tertiary-treated, Title 22 recycled water by the City of Santa Rosa. Increases in stream temperature are possible. This is a potentially significant impact.

BIOLOGICAL RESOURCES

In a ten-year study of the Russian River drainage reports that agricultural diversions and drought had the greatest impact on migrating and spawning salmonid fish (Santa Rosa, 2003 [Merritt-Smith, 2003]). However, these studies and the subsequent environmental impact reports (Santa Rosa, 2003, 2004) reveal that discharges of tertiary treated wastewater into the Laguna de Santa Rosa in the winter months do not significantly impact biological resources, including threatened and endangered salmonid fish, amphibians, or invertebrates.

Provided that the project complies with the conditions of the NPDES permit i.e. no discharges would be permitted in the summer and fall, impacts from plant operations would be less than significant.



SOURCE: Napa, CA & Healdsburg, CA 1:100,000 USGS Quadrangles ; (1983, Laguna de Santa Rosa Foundation ; AES, 2004

Figure 8

3.4 CUMULATIVE IMPACTS

One of the cumulative impacts analyzed by the City of Santa Rosa in the *Incremental Recycled Water Program* (IRWP) *Addendum to the EIR* addresses the question: "*Will the Program* (Santa Rosa's) *plus cumulative projects* (the Tribe's) *result in non-attainment of established TMDLs* (Santa Rosa, 2004)?" The City's 2004 IRWP EIR Addendum is relevant to the Tribe's project as it (the Tribe's project) is specifically mentioned in the City of Santa Rosa's analysis if the IRWP. The analysis of cumulative impacts of the IRWP and the Tribe's (Rohnert Park) project states:

"The TMDL for the Laguna Santa Rosa for nitrogen and ammonia already in place is designed to prevent cumulative projects on that constituent. With appropriate mitigation, the IRWP will meet the established TMDL for nitrogen and ammonia. It is presumed that the Rohnert Park cumulative project will be allocated loads by the USEPA in a manner similar to the RWQCB as appropriate to prevent environmental degradation due to nitrogen and ammonia. Therefore the cumulative impact on established TMDLs will be less than significant and no further mitigation is required."

Page 4.6-19 of Santa Rosa's EIR Addendum states:

"*She (Suesan Saucerman) stated that a USEPA issued permit for the Casino will be very similar to the one issued by the Regional Board including a seasonal discharge prohibition, a limitation of discharge to one percent of the receiving water (Laguna) flow, and no dilution allowed for determining reasonable potential and permit compliance.*"

Based on the above discussion, the Tribe's casino and hotel project wastewater discharge, if operated under the same standards at the City of Santa Rosa Laguna Sub-regional Wastewater Treatment Plant, would have a less than significant cumulative impact.

4.0 MITIGATION

It is the policy of the RWCQB as stated in the Basin Plan not to allow wastewater discharges into the Russian River and its tributaries during the period May 15 through September 30. Based on the most recent NPDES Permit that was issued to the neighboring City of Santa Rosa, Laguna Sub-regional Wastewater Treatment Plant, the State Water Quality Control Board (SWCRB) will probably not allow discharges into the Laguna de Santa Rosa after May 14 or before October 1 of any year (SWRCB, 2000). The RWQCB restricts discharges of treated effluent to the Laguna de Santa Rosa when Russian River flows are less than 1,000 cfs as measured from the Hacienda Bridge.

During the dry season from May to October the flow of the Russian River as measured from the Hacienda Bridge (over a 63-year average) ranges from 304 to 723 cfs. During the wet season (November through April) the flow increases to 1,166 up to 6,919 cfs. Corresponding flow in the Laguna de Santa Rosa at Stony Point Road ranges from 3.36 to 121.9 cfs. Water backs-up (water flow reverses) into the Laguna de Santa Rosa when the Russian River is flooding. The annual fluctuations in stream flow, coupled with low flow or no flow in dry years, and point and non-point pollutant sources have caused phosphates and nitrates to build-up in the sluggish backwater mud of the Laguna de Santa Rosa resulting in chronic impairment of water quality.

The following mitigation measures are recommended.

1. Water conservation measures including use of reclaimed water for landscape watering and toilets should be implemented. Potable water conservation measures would also be adopted including limits on drinking water served in the casino and hotel restaurants and electronic dispensing devices in faucets.

