Draft

Subsequent Environmental Impact Report

for the

River Islands at Lathrop Project

  

Volume Ib: Draft SEIR
(Section 4.8 - Chapter 10)

State Clearinghouse No. 1993112027

October 16, 2002

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TABLE OF CONTENTS

Chapter/Section

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section | **Page**

TABLES

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section **Page**

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section | **Page**

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section **Page**

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section **Page**

EXHIBITS

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section **Page**

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section **Page**

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section | **Page**

TABLE OF CONTENTS *(CONTINUED)*

Chapter/Section **Page**

TABLE OF CONTENTS *(CONTINUED)*

APPENDICES BOUND SEPARATELY

4.8 HYDROLOGY AND WATER QUALITY

4.8 HYDROLOGY AND WATER QUALITY

This section analyzes the hydrology, hydraulics, and water quality in the vicinity of the River Islands project and in the greater Sacramento-San Joaquin River Delta (Delta). The focus is primarily on the project impacts in the waterways surrounding Stewart Tract, a Delta island bounded by the San Joaquin River, Old River, and Paradise Cut. Sufficient detail is provided in this section to analyze effects related to hydrology and water quality at a project level of detail for both Phase 1 and Phase 2 of the proposed project. Exhibits and tables supporting the analysis are compiled at the end of this section.

This evaluation uses existing information from previously completed documents that address water resources in the Delta, including (1) Environmental Impact Report for the Lathrop Water, Wastewater, and Recycled Water Master Plan (EDAW 2001); (2) Proposed Mitigated Negative Declaration and Initial Study, Temporary Barriers Project 2001-2007 (California Department of Water Resources 2000); (3) Future Water Supply Implementation Environmental Impact Report (EDAW 1998); (4) Draft Environmental Impact Report and Environmental Impact Statement for the Delta Wetlands Project, Volume 2 (State Water Resources Control Board and U.S. Army Corps of Engineers 1995); (5) Environmental Impact Report for Implementation of the 1995 Bay/Delta Water Quality Control Plan (WQCP) (State Water Resources Control Board 1999); (6) South San Joaquin Irrigation District (SSJID) EIR/EIS for Meeting Flow Objectives for the San Joaquin River Agreement; and (7) Draft Environmental Impact Report for the Mossdale Landing Urban Design Concept (EDAW 2002).

In addition, substantial site-specific, water-related technical analyses were developed for this project by HSI Hydrologic Systems and MBK Engineers. These analyses have been reviewed by EDAW and are used in this environmental impact report (EIR) where appropriate. Detailed and supporting information regarding these analyses is provided in technical appendices as follows:

- Appendix E, "River Islands at Lathrop Water Use and Discharge Existing Conditions Analysis" (HSI Hydrologic Systems 2002a);
- Appendix F, "River Islands at Lathrop Preliminary Interior Lake Water Budget" (HSI Hydrologic Systems 2002b);
- Appendix G, "River Islands Preliminary Interior Hydrology and Stormwater Runoff Analysis" (HSI Hydrologic Systems 2002c);
- Appendix H, "River Islands at Lathrop Post-Project Water Quality Analysis" (HSI Hydrologic Systems 2002d); and
- Appendix I, "River Islands at Lathrop Hydraulic Impact Analysis" (MBK Engineers 2002).

4.8.1 REGULATORY BACKGROUND

Within the context of the regulatory background discussion below, the project site is considered to be located in the South Delta, along the lower San Joaquin River.

Regional Surface Hydrology

The regulatory background of surface hydrology in the Delta region has been a contentious and complex issue for many years. The hydrology and water quality regulatory components are inextricably linked, and two major processes are ongoing to attempt to solve the water supply, water quality, and ecosystem restoration needs in the Delta: the State Water Resources Control Board's (SWRCB's) 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (1995 Bay-Delta Plan) and the CALFED Bay-Delta Program. These are described below.

SWRCB Bay-Delta Plan

The SWRCB was created by the California Legislature in 1967. Its mission is to ensure the highest reasonable water quality and to allocate available water to achieve a balance of beneficial uses. The joint authority of water allocation and water quality protection enables the SWRCB to provide comprehensive protection for California's water. The SWRCB has the responsibility to protect the beneficial uses of water in the Bay-Delta Estuary against the adverse effects of water diversions. The SWRCB's practice in addressing Bay-Delta issues is first to identify the beneficial uses of a water body and then to adopt water quality objectives that, when implemented, would protect the beneficial uses. The SWRCB implements the objectives through water right orders and by requesting or directing that other agencies take appropriate actions. Implementing the water quality control measures is primarily the responsibility of the nine Regional Water Quality Control Boards (RWQCBs) that have jurisdiction over geographic regions of the state.

In 1995, the SWRCB adopted the Bay-Delta Plan, which identifies municipal and industrial, agricultural, and fish and wildlife beneficial uses for waters of the Delta and specifies objectives to protect these uses. The RWQCB also developed the Water Quality Control Plan for the Sacramento and San Joaquin River Basins. The focus of these two plans is to identify both quantitative and qualitative objectives with respect to flow and water quality for each water body in the Delta. Among the various criteria described in the Bay-Delta Plan are numeric objectives for water quality constituents (salinity and dissolved oxygen), numeric operational constraints for the federal Central Valley Project (CVP) and State Water Project (SWP), a narrative objective to protect salmon, and a narrative objective to protect brackish tidal marshes in Suisun Marsh. The Bay-Delta Plan is the substantive regulatory authority over Delta hydrologic conditions.

Most of the objectives in the 1995 Bay-Delta Plan were initially implemented through biological opinions issued by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) to protect delta smelt and winter-run chinook salmon and through SWRCB Water Right Decision 1485 (D-1485). The current water right requirements to implement the Bay-Delta flow-dependent objectives are set forth in D-1641 and in Order WR 2000-10. D-1641 includes both long-term and temporary implementation requirements. Order WR 2000-10 requires partial implementation that would remain in effect up to 35 years. In D-1641 and in Order WR 2000-10, the SWRCB assigned responsibilities, for specified periods, to water users in the watershed of the San Joaquin River upstream of Vernalis and elsewhere. These responsibilities need not be revisited in the near future. So-called "Phase 8 Negotiations" are ongoing between Sacramento River watershed water rights holders, the

California Department of Water Resources (DWR), and the U.S. Bureau of Reclamation (USBR) to attempt to reach agreement on how to meet flow-related objectives in the 1995 Bay-Delta Plan.

Until further agreements are reached, the responsibility for meeting most of the 1995 Bay-Delta Plan objectives is assigned to the SWP, operated by DWR, and to the CVP, operated by USBR. DWR and USBR have agreed to implement the objectives until the SWRCB adopts a water right decision that allocates responsibility to meet the plan objectives. This administrative action to implement the 1995 Bay-Delta Plan allocates responsibility for achieving the plan objectives to water rights holders whose diversions affect the beneficial uses of water in the estuary (SWRCB 1999).

CALFED Bay-Delta Program

The CALFED Bay-Delta Program (CALFED) is not a regulatory program but arguably the largest water management and ecosystem restoration program in the nation. It is a comprehensive program established to solve the Bay-Delta water supply, water quality, ecosystem, and levee integrity problems. As such, CALFED deserves mention as part of the regulatory background because implementation is currently having a substantial effect on conditions and actions throughout the Delta, and future CALFED projects would likely have an even greater effect.

Initiated in 1995, the CALFED Bay-Delta Program is an unprecedented collaboration among state and federal agencies and the state's leading urban, agricultural, and environmental interests to address and resolve the environmental and water management problems associated with the Bay-Delta system. The mission of CALFED is to develop and implement a long-term comprehensive plan that would restore ecological health and improve water management for beneficial uses of the Bay-Delta. CALFED addresses four interrelated, interdependent programs concurrently: water supply reliability, water quality, ecosystem restoration, and levee system integrity. Each is discussed briefly below.

- Water Supply Reliability - potentially increases California water supplies by nearly 3 million acre-feet (MAF) through surface water and groundwater storage, an Environmental Water Account to enhance water supply reliability, and water use efficiency projects (estimated cost is $5.5 billion between 2001 and 2007);

- Water Quality - improves drinking water supplies for the 22 million Californians who rely on Delta water by investing in conveyance improvements, watershed and agricultural drainage projects, and treatment technologies (estimated cost is $1 billion between 2001 and 2007);

- Ecosystem Restoration - protects and restores sensitive species and their habitats throughout the Bay-Delta system to meet recovery goals and mandates (estimated cost is $1.6 billion between 2001 and 2007); and

- Levee System Integrity - improves stability of Delta levees that protect the state's water supply and reduces conflicts between levee maintenance and habitat needs (estimated cost is $0.5 billion between 2001 and 2007).

These four major programs are implemented through 12 major program elements: Storage, Conveyance, Water Use Efficiency, Water Transfers, Ecosystem Restoration, Environmental Water Account, Water Management, Watersheds, Drinking Water Quality, Levee System Integrity, the CALFED Science Program, and Program Tracking and Accountability.

CALFED has developed the draft Sacramento-San Joaquin River Delta Regional Implementation Plan (CALFED 2001), which describes projects proposed for the Delta region. A partial list of the organizations providing input to the plan includes Bay-Delta Public Advisory Committee, CALFED Science Board, Delta Drinking Water Council, Agency Stakeholder Ecosystem Team, Delta Protection Commission, Delta Recreation Citizens Advisory Group, Delta-Wide Ecosystem Steering Committee, Delta Restoration Implementation Plan Development Team, In-Delta Storage Program Stakeholders Committee, Delta Levees and Habitat Advisory Committee, Levees and Channels Technical Team, Central Valley Fish Facilities Coordination Team, Clifton Court Forebay Technical Advisory Team, Tracy Technical Advisory Team, and Old River/Rock Slough Water Quality Action Work Group.

Numerous proposed CALFED projects are defined in the draft Delta Regional Implementation Plan. Only one project, however, is specifically proposed in the immediate vicinity of the River Islands project: Head of Old River permanent barrier. This permanent barrier would replace an existing temporary rock barrier installed at the head of Old River in spring and fall to minimize migratory fish entering Old River (see the discussion of Old River in section 4.8.2, "Existing Conditions," below). The permanent barrier, as planned, would have locks to allow boat passage but would restrict fish and water passage from the San Joaquin River into Old River. The following additional projects may indirectly have some effect on the Delta waterways immediately surrounding the River Islands project, depending on the locations of specific projects as they move forward:

- South Delta Improvement Program - Installs operable barriers to ensure water of adequate quantity and quality to agricultural diverters and increases pumping capacities that could affect hydrodynamics in the River Islands project area.

- Temporary Barriers Program - Increases water levels in the South Delta for agricultural irrigators until a permanent water supply solution is identified. The Head of Old River temporary barrier, adjacent to Stewart Tract (discussed above), is a critical component of the Vernalis Adaptive Management Plan and is used to enhance juvenile salmon outmigration in spring and fall.

- Agricultural Diversion Extension - protects agricultural diverters who suffer from low water levels because they are located where they cannot benefit from the barriers. Projects include installing and operating portable pumps, providing limited dredging of existing intakes, and modifying existing diversion structures.

- Recirculation Feasibility Study - evaluates the recirculating of water pumped from the Delta through the Newman Wasteway to help meet San Joaquin River flow and water quality objectives.

- Lower San Joaquin River Flood Control - improves flood control capacity on the lower San Joaquin River and enhances ecosystem structure and function in the lower San Joaquin River and South Delta areas.

- Old Slough and Rock Slough Water Quality Actions - achieves a net water quality improvement through a number of mechanisms, including reducing the pollutant loads discharged into Old River.

- In-Delta Surface Storage - provides approximately 250,000 acre-feet (af) of storage and could affect flows and water quality in the South Delta.

- Base Level Protection for Delta Levees - provides funding to help local reclamation districts reconstruct all Delta levees to a base level of protection (the Public Law 84-99 standard). Currently, approximately 520 out of 1,100 miles of Delta levees do not meet the base level standard, including some along waterways associated with the proposed project in the vicinity of the project site (e.g., San Joaquin River and Old River).

- Special Improvement Projects for Delta Levees - enhances the stability of levees of particular importance to the system with priorities for saving life and personal property, preventing salinity intrusion, and protecting agricultural production and ecosystems. No work is currently proposed for Stewart Tract.

- Subventions for Delta Levees - provides financial assistance to local agencies to maintain and rehabilitate nonproject Delta levees through the Delta Levees Maintenance Subventions Program. The state reimburses local agencies for the part of the costs to maintain and improve nonproject and project levees guided by program procedures.

- Delta Master Recreation Plan - develops in conjunction with the Delta Protection Commission and the California Department of Boating and Waterways a comprehensive recreation plan for the Delta.

- Ecosystem Restoration Program - consists of more than 100 projects. Potentially of most relevance to the River Islands project are programs to reduce the use of pesticides and fertilizers in the Sacramento and San Joaquin River watersheds, the Delta dredging reuse strategy, the innovative fish screen for small diversions demonstration project, the small diversion fish screen program, outreach and education to reduce the risk of importing and distributing nonnative invasive species, the levee setback geomorphic model, the habitat restoration/flood control bypasses program, floodplain restoration on existing conservation lands, and habitat acquisition for riparian brush rabbit and riparian woodrat. In addition, numerous fish and water quality studies would likely take samples in the River Islands project area water bodies (San Joaquin River, Old River, and Paradise Cut).

FLOOD CONTROL/DRAINAGE

All urban development within the project region is required to be protected from flooding. The design standard for flood protection is established by the Federal Emergency Management Agency (FEMA), with the minimum level of flood protection for new development to be the 1-in-100 Annual Exceedence Probability (AEP) (i.e., 100-year flood event). Specifically, where levees provide flood protection, the levee crown is to have 3 feet of freeboard above the 1-in-100-AEP water surface elevation, except in the vicinity of a structure such as a bridge, where the levee crown must have 4 feet of freeboard for a distance of 100 feet upstream and downstream from the structure. FEMA also publishes Flood Insurance Rate Maps (FIRMs) that identify which land areas are subject to flooding. These maps provide flood information and identify zones having varying degrees of flooding potential.

The State Reclamation Board also has jurisdiction over flood control in California. It is responsible for ensuring the serviceability of levees and requires permits for any activity that may affect the capacity of the flood control system.

The storm drainage design standards for both the City of Lathrop and San Joaquin County require that a drainage report be prepared for all subdivisions greater than 25 acres in size. The report must include maps showing drainage basins relative to the project, and subbasins within the project, with catch basin and inlet locations and calculations of design runoff before and after subdivision development. Hydraulic calculations for depth of flow and quantity of runoff, pipe sizing, pump stations, and detention/retention basins must be included in the drainage report.

U.S. Army Corps of Engineers Sacramento and San Joaquin River Basins Comprehensive Study

The Sacramento and San Joaquin River Basins Comprehensive Study is a joint effort by the State Reclamation Board and the USACE, in coordination with federal, state, and local agencies, groups, and organizations in California's Central Valley. Responding to the flooding of 1997, the California Legislature and the U.S. Congress directed the Reclamation Board and the USACE to develop a comprehensive plan for flood damage reduction and environmental restoration purposes for the Sacramento and San Joaquin River Basins. Furthermore, the directive gave equal weight to these two primary purposes. Similar to CALFED, the comprehensive study is not a regulatory program per se, but consistency with its goals and objectives is important for any project affecting flood control in the Sacramento-San Joaquin River basins.

On July 22, 2002, a draft interim report was released by the Comprehensive Study team (USACE 2002). The draft interim report identified the comprehensive plan as an approach to developing projects in the future to reduce damages from flooding and restore the ecosystem in the Sacramento-San Joaquin River basins. As described in the draft interim report, the comprehensive plan has three parts: (1) a set of principles to guide future projects, (2) an approach to develop projects with consideration for systemwide effects, and (3) an organization to consistently apply the guiding principles in maintaining the flood management system and developing future projects.

The comprehensive study has proposed a set of guiding principles to govern implementation of projects that propose modifying the Sacramento or San Joaquin flood control systems. These principles have been developed to ensure that projects that are moving forward are consistent with the objectives established by the USACE and the Reclamation Board. The following is a list of the comprehensive study's draft guiding principles:

- Recognize that public safety is the primary purpose of the flood management system.
- Promote effective floodplain management.
- Promote agriculture and open space protection.
- Avoid hydraulic and hydrologic impacts.
- Plan system conveyance capacity that is compatible with all intended uses.
- Provide for sediment continuity.
- Use an ecosystem approach to restore and sustain the health, productivity, and diversity of the floodplain corridors.
- Optimize use of existing facilities.
- Integrate with the CALFED Bay-Delta Program and other programs.
- Promote multi-purpose projects to improve flood management and ecosystem restoration.

The proposed project lies in the Lower San Joaquin River Region of the comprehensive study. The draft interim report notes in the discussion of this region that

> [d]iverting more flows through Paradise Cut and Old River, away from the San Joaquin River, would allow for more effective conveyance within the South Delta and would direct flows away from the existing urbanized area.... Wetland and riparian restoration projects could contribute to water quality improvements through water treatment and bank stabilization. These projects would also benefit conditions for migratory fish through the creation of shaded riverine aquatic habitat along river channel margins .... Various local stakeholders have expressed an interest in improving the conveyance capacity of Paradise Cut to direct more flood flows toward Old River away from the developed areas around Stockton. This could include levee realignment that would create an opportunity for riparian restoration.

GROUNDWATER HYDROLOGY

California groundwater law is highly complicated because of the variety of groundwater rights recognized in the state. Groundwater is classified as either a subterranean stream or as percolating groundwater. A subterranean stream exists when the flow of groundwater is confined to a known and defined subsurface channel. Groundwater not flowing as a subterranean stream is classified as percolating groundwater. Subterranean streams are subject to surface water law, which recognizes riparian and appropriative rights. Percolating groundwater is subject to groundwater law, which recognizes overlying and appropriative rights.

Regulatory requirements related to groundwater quality are covered below, under "Water Quality."

WATER QUALITY

As with most water issues in California, the regulatory background for water quality is extremely complex. The SWRCB's role relative to Bay-Delta water quality was described previously under "Surface Hydrology." In addition, numerous other regulatory statutes exist that specifically address water quality. Both federal and state regulatory authority exists for the control of water quality in surface waters of California, including the San Joaquin River and the Delta. Key elements of the federal and state regulatory processes are described below.

Federal Laws and Regulations

Clean Water Act

The U.S. Environmental Protection Agency (EPA) is the lead federal agency responsible for water quality management. The Clean Water Act (CWA) is the primary federal law that governs and authorizes water quality control activities by the EPA as well as the states. Various elements of the CWA address water quality. These are discussed below. Wetland protection elements of the CWA administered by the USACE are discussed in section 4.14, "Terrestrial Biology."

<u>Water Quality Criteria/Standards</u>

Pursuant to federal law, EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations (40 CFR). Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the act, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question and (2) criteria that protect the designated uses. Section 304(a) requires EPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use.

<u>National Toxics Rule and California Toxics Rule</u>

In 1992, EPA promulgated the National Toxics Rule (NTR) under the CWA to establish numeric criteria for priority toxic pollutants. The NTR established water quality standards for 42 pollutants for which Section 304(a) water quality criteria exists but that were not covered under California's statewide water quality regulations. As a result of the court-ordered revocation of California's statewide water quality control plans in September 1994, EPA initiated efforts to promulgate additional federal water quality standards for California. In May 2000, EPA issued the California Toxics Rule (CTR), which addresses all the priority pollutants for which EPA has issued Section 304(a) numeric criteria that were not included in the NTR. Section 304(a) numeric criteria are those CWA criteria, established by the EPA on a pollutant-by-pollutant basis, required to safeguard the chemical, physical, and biological integrity of a water body.

NPDES Permit Program

The National Pollutant Discharge Elimination System (NPDES) permit program was established in the CWA of 1972 to regulate municipal and industrial discharges to surface waters of the United States. The discharge of wastewater to surface waters is prohibited unless an NPDES permit issued by the applicable RWQCB allows that discharge. Each NPDES permit identifies effluent and receiving water limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge; prohibitions on discharges not specifically allowed under the permit; and provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring, and other activities.

More specifically, the discharge prohibitions and limitations in an NPDES permit would be designed to ensure the maintenance of public health and safety, protection of receiving water resources, and safeguarding of the designated beneficial uses. Discharge limitations typically define allowable effluent quantities for flow, biochemical oxygen demand (BOD), total suspended matter, residual chlorine, settleable matter, total coliform, oil and grease, pH, and toxic pollutants. Limitations also typically encompass narrative requirements regarding mineralization and toxicity to aquatic life. The provisions provide stipulations for the disposal of solid materials, limitations on effects caused to receiving waters, and other general requirements.

Table 4.8-1 presents waste discharge requirements for the Mountain House development, which is the most recently approved new surface water discharge in the area of the proposed project. (As noted previously, all exhibits and tables are compiled at the end of this section.)

The RWQCBs also use the NPDES program to regulate stormwater runoff. The system is implemented through the issuance of permits for certain construction and operational activities that could result in the generation of contaminants in stormwater runoff. NPDES permits require the implementation of design and operational best management practices (BMPs) to reduce the level of contaminant runoff. Types of BMPs include source controls, treatment controls, and site planning measures.

Section 401 Water Quality Certification/Waiver

Under Section 401 of the CWA, an applicant for a Section 404 permit (to discharge dredged or fill material into waters of the United States) must first obtain a certificate from the appropriate state agency stating that the fill is consistent with the state's water quality standards and criteria. In California, the authority to either grant water quality certification or waive the requirements is delegated by the SWRCB to the nine regional boards.

Pretreatment Requirements

Under the CWA, EPA was required to establish pretreatment standards to prevent the discharge into a Publicly Owned Treatment Works (POTW) of any pollutant that would interfere with, pass through untreated, or otherwise be incompatible with such treatment works. Each POTW capable of treating more than 5 million gallons per day (mgd) is required to develop and enforce specific local limits for discharges to the POTW. The development and implementation of local limits by POTWs is a federal requirement under the General Pretreatment Regulations of the Clean Water Act. EPA is responsible for enforcing the National Pretreatment Program at the federal level. At the state level in California, Pretreatment Program enforcement is the responsibility of the California RWQCBs.

Antidegradation Policy

The federal antidegradation policy has been in existence since 1968. The policy is designed to protect existing uses and water quality and national water resources. The federal policy directs states to adopt a statewide policy that includes the following primary provisions: (1) existing in-stream uses and the water quality necessary to protect those uses shall be maintained and protected; (2) where existing water quality is better than necessary to support fishing and swimming conditions, that quality shall be maintained and protected unless the state finds that allowing lower water quality is necessary for important local economic or social development; and (3) where high-quality waters constitute an outstanding national resource, such as waters of national and state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

Section 303(d) Impaired Waters List

Under Section 303(d) of the CWA, states are required to develop lists of water bodies that would not attain water quality objectives after implementation of required levels of treatment by point source dischargers (municipalities and industries). The most recent Section 303(d) list in California (1998) identifies Sacramento-San Joaquin River Delta waterways, the San Joaquin River, and the Stockton Deep Water Channel in nonattainment for a number of pollutants (Table 4.8-2).

Section 303(d) requires that the state develop a total maximum daily load (TMDL) for each of the listed pollutants. The TMDL is the amount of loading that the water body can receive and still be in compliance with water quality objectives. The TMDL is also a plan to reduce loading of a specific pollutant from various sources to achieve compliance with water quality objectives. The TMDL prepared by the state must include an allocation of allowable loadings to point and nonpoint sources, with consideration of background loadings and a margin of safety. The TMDL must also include an analysis that shows the linkage between loading reductions and the attainment of water quality objectives. EPA must either approve a TMDL prepared by the state or disapprove the state's TMDL and issue its own. NPDES permit limits for listed pollutants must be consistent with the waste load allocation prescribed in the TMDL. After implementation of the TMDL, it is anticipated that the problems that led to placement of a given pollutant on the Section 303(d) list would be remediated.

Currently, the Central Valley RWQCB (CVRWQCB) has initiated work on a TMDL to address low dissolved oxygen levels in the Stockton Deep Water Channel along with total dissolved solids (TDS) and mercury levels in fish in the Delta. A stakeholder process is being employed in each of these TMDL efforts to address technical, social, and economic issues. TMDLs for other listed pollutants are scheduled to be developed at various times over the next 13 years, in accordance with the priorities contained in the 1998 Section 303(d) list.

State Laws and Regulations

In California, the SWRCB has broad authority over water quality control issues for the state. The SWRCB is responsible for statewide water quality policy development and exercises the powers delegated to the state by the federal government under the CWA. Other state agencies with jurisdiction in water quality regulation in California include the California Department of Health Services (DHS) (drinking water regulations), the California Department of Pesticide Regulation, the California Department of Fish and Game (CDFG), and the Office of Environmental Health and Hazard Assessment.

Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs. The regional boards are required to formulate and adopt water quality control plans for all areas in the region and establish water quality objectives in the plans. The RWQCB responsible for the San Joaquin River and the Sacramento-San Joaquin River Delta is the CVRWQCB (Region 5), headquartered in Sacramento.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) is California's statutory authority for the protection of water quality. Under the act, the state must adopt water quality policies, plans, and objectives that protect the state's waters for the use and enjoyment of the people. The act sets forth the obligations of the RWQCBs pertaining to the adoption of water quality control plans (Basin Plans) and establishment of water quality objectives and authorizes the SWRCB and RWQCBs to issue and enforce permits containing waste discharge requirements. Basin Plans are the regional water quality control plans required by both the CWA and Porter-Cologne Act in which beneficial uses, water quality objectives, and implementation programs are established for each of the nine regions in California.

Statewide and Regional Water Quality Control Plans

Each RWQCB is required to implement the provisions of several statewide plans and policies related to water quality. Several of these are relevant to the proposed project and are discussed below. Regional Water Quality Control Plans are also required by the California Water Code (§13240).

Toxic Pollutants (Inland Surface Waters and Enclosed Bays and Estuaries Plan)

The SWRCB adopted its Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California in 2000. This state implementation policy has been approved by the Office of Administrative Law and has been submitted to EPA Region IX for review and approval. The state implementation policy outlines procedures for NPDES permitting for toxic pollutant objectives that have been adopted in Basin Plans, in the NTR, and in the CTR.

Temperature (Thermal Plan)

The Thermal Plan was adopted by the SWRCB in 1971, was revised in 1972, and is currently under review by the SWRCB. The plan restricts discharges of thermal waste or elevated temperature waste to waters of the state. Generally, the Thermal Plan prohibits elevated temperature waste discharges that would increase ambient temperatures by more than 1°F over more than 25% of the stream cross section and prohibits elevated temperature waste discharges that increase surface water temperatures by more than 4°F in any location.

WQCP for the San Francisco Bay/Sacramento-San Joaquin River Delta Estuary (Bay-Delta Plan)

The 1995 Bay-Delta Plan was described previously under "Surface Hydrology."

WQCP for the Sacramento-San Joaquin River Basins (Basin Plan)

The Sacramento-San Joaquin River Basins Plan (Basin Plan), adopted by the CVRWQCB in 1998, provides water quality objectives and standards for waters of the Sacramento River and San Joaquin River basins, including the Delta. The Basin Plan contains specific, numeric water quality objectives for a number of chemical constituents, including chloride and electrical conductivity. In addition, the Basin Plan and the 1995 Bay-Delta Plan contain specific numeric standards for Delta inflow and outflow. Water quality objectives for toxic pollutants in the Basin Plan applicable to Delta waters have been superseded by the federal water quality standards adopted in the CTR in May 2000.

Nondegradation Policy

In 1968, the SWRCB adopted the nondegradation policy, a policy aimed at maintaining high-quality waters in California. The nondegradation policy states that the disposal of wastes into state waters shall be regulated so as to achieve the highest water quality consistent with maximum benefit to the people of the state and so as to promote the peace, health, safety, and welfare of the people of the state. The policy prescribes the following:

a. Where the existing quality of water is better than required under existing water quality control plans, such quality would be maintained until it has been demonstrated that any change would be consistent with maximum benefit to the people of the state and would not unreasonably affect present and anticipated beneficial uses of such water.

b. Any activity which produces waste or increases the volume or concentration of waste and which discharges to existing high-quality waters would be required to meet waste discharge requirements which would ensure (1) pollution or nuisance would not occur and (2) the highest water quality consistent with the maximum benefit to the people of the state would be maintained.

Other Federal and State Water Quality Regulatory Considerations

Other federal regulations that embody water quality authority include the Coastal Zone Management Act, which regulates land and water uses (extending to inland shorelands) that may affect the quality of coastal waters and habitats; the Endangered Species Act (ESA), which protects species of fish, wildlife, and plants that are in danger of, or threatened with extinction; Essential Fish Habitat designations that are managed by NMFS; and the Safe Drinking Water Act (SDWA), which regulates contaminants of concern to domestic water supply. Additional state water quality regulations include Water Reclamation Requirements, which establish acceptable levels of constituents in recycled water to ensure protection of public health, and the State Drinking Water Program, under which DHS is responsible for implementing drinking water standards that are at least as stringent as those developed by EPA under the federal SDWA.

In addition, the CVP and SWP are currently responsible for maintaining water quality in the Delta to standards established by the SWRCB (see previous discussion under "Surface Hydrology"). Compliance with the standards is maintained, in part, by regulating the releases from CVP/SWP reservoirs upstream of the Delta. During certain months of certain years, a major portion of inflow to the Delta is affected by CVP/SWP regulation.

RECYCLED WASTEWATER REQUIREMENTS

Wastewater recycling in California is regulated under Title 22, Division 4, of the California Code of Regulations. The intent of these regulations is to ensure protection of public health associated with the use of recycled water. The regulations establish acceptable levels of constituents in recycled water for a range of uses and prescribe means for ensuring reliability in the production of recycled water. Use of recycled water for nonpotable uses is common throughout the state and is an effective means of maximizing use of water resources in water-short communities. DHS has jurisdiction over the distribution of recycled wastewater and the enforcement of Title 22 regulations. The RWQCB is responsible for issuing waste discharge requirements (including discharge prohibitions, monitoring, and reporting programs). The RWQCB is also responsible for user reuse requirements associated with the implementation of wastewater reclamation projects.

It is the intent of the proposed project to use recycled wastewater; therefore, project wastewater would need to be treated to standards set forth by Title 22 for unrestricted use. These standards are described in Table 4.8-3.

DRINKING WATER

Safe Drinking Water Act

As mandated by the SDWA (Public Law 93-523), passed in 1974, EPA regulates contaminants of concern to domestic water supply. Contaminants of concern relevant to domestic water supply are defined as those that pose a public health threat or that alter the aesthetic acceptability of the water. These types of contaminants are regulated by EPA primary and secondary Maximum Contaminant Levels (MCLs). MCLs and the process for setting these standards are reviewed triennially. Amendments to the SDWA enacted in 1986 established an accelerated schedule for setting drinking water MCLs.

EPA has delegated to the DHS the responsibility for California's drinking water program. DHS is accountable to EPA for program implementation and for adoption of standards and regulations that are at least as stringent as those developed by EPA.

Title 22 of the California Administrative Code (Article 16, Section 64449) defines secondary drinking water standards, which are established primarily for reasons of consumer acceptance (i.e., taste) rather than for health issues. For mineralization (i.e., TDS and chloride), the secondary standards are expressed in the form of recommended, upper, and short-term MCLs. The recommended, upper, and short-term MCLs for TDS are 500, 1,000, and 1,500 milligrams per liter (mg/l), respectively.

Disinfection/Disinfection By-Product Rule

EPA has proposed a Stage I Disinfection/Disinfection By-Product Rule that would lower the current maximum drinking water contaminant levels for total trihalomethanes (chloroform, bromodichloromethane, chlorodibromomethane, and bromoform) from 100 micrograms per liter (μg/l) to 80 μg/l and would establish new MCLs for haloacetic acids (60 μg/l) and bromate (10 μg/l). These requirements would limit (to varying degrees) the ability of water utilities to select treatment options.

BENEFICIAL USES OF RECEIVING WATERS

State and federal laws mandate the protection of designated "beneficial uses" of water bodies. Protecting and enhancing existing and potential beneficial uses are goals of water quality planning. Beneficial uses of the San Joaquin River and the Delta include, but are not limited to, municipal, industrial, and agricultural water supply; recreation; groundwater recharge; fresh water replenishment; and preservation and enhancement of fish, wildlife, and other aquatic resources provided by freshwater habitat. Each of these is discussed briefly below.

Municipal and Industrial Water Supplies

The San Joaquin River is not currently a source of municipal water supply for the City of Lathrop or for the proposed River Islands project, although some farms in the area use the river as a source of water for irrigation. The City currently uses groundwater only and plans to obtain municipal water supplies to serve future growth through a combination of additional groundwater and surface water from the South San Joaquin Irrigation District (SSJID) South County Surface Water Supply Project (SCSWSP), which does not rely on the San Joaquin River.

Diversions from the Delta for municipal water supplies are made by Antioch (at the Antioch Water Works), Contra Costa Water District (intakes at Rock and Mallard sloughs, and the intake for the Los Vaqueros Reservoir from Old River near State Route 4), the SWP's North and South Bay Aqueducts (at Barker Slough and Clifton Court Forebay, respectively), and the CVP's Delta-Mendota Canal (intake near Tracy). Current Delta diversions by SWP and CVP systems for municipal and industrial use are approximately 2.5 MAF per year.

Diversions for industrial uses are scattered throughout the San Joaquin River and Delta areas, with the major industrial diversions in the Pittsburg-Antioch area. A portion of the CVP and SWP diversions are also used for industrial purposes.

Agricultural Water Supply

Extensive use is made of San Joaquin River and Delta waters for agricultural purposes. Annual water diversions from the Delta by SWP and CVP for agriculture are estimated to reach 4.3 MAF per year by 2030. In addition to the state and federal water project diversions for agriculture outside of the San Joaquin River and Delta areas, there are about 2,000 privately owned diversions for agricultural water supply scattered throughout the Delta, including several within the project area. Most of the individual diversions are riverside pumping stations.

Recreation

Water-dependent recreation uses of the San Joaquin River and the Delta include swimming, wading, water-skiing, sport fishing, and a variety of other activities that involve contact with the water. Noncontact (water-enhanced) recreation uses include picnicking, camping, pleasure boating, hunting, bird watching, education, and aesthetic enjoyment.

Groundwater Recharge

Water from the San Joaquin River and the Delta recharges the San Joaquin Valley groundwater basin. Recharge serves to maintain soil column salt balance, prevent saltwater intrusion into freshwater aquifers, and provide for water supplies. Groundwater is replenished through deep percolation of streamflow, precipitation, and applied irrigation water. Groundwater quality is generally adequate throughout the San Joaquin Valley and the Delta, although at shallow depths within the Delta the water is often saline and contains high levels of TDS and dissolved minerals. Enforceable TDS standards do not exist for drinking water. The need for treatment generally depends on consumer acceptance.

Fish and Wildlife

The San Joaquin River and the waterways of the Delta provide important habitat to a diverse variety of aquatic life and terrestrial wildlife. This includes temporary habitat and migration routes for anadromous and other migratory species, as well as permanent habitat for resident species. Fish dependent on the Delta as a migration corridor, nursery, or permanent residence include Chinook salmon, steelhead, delta smelt, Sacramento splittail, striped bass, American shad, sturgeon, catfish, largemouth bass, and numerous other estuary and freshwater species. The amount and quality of water flowing through the Delta greatly influences the overall productivity of the area on an annual basis. A large assemblage of wildlife uses the Delta either seasonally or year round, including waterfowl; migratory and resident songbirds; mice, rabbits, and other small mammals; water-dependent mammals, such as beaver and muskrat; and predators such as skunk, raccoon, northern harrier, and coyote.

LOCAL POLICIES

One of the goals presented in the Lathrop General Plan (General Plan) includes providing for the reuse of wastewater and surface water so that there is no net increase in water pollution (Lathrop General Plan, Goal 10: Water Supply, Wastewater and Surface Water Management). Neither the General Plan nor the

West Lathrop Specific Plan (WLSP), however, identifies requirements or regulatory constraints pertaining to water quality and recycled water use beyond those outlined above.

The Infrastructure Element of the WLSP does provide guidance on the use and management of a central lake to store and treat stormwater.

4.8.2 EXISTING CONDITIONS

HYDROLOGY

General Surface Hydrology

Bay-Delta

The Delta is located between the Sacramento and San Joaquin rivers and extends inland from the confluence of the two rivers west of Antioch to Sacramento and south of Stockton (Exhibit 4.8-1). The Delta covers approximately 1,500 square miles, is interlaced with hundreds of miles of waterways, and includes flows from 19 tributary rivers (including the San Joaquin River). The Delta is clearly delineated by a legal boundary that extends from San Francisco Bay eastward to Sacramento in the northeast and the Mossdale area in the southwest. The River Islands project lies entirely within the legal boundary of the Delta.

The Sacramento River contributes roughly 75-80% of the Delta inflow in most years, while the San Joaquin River contributes about 10-15%. The minor flows of the Mokelumne, Cosumnes, and Calaveras rivers, which enter into the eastern side of the Delta, contribute the remainder. The rivers flow through the Delta and into Suisun Bay, San Pablo Bay, San Francisco Bay, and the Pacific Ocean. Historical annual Delta inflow has averaged approximately 23 MAF from 1945 to 1995, with a minimum inflow of approximately 6 MAF in 1977 and a maximum of approximately 70 MAF in 1983.

The Delta contains roughly 1,000 miles of channels; 1,100 miles of levees; and approximately 70 "islands," or tracts of land. Delta channels are generally less than 20 feet deep, unless dredged, and vary in width from less than 100 feet to over 1 mile. Some channels are edged with aquatic and riparian vegetation, but most are bordered by steep banks of mud or riprapped levees. Vegetation is generally removed from channel margins to increase floodflow capacity and facilitate levee maintenance.

Hydraulics of this estuarine system are complex. Freshwater inflows to the Delta vary greatly depending on precipitation, snowmelt, and CVP and SWP operations. During the summer months, most of the inflow to the Delta comes from regulated releases from SWP and CVP reservoirs. Both of these projects withdraw significant volumes of water from the Delta for agricultural and urban use.

Tidal influences are combined with freshwater outflow, resulting in flow patterns that vary daily. Tidal changes strongly influence Delta channel conditions by changing water surface elevation, current velocity, and flow direction twice daily. The average tidal flow at Chipps Island in the western Delta, ebb or flood, is approximately 170,000 cubic feet per second (cfs). The average tidal flow farther inland at the entrance to Clifton Court Forebay averages about 7,700 cfs. Delta hydraulics are further complicated by a multitude of agricultural, industrial, and municipal diversions for use within the Delta itself and by CVP and SWP for exports (EDAW 1998).

The proposed project is located in an area identified as the South Delta. Major channels and waterways in the South Delta include the San Joaquin River, Old River, Paradise Cut (all adjacent to the River Islands project), Middle River, Grant Line Canal, as well as numerous other canals and sloughs. The CVP and SWP export facilities are located within the Clifton Court Forebay in the South Delta.

Water conditions in the South Delta area are influenced in varying degrees by natural tidal fluctuation, San Joaquin River flow and quality, local agricultural drainage water, CVP and SWP export pumping, local diversions, and channel capacity. These factors affect water levels and availability at some local diversion points. When the CVP, SWP, and local farmers divert water, flows in local channels, many of which are shallow and dead-end, can converge, creating "null zones." A null zone is a reach of a channel where flow is essentially stagnant, due to poor water circulation patterns. Shallow and narrow channels restrict the flow and volume of water supply for agricultural diversions, which can be aggravated by SWP and CVP export pumping, especially at low tides.

San Joaquin River

The San Joaquin River basin is bounded on the west by the Coast Ranges and on the east by the Sierra Nevada. The San Joaquin River itself is 330 miles in length and drains a watershed area of 13,540 square miles from the Sierra Nevada to the Sacramento-San Joaquin River Delta. Major tributaries flowing into the San Joaquin River include the Stanislaus, Merced, and Tuolumne rivers. The River Islands project is located toward the northern end of the San Joaquin River in the South Delta.

Hydrologic conditions in the San Joaquin River Basin are dominated by snowmelt from the Sierra Nevada. Before completion of major water storage projects on the San Joaquin River and its major tributaries, lower San Joaquin River flows generally peaked in late spring/early summer and dropped to low levels in the fall. Since the completion of Friant Dam (1944), McClure Reservoir (1967 on the Merced River), Don Pedro Reservoir (1971 on the Tuolumne River), and New Melones Reservoir (1979 on the Stanislaus River), the lower San Joaquin River seasonal flow pattern has been significantly altered. Before 1944, (based on the 1923-1944 period of record), the lower San Joaquin River flow tended to peak in May and June with an average monthly flow of almost 11,000 cfs and declined rapidly to an average monthly flow of approximately 1,200-1,300 cfs in August and September. Since 1979, the average monthly flow has peaked in March at just over 10,000 cfs with a more gradual decline to approximately 2,400 cfs in August.

Old River

Varying levels of San Joaquin River water consistently flow into Old River near Mossdale. During periods of low San Joaquin River flow (less than 2,000 cfs), a large proportion of this flow is diverted into the Old River channel. This can be problematic for fish passage through the San Joaquin River and South Delta because fish are diverted into Old River and may ultimately suffer entrainment in SWP and

CVP water diversion pumps or increased predation. Low San Joaquin River flows have also caused problems for water levels and circulation. To alleviate some of these problems, the DWR has initiated a program to prevent low-flow water from entering Old River during crucial fish migration periods. The South Delta Temporary Barriers Project, initiated as a test project in 1991, consists of four rock barriers across South Delta channels (Exhibit 4.8-2). Barriers have been installed at these locations to improve water levels, water circulation, and migration conditions for San Joaquin River salmon.

The "Head of Old River" barrier is located adjacent to the River Islands project at the confluence of the San Joaquin River and Old River (Exhibit 4.8-2). This barrier is installed twice each year, once in the spring and again in the fall. The spring barrier has been in place from April 15 to May 30 during about half of the past 10 years. For most years since 1963, the fall barrier has been in place between September 15 and November 30. The barrier's purpose in fall is to improve dissolved oxygen levels in the San Joaquin River between the Head of Old River and Medford Island and to aid adult salmon migration in the San Joaquin River. The barrier's purpose in spring is to reduce the loss of outmigrating San Joaquin fall-run chinook salmon smolts by significantly decreasing their diversion down Old River, consequently reducing their entrainment at the SWP and CVP pumps.

When all four barriers associated with the temporary barriers project are installed, they substantially alter water circulation patterns, especially in Old River. During these times, incoming tide is impounded between the Head of Old River barrier and the upstream channels of the remaining three barriers. During times when all but the Head of Old River barrier is operating, net tidal flow tends to move upstream, out Old River at the Head of Old River and down the San Joaquin River.

Paradise Cut

Paradise Cut is a flood control bypass connecting the San Joaquin River and Old River. There are several canals in the cut, with the main canal consisting of a small historic slough channel. The channel flows along the south side of the Stewart Tract, extending from the San Joaquin River to Old River, but is separated from the San Joaquin River by a low rock weir. It can be considered to be a dead-end slough and connects primarily to Old River except during high San Joaquin River flows. When the San Joaquin River flow exceeds 18,000 cfs, the river overflows the Paradise Weir into Paradise Cut. Typically, the only non-flood flow in Paradise Cut results from tidal inflow via Old River, agricultural discharges from adjacent properties, and treated wastewater from Deuel Vocational Institution.

Delta Water Use

The Sacramento-San Joaquin River Delta is the hub of California's major state and federal water development facilities and numerous local water supply projects. Water projects divert water from Delta channels to meet the needs of about two-thirds of the state's population and to irrigate 4.5 million acres. During normal water years, approximately 10% of the water reaching the Delta would be withdrawn for local use, 30% would be withdrawn for CVP and SWP export, 20% would be needed for Delta salinity control, and the remaining 40% would become Delta outflow in excess of minimum requirements. The excess outflow would occur almost entirely during the winter and spring runoff season (SWRCB 1999).

The CVP is a federal water supply, flood control, and power generation project operated by the U.S. Bureau of Reclamation (USBR). It is the largest water storage and delivery system in California. The CVP supplies water to more than 250 long-term water contractors whose contracts total 9.3 MAF per year. Much of this water is diverted at the Tracy Pumping Plant in the South Delta and exported south, primarily for agricultural uses.

Like the CVP, the SWP stores runoff from within the Sacramento Valley basin, releases stored water to the Sacramento River and the Delta, and pumps water out of the Delta for delivery to water users in the Bay Area, the San Joaquin Valley, and southern California. The SWP delivers water to 29 long-term contractors, including over 2 MAF to Metropolitan Water District of southern California. In the South Delta, water is diverted into Clifton Court Forebay, then pumped at the Harvey O. Banks Delta Pumping Plant into the California Aqueduct.

The combined pumping of the SWP and CVP in close proximity in the South Delta can have substantial hydraulic effects throughout the Delta because of the large volume of pumping that can occur relative to overall Delta inflows and outflows. Operation of the CVP and SWP Delta export facilities are coordinated to meet water quality and flow standards set by the SWRCB, the U.S. Army Corps of Engineers (USACE), and more recently by federal and state fisheries agencies (USFWS, NMFS, and CDFG).

Delta agricultural water users typically divert directly from the channels near their cropland, using more than 1,800 unscreened pumps and siphons, which vary from 4 to 30 inches in diameter, and with flow rates up to about 200 cfs. These local diversions vary between 2,500 and 5,000 cfs during April through August, with maximum rates in July (SWRCB 1999).

Groundwater Hydrology

The groundwater basin in the Lathrop area is part of the Sacramento-San Joaquin River Delta subregion, a part of the Central Valley aquifer system. Most of the fresh groundwater is unconfined and at depths of less than 2,500 feet. Several hydrologic formations underlie the Lathrop area; however, only the top two, the Victor and the Laguna formations, are currently being used as a source of fresh water. The Victor formation, the uppermost formation, extends from the ground surface to a maximum depth of approximately 150 feet. The underlying Laguna formation is hydrologically connected to the Victor formation and is estimated to be 75–1,000 feet thick. Most of the municipal and industrial wells in the Lathrop area penetrate through the Victor formation into the Laguna formation (EDAW 2001).

The groundwater surface in the Lathrop area generally slopes from south to north. In 1997, groundwater elevations in Lathrop ranged from -14 to +10 feet National Geodetic Vertical Datum (NGVD), respectively, with an average of 0 foot NGVD. The groundwater elevation in the fall, after the high-use summer months, averages approximately 3 feet lower than during the spring. Between 1993 and 1999, there were several years of above-average precipitation, and over this 6-year period groundwater in the Lathrop area increased approximately 4 feet in elevation (EDAW 2001). Groundwater wells located on the River Islands project site indicate that groundwater levels range from approximately 2 feet to 14 feet below the ground surface.

During periods of high flow in Delta waterways, the rising groundwater table, along with some seepage through the levees, can cause soils in the low-lying portions of Delta islands to become saturated. This is especially true in the central portion of the Delta, where the soils contain large amounts of peat. In those islands that are below sea level, water is regularly pumped from a depth of 2-3 feet below ground level to keep the land from flooding. Seepage rates and dewatering costs increase as the elevation difference between the channel surface and island interior increases. The ground elevation in the River Islands Development Area (RID Area) ranges from 0 to +5 feet NGVD. Based on existing pumping records, seepage processes are relatively slow in the compacted sandy soils surrounding this area and do not respond measurably to short-term fluctuations in channel flow.

Stewart Tract soils are sandy as a result of the change in gradient of the San Joaquin River from a steeper river associated with drainages of the Sierra Nevada to a flatter river associated with tidally influenced flows typical of the South Delta. That change in gradient has subjected the area to a pattern of deposition whereby sediment entrained in the San Joaquin River flows settles out as the river flattens, resulting in sandy soils in the Stewart Tract area, rather than the clay and peat soils encountered on many Delta islands. Because of the permeability of sandy soils, Stewart Tract is subject to greater overall fluctuations in groundwater elevations (from sources other than levee seepage) than Delta islands with clay and peat soils.

Site-Specific Delta Hydrology

Existing Water Diversions to the RID Area

Twelve existing intake pumps can be used to pump water into the RID Area for agricultural use (Exhibit 4.8-3). Water is pumped, however, primarily from four separate locations: Intake Pumps 9, 10, 12, and 12a. Water is generally pumped at the same volume from each of these locations. From these pumps, the irrigation water is delivered to areas of the property through an irrigation system composed of pipes and open ditches. None of these existing pump stations are metered, and furrow irrigation is the primary irrigation practice on the tract. Excess irrigation water and drain water are collected in an open ditch drain system. Some of the drain water is reused; the remainder continues through the drainage system to the southwestern corner of the property, where it is pumped into Paradise Cut.

Due to the lack of pumping data, agricultural water use on the project site was estimated based on the consumptive use of the crops that were planted over the past 18 years. Specific methods for calculating agricultural water use are presented in Appendix E.

Based on equations presented in Appendix E, the average annual pumping volume into the RID Area ranged between approximately 10,400 and 16,600 af per year, with the mean annual pumped volume of 13,696 af (Table 4.8-4). Exhibit 4.8-4 is a plot of the estimated annual pumping volume for the 1984-2000 water years. Table 4.8-5 and Exhibit 4.8-5 present the mean monthly distribution of the Delta diversions to the RID Area. Mean monthly diversions are lowest during October through February and highest during March through September. Irrigation pumping volumes are generally inversely proportional to precipitation; pumping volumes are higher in years with low precipitation and lower in years with high precipitation (Exhibit 4.8-4).

Existing Water Discharges from the RID Area

Agricultural drain water, excess irrigation water, and excess precipitation are collected in the RID Area agricultural drain system. The central drainage ditch serving the entire RID Area is shown on Exhibit 4.8-3. Water from the drain system is pumped into Paradise Cut at a pumping station at the southwest end of the RID Area. This pump station consists of three pumps: a 24-inch 50-hp pump that is activated by an automatic float level in the drain canal and two 16-inch 25-hp pumps that are manually activated when required. There are other drain pumps within Stewart Tract, but only the three located at the discharge pump station are used on a regular basis.

There are no records kept for the amount of water pumped from Stewart Tract. To estimate the monthly volume, electrical records were obtained from Pacific Gas and Electric Company (PG&E). These electrical records provided information on the amount of energy that was used by all three pumps. Appendix E, presents the methods used to determine the quantity of water discharged from the RID Area.

Table 4.8-6 and Exhibit 4.8-6 provide the estimated annual drain pump discharge into Paradise Cut between 1990 and 2000. The peak year was 1996 with a volume of 11,341 af, and the lowest year was 1991 with 7,300 af pumped. The mean annual discharge pumped from the RID Area is 8,712 af per year. Table 4.8-7 and Exhibit 4.8-7 provide the mean monthly pumped volume based on the monthly electrical data. The monthly pumping rate ranges from 1,588 af in July to 156 af in December, with the mean monthly pumped discharge of 721 af. More than half of the water volume diverted onto the RID Area is discharged from the RID Area.

Flood Hydrology

Stewart Tract (and the RID Area) is surrounded by the San Joaquin River on the north and east, Old River on the north, and Paradise Cut on the south. Paradise Cut is a bypass channel designed to divert excess waters from the San Joaquin River during flood events, thereby reducing downstream flood levels on the San Joaquin. The flow in Paradise Cut joins the flow in Old River at the west end of Stewart Tract. The Paradise Weir, which separates Paradise Cut from the San Joaquin River, has a crest elevation of approximately 13 feet NGVD that prevents water from entering Paradise Cut until the flow in the San Joaquin River exceeds approximately 18,000 cfs. This flow has an AEP of approximately 1 in 4. Table 4.8-8 summarizes the number of days in the most recent historical record on which flows were expected to flow across Paradise Weir (e.g., San Joaquin River flows exceeded 18,000 cfs). The review was limited to the period since 1979, when the last significant flood control project in the San Joaquin River Basin, New Melones Reservoir, was completed.

The San Joaquin River Basin is subjected to two types of floods: those attributable to prolonged rainstorms during the late fall and winter and those attributable to snowpack melting in the Sierra Nevada during the spring and early summer, particularly during years of heavy snowfall. Major problem areas include the lower San Joaquin River in the project region, where flood flows regularly exceed channel capacities. The potential for flooding under conditions of a 1-in-100-AEP-intensity event is high for Stewart Tract. Historic levee breaks on Stewart Tract occurred in 1938, 1950, and 1997. The 1950 failure was located just north of Paradise Weir, at the juncture of Paradise Cut and the San Joaquin River.

This failure caused the eastern part of Stewart Tract to become flooded to the western Union Pacific Railroad (UPRR) (formerly Southern Pacific Railroad [SPRR]) embankment. In time, the railroad embankment also failed, which led to flooding in the rest of Stewart Tract. In 1997, flooding again occurred when the Paradise Cut levee failed just upstream of the eastern UPRR bridge. The floodwaters entered the eastern portion of Stewart Tract and were retained by the western UPRR embankment until it failed, allowing the floodwaters to pass onto the rest of the island.

The design flow in the San Joaquin River between Vernalis and Paradise Cut used in the design of the federal project levees in this reach was 52,000 cfs, which at the time (1955) was thought to represent an approximately 1-in-50 AEP. The U.S. Geological Survey (USGS) estimated that the instantaneous peak flow at the Vernalis gage in the January 1997 flood event, the most recent flood event, was 75,600 cfs, with a peak mean daily flow of 54,300 cfs. As stated above, numerous levee failures occurred in the project region during this event, including one on Stewart Tract; however, no levee failures occurred in the RID Area. Exhibit 4.8-8 shows recent (2001) estimated San Joaquin River flows near Vernalis during projected 1-in-10-, 1-in-50-, 1-in-100-, and 1-in-200-AEP flood flows.

Since the January 1997 flood, the USACE and the Reclamation Board began work on the Sacramento and San Joaquin River Basins Comprehensive Study, which was authorized by the U.S. Congress and the California Legislature (see previous discussion in the "Flood Control/Drainage" portion of section 4.8.1, "Regulatory Background"). As part of the study, the USACE performed a new hydrologic analysis of the San Joaquin River basin and developed probability-of-failure curves for the levees in the basin. Exhibit 4.8-9 shows the probability of failure curve that was developed for all of the levees within the River Islands study area. This curve indicates that there is a 100% probability of levee failure when the river stage is 3 feet below the top of the levee.

Additional detail on existing flood hydrology conditions is contained in Appendix I.

WATER QUALITY

Much of the general water quality information presented herein was drawn from data included in the City of Lathrop's Environmental Impact Report for the Lathrop Water, Wastewater, and Recycled Water Master Plan (EDAW 2001) and the SWRCB's 1995 Bay-Delta Water Quality Control Plan (SWRCB 1999). Site-specific information presented herein is based on technical water quality analyses prepared by HSI Hydrologic Systems specifically for the River Islands project (Appendices E, F, G, and H).

General Delta Water Quality

The water quality of the lower San Joaquin River drainage and the Delta has been substantially affected by human activities. The existing water quality problems of the Delta may be generally placed in the categories of toxic materials, suspended sediments and turbidity, eutrophication and associated dissolved oxygen fluctuations, salinity, and bacteria. Each of these broad categories is discussed briefly below.

Toxic Chemicals

Toxic chemicals have impaired water quality in many Delta waterways. High concentrations of some metals from point and nonpoint sources appear to be ubiquitous in the Delta. Tissues from fish taken throughout the Delta exceed the National Academy of Sciences/Food and Drug Administration guidelines for mercury. There is currently a health advisory in effect for mercury in striped bass. High levels of other metals (i.e., copper, cadmium, and lead) in Delta waters are also of concern. Also, in localized areas of the Delta (e.g., near Antioch and in Mormon Slough), fish tissues contain elevated levels of dioxin as a result of industrial discharges (SWRCB 1999).

Pesticides are found throughout the waters and bottom sediments of the Delta. High levels of chlordane, toxaphene, and DDT from agricultural discharges impair aquatic life throughout the Delta, while diazinon can be found in elevated concentrations at various locations. The more persistent chlorinated hydrocarbon pesticides are consistently found throughout the system at higher levels than the less persistent organophosphate compounds. The sediments having the highest pesticide content are found in the western Delta. Pesticides have concentrated in aquatic life in the Delta, and the long-term effects are unknown. The effects of intermittent exposure of toxic pesticide levels in water and of long-term exposure to these compounds and combinations of them are likewise unknown (SWRCB 1999).

Suspended Sediments

Suspended sediments (silts, clays, and organic matter) are abundant in the Delta and cause turbidity throughout the region. Most of these sediments enter the tidal system with the flow of the major tributary rivers. Some enriched areas are turbid as a result of planktonic algal populations, but inorganic turbidity tends to suppress nuisance algal populations in much of the Delta. Continuous dredging operations to maintain deep channels for shipping have contributed to turbidity problems and are a factor in the temporary destruction of bottom organisms through displacement and suffocation (SWRCB 1999).

Eutrophication and Dissolved Oxygen

The most serious enrichment problems in the Delta (which can lead to eutrophication and low dissolved oxygen) are found along the lower San Joaquin River near Stockton and in certain localized areas receiving waste discharges but having little or no net freshwater flow. Low dissolved oxygen levels result in these areas mainly in late summer and coincide with low river flows and high temperatures. Dissolved oxygen problems can be further aggravated by channel deepening for navigational purposes. The resulting depressed dissolved oxygen levels have not been sufficient to support fish life and, therefore, prevent fish from moving through the area. In autumn, these conditions, together with reversal of natural flow patterns by CVP/SWP export pumping, have created environmental conditions unsuitable for the passage of anadromous fish (chinook salmon) from the Delta to spawning areas in the San Joaquin Valley. Flow augmentation in the San Joaquin River in the vicinity of Stockton would occur if South Delta channel barriers are constructed by DWR as part of the Interim South Delta Program (SWRCB 1999).

Warm, shallow, dead-end sloughs of the eastern Delta support populations of planktonic blue-green algae during summer months. Floating and semi-attached aquatic plants, such as water primrose and water hyacinths, frequently clog waterways in the lower San Joaquin River system during the summer. Extensive growths of these plants have also been observed in other Delta waterways. These plants interfere with the passage of small boat traffic and contribute to the total organic load in the Bay/Delta system (SWRCB 1999).

Salinity

Localized salinity problems may occur when local diversions in shallow, low-capacity channels exceed flows through the channel. When this happens, water stops flowing out of the channel or begins to flow into the channel from both ends. At the same time, drainage return flows continue to be discharged to the channels. These discharges do not move downstream and out of the area but instead become trapped in "null zones" of zero net flow. The lack of circulation prevents better quality water otherwise available from the main channels from freshening the increasingly saline water in the shallow channel, even in wet years. Null zones in the Delta exist predominantly in three areas: in the San Joaquin River between the head of Old River and the City of Stockton, in Old River between Sugar Cut and the CVP intake, and in Middle River between Old River and Victoria Canal (SWRCB 1999).

Reduced tidal influence contributes to broader scale surface water quality problems (including salinity) in the Delta. Previous reclamation of tidal wetlands and construction of levees in areas such as the eastern Delta have inhibited tidal exchange. Historically, larger volumes of water were exchanged twice daily with adjacent tidal wetlands, and the resulting flows helped keep channels open and reduced the risk of water quality problems (SWRCB 1999).

Broad-scale salinity control is necessary in the Delta region because the Delta is contiguous with the ocean, and its channels are at or below sea level. Unless repelled by continuous seaward flow of fresh water, seawater would advance up the estuary into the Delta and degrade water quality. During winter and early spring, flows through the Delta are usually above the minimum required to control salinity. At least for a few months in summer and fall of most years, however, salinity must be carefully monitored and controlled. The monitoring and control are provided by the CVP and SWP and regulated by the SWRCB under its water rights authority (SWRCB 1999).

At present, salinity problems occur mainly during years of below-normal runoff. In the eastern Delta, these problems are largely associated with the high concentrations of salts carried by the San Joaquin River into the Delta. Operation of the CVP/SWP export pumping plants near Tracy draws high-quality Sacramento River water across the Delta and restricts the low-quality area to the southeast corner. Salinity problems in the western Delta result primarily from the incursion of saline water from the San Francisco Bay when freshwater inflow from the Delta to the bay is low (SWRCB 1999).

Bacteria

The bacteriological quality of Delta waters, as measured by the presence of coliform bacteria, varies depending upon proximity of waste discharges and significant land runoff. The highest concentrations of coliform organisms are generally found in the western Delta. However, in other areas, high concentrations often can be found in the vicinity of major municipal waste discharges.

Another water quality concern related to bacteria is the presence of disinfecting byproducts in the Delta. Delta water contains precursors of trihalomethanes (THMs), which are suspected carcinogens produced when chlorine used for disinfecting reacts with natural substances during the water treatment process.

General Delta Water Quality Monitoring Programs

The need for action to correct water quality problems in the Delta arises from recognition that water quality impairment negatively affects, or has the potential to negatively affect, a number of beneficial uses of these waters. Section 303(d) of the Clean Water Act (CWA) requires states to identify and list water bodies with impaired quality with respect to supporting beneficial uses. Through this process, the San Joaquin River and various Delta waterways have been listed as impaired due to a variety of pollutants and stressors.

Long-term, comprehensive surface water quality evaluations of water bodies adjacent to the proposed project site (San Joaquin River, Old River, and Paradise Cut) are limited. Major monitoring programs include the California Department of Water Resources (DWR) Municipal Water Quality Investigations (MWQI) Program and the DWR D-1485 Water Quality Monitoring Program. The City of Stockton also monitors ambient water quality in the San Joaquin River to assess potential impacts associated with discharges from its wastewater treatment plant. Included in the Master Plan EIR (EDAW 2001) is a summary of sampling locations and compliance records from seven water quality monitoring sites in the vicinity of the project site for the period 1990-2000 (Table 4.8-9, Exhibit 4.8-10, Table 4.8-10) (Nolte Associates 2001). As seen in Table 4.8-10, compliance with water quality criteria is not always met for most water quality parameters. General information on water quality parameters listed in Table 4.8-10, as well as on trace organic compounds, is further described below, based on sampling results from these monitoring programs (EDAW 2002).

Total Dissolved Solids

The salinity of surface waters is often measured by the concentration of total dissolved solids (TDS) measured in milligrams per liter (mg/l). The analysis of existing TDS data shows that median TDS concentrations are greater during critical (drought) water years than during wet/above-normal water years. Median TDS concentrations were higher in the mainstem San Joaquin River at Vernalis (530-560 mg/l) than in southwestern Delta locations (320-380 mg/l) during critical dry years. During wet/above-normal water years, TDS concentrations in the mainstem San Joaquin River and the southwestern Delta were similar (180–200 mg/l). No primary water quality criterion currently exists for TDS, although the secondary criterion is 500 mg/l. Electrical conductivity is commonly used as a surrogate parameter upon which to evaluate TDS. A comparison of electrical conductivity to its relevant regulatory standard is provided in Table 4.8-10 and discussed below.

Total Organic Carbon and Dissolved Organic Carbon

Organic carbon (in both its total and dissolved forms) in surface waters acts as a precursor to the formation of unwanted chemical byproducts (called disinfection byproducts) resulting from chlorination during the drinking water disinfection process. Organic carbon was measured as both total organic carbon (TOC) and dissolved organic carbon (DOC) at three of the seven monitoring sites listed in Table 4.8-9: two in the San Joaquin River and one in Old River (deeper in the Delta). In general, TOC and DOC levels appear to be similar in the San Joaquin River (2.8 to 3.0 mg/l) and the Old River (3.1 to 3.2 mg/l) monitoring locations during wet/above-normal water years.

DOC concentrations during critical water years also showed little difference between levels found in the San Joaquin River (3.3 to 3.4 mg/l) and the Old River/Delta (3.4 to 3.7 mg/l). As expected, organic compound concentrations were greater at all sites during critical dry water years than during wet/above-normal water years.

The RWQCB has not adopted water quality objectives for TOC/DOC in the Basin Plan. To date, no findings have been made by the RWQCB that ambient organic carbon concentrations in the Delta are causing or contributing to an impairment of beneficial uses. However, TOC and DOC concentrations are commonly compared to the 2-mg/l and 4-mg/l treatment thresholds of the Disinfection/Disinfection Byproduct (D/DBP) Rule of the federal Safe Drinking Water Act, which are health-based standards applied at the intakes to drinking water treatment plants. These thresholds are to be applied at raw water intakes and are levels above which additional treatment may (but not necessarily would) be required by the DHS. In comparing the TOC and DOC data with the D/DBP Rule, essentially all monitoring sites exceed the 2-mg/l treatment threshold criterion, while a number of maximum data points exceed the 4-mg/l threshold for TOC.

Fecal Coliform and Pathogens

Fecal coliform bacteria are used as an indicator of the presence of human pathogens in water. Monitoring data typically measure coliform concentrations in Most Probable Number (MPN) per 100 milliliters (ml). MPN is a measure based on a test of whether coliform bacteria is present. The test has two components: (1) determining whether the coliform organism is present (the presumptive test), and (2) if present, then growing the organism and estimating the concentrations of the organism (the confirmed test). The MPN test is based on statistical analysis of the number of positive and negative results obtained by testing multiple samples of equal volume for the presence of coliform. The MPN is not an absolute concentration of organisms that are present, but rather a statistical estimate of the concentration.

Monitoring data show that fecal coliform concentrations decrease in the downstream direction in the San Joaquin River and into the Delta. Median concentrations range from 192 MPN per 100 ml at Vernalis, decreasing to 128 MPN per 100 ml at Mossdale. Fecal coliform levels in the Delta (Old River near Byron) were 12-24 MPN per 100 ml. This is consistent with the frequency of compliance results shown in Table 4.8-10 with the percentage of compliance ranging from 55.5% in the San Joaquin River near Vernalis to 90.9% at Old River near Byron. Although monitoring data for the pathogens Giardia and

Cryptosporidium are insufficient to allow summary statistics, all data collected in the San Joaquin River (Vernalis) for these pathogens were below the laboratory detection limits of 10 cysts per 100 liters.

Dissolved Oxygen

Dissolved oxygen (DO) levels must be maintained above specified levels to protect aquatic life beneficial uses. The Basin Plan specifies that the DO concentration for the San Joaquin River and the Delta shall not be reduced below 5 mg/l, and in the lower San Joaquin River, within the Stockton Deep Water Ship Channel, the DO concentration shall not be reduced below 6 mg/l from September 1 through November 30 (Table 4.8-10).

Monitoring data show that DO concentrations regularly fall below the 5-mg/l and 6-mg/l standards in the San Joaquin River near Stockton. Low or negative streamflow past Stockton due to tidal influences reduces dilution and mixing, which reduces re-aeration of the water. Oxygen depletion in the San Joaquin River and other water bodies in the Central Valley is typically highest in late summer and fall, when high water temperature reduces the oxygen-carrying capacity of the water. These low DO concentrations are called an "oxygen sag" and may act as a barrier to upstream migration of adult San Joaquin fall-run chinook salmon in the San Joaquin River.

In 1998, the RWQCB adopted a revised 303(d) list that identified low DO levels in the lower San Joaquin River as a high-priority problem and committed to developing a waste load allocation or TMDL by 2011 that achieves the DO objectives of the lower San Joaquin River as established in the Basin Plan.

An analysis of DO data collected during critical water years revealed DO concentrations in the upper San Joaquin River (9.0 to 10.0 mg/l) that were higher than those in the Delta (7.6 to 8.1 mg/l). This same general pattern of upper San Joaquin River DO concentrations being greater than southwestern Delta concentrations was also observed during wet/above-normal water years. Unlike TDS and DOC, DO concentrations during critical dry water years were not dissimilar from DO concentrations collected during wet water years.

Monitoring data for DO show near total compliance with the Basin Plan DO objectives (minimum of 5 mg/l) in the San Joaquin River upstream of the Stockton Deep Water Ship Channel (Table 4.8-10). Minimum levels in this reach range from 4.2 to 6.9 mg/l. Similar compliance with objectives is found in the Delta (Old River near Byron).

Electrical Conductivity

Electrical conductivity (EC) is a measurement of the ionic activity of water and is positively correlated with total dissolved solids (TDS) concentrations in water. EC is typically measured as micromhos per centimeter (μmhos/cm). The unit μmhos/cm is a measurement of the ability of water to carry an electrical current and varies according to the number and type of ions in the water (the higher the ions and corresponding salts, the higher the EC). For Delta waters, 1 EC unit is considered equivalent to 0.64 part per million (ppm) of dissolved solids. Discharges from agriculture, wetlands, mines, industries, and urban areas contribute TDS, and therefore EC, to the San Joaquin River and the Sacramento-San Joaquin

River Delta. Seasonal and site-specific objectives for EC are routinely exceeded in the San Joaquin River near Vernalis and at Mossdale Bridge (Table 4.8-10), whereas desired standards are typically met at the other monitoring locations. As with TDS, specific conductance values are greater during critical (dry) water years than wet/above-normal water years.

pH

The measurement of pH indicates the concentration of hydrogen ions in solution and expresses the intensity of an acid. Neutral pH has a value of 7.0, with lower values indicating greater acidity and higher values indicating basic conditions. Aquatic life may begin to be adversely affected by pH values that are less than 6.5 or greater than 8.5. In natural waters, pH levels are influenced by both the photosynthesis of algae and aquatic plants and the respiration of plants, animals, and bacteria.

In an effort to limit the exposure of aquatic organisms to potentially harmful pH levels, the RWQCB has established a Basin Plan pH range criteria from 6.5 to 8.5 pH standard units (Table 4.8-10). An analysis of critical water year pH data revealed that median pH levels in the main stem San Joaquin River ranged from 7.9 to 8.1 pH units. Slightly lower pH was observed in the Delta (Old River near Byron) (7.6 to 7.7 pH units). During wet/normal water years, pH values are lower than in critical water years and in general are similar in the San Joaquin River and the Delta. Intense algal growth or eutrophication can affect pH. During the process of photosynthesis, algal growth in shallow areas can elevate pH levels. Compliance with the Basin Plan pH objective ranged from 90% to 100% of the time at all monitoring sites.

Temperature

Ambient water temperatures have a clear influence on the aquatic species composition of a water body. Separate beneficial uses are designated in the Basin Plan for warm water uses and cold water uses. The Lower San Joaquin and Delta waterways are classified as supporting warm water fisheries, although efforts are underway to improve the San Joaquin River as a migration corridor for various endangered species that favor cold water conditions.

Specific numeric Basin Plan objectives have not been adopted for temperature in the San Joaquin River or the Delta (Table 4.8-10). Median water temperatures collected during critical water years showed the mainstem San Joaquin River to be at least 1-3 degrees centigrade cooler than median temperatures calculated for the Delta. Data generally suggest that temperatures increase in the downstream direction in the San Joaquin River. As expected