2. Construction of the proposed outfall structure would be undertaken during the dry season under permit from the Department of the Army, Corps of Engineers. Bioengineered rip-rap and habitat restoration of the agricultural ditch is proposed to offset construction impacts to existing bank vegetation. The ditch is currently vegetated with non-native weeds and grasses. Eragrostoid sedge has colonized the floor of the ditch.

3. Effluent temperature could be reduced by storing effluent in tanks and holding ponds.

4. The Tribe would restrict discharge of tertiary treated "Title 22" reclaimed water from May 14 to September 30 each year.

5. The discharge of advance treated wastewater (tertiary-treated, Title 22 reclaimed water) will not generally allowed until the Russian River flow reaches 1000 cfs measured at the Hacienda Bridge.

6. Options to reduce loading during critical periods could be implemented including chemical precipitation of phosphates and nitrates from tertiary-treated wastewater.

7. Tertiary-treated effluent could be stored in tanks and holding ponds during the May 14 through September 30 prohibitory discharge period.

5.0 REFERENCES

California Department of Fish & Game. 2002. Russian River Basin Fisheries Restoration Plan. July 2002 draft plan.

Colbaugh, J. E. 2003. February 11, 2003 Letter to Mr. Dave Smith, USEPA Region 9, "Comments on Malibu Creek Draft TMDL (Nutrients)."

Entrix. 2004. Russian River Draft Biological Assessment. U. S. Army Corps of Engineers and Sonoma County Water Agency, January 16, 2004.

Hopkins, J., R. L. Williamson, and R. Simonsen. 2002. The Impact of Recycled Water on Water Quality in Coyote Creek in San Jose, California. City of San Jose, July 2002 report.

HydroScience, Inc. 2004a. Graton Rancheria Hotel and Casino Project Regulatory Compliance Technical Memorandum. July 2004 draft.

HydroScience, Inc. 2004b. Graton Rancheria Hotel and Casino Project NPDES Wastewater Treatment Plant Engineering Report. July 2004 draft.

Jones, W. 2000. National Marine Fisheries Service Anadromous Fish Distributions: California Coastal Salmon and Steelhead Current Stream Habitat Distribution Table. January 2000 draft table.

Merritt Smith Consulting. 2003. Salmonid Juvenile Density Monitoring in Sonoma County Streams, Synthesis of a Ten-year Study (1993-2002). Appendix J.8 of the City of Santa Rosa IRWP DEIR.

Morris, C. N. 1995. Waste Reduction Strategy for the Laguna de Santa Rosa. California Regional Water Quality Control Board North Coast Region, March 1, 1995 report.

North Coast Regional Water Quality Control Board. 1996. Revised Basin Plan.

Payne, G. A., K. E. Lee, G. R. Montz, P. J. Talmage, J. K. Hirsch, and J. D. Larson. 2002. Water-quality and aquatic-community characteristics of selected reaches of the St. Croix River, Minnesota and Wisconsin, 2000. USGS Water-Resources Investigations Report 02-4147 (abstract).

Sedlak, D. L., J. L. Gray, and K. E. Pinkston. 2000. Understanding microcontaminants in recycled water. Environmental Science & Technology 34(23) 508A-515A.

Santa Rosa, City of. 1997. Santa Rosa Sub-regional Water Reclamation Project Environmental Impact Report.

Santa Rosa, City of. 2003. Incremental Recycled Water Program Draft EIR. May 16, 2003 DEIR.

Santa Rosa, City of. 2004. Santa Rosa Sub-regional Water Reclamation System Incremental Recycled Water Program Draft Program Environmental Impact Report. February 17, 2004 DEIR.

Sonoma County Water Agency. 2003. Russian River Action Plan. March 2003 report.

Sonoma Land Trust & Laguna de Santa Rosa Foundation. 2003. Laguna de Santa Rosa: Resource Atlas and Protection Plan.

State Water Resources Control Board. 2000. Water Quality Order No. 2000-02, NPDES Permit No. CA0022764, ID No. 1B830990SON, Waste Discharge Requirements for the City of Santa Rosa, Laguna, Sub-regional Wastewater Treatment, Reuse, and Disposal Facilities, Sonoma County.

The Huffman-Broadway Group, Inc. 2004. Draft Biological Assessment Proposed Gaming Facility Sonoma County, California. May 5, 2004 technical report.

United States Environmental Protection Agency (USEPA). 2003. Letter from Alexis Strauss, Associate Regional Administrator, USEPA Region 9 to Celeste Canti, Executive Director, California State Water Resources Control Board.(with 18 page attachment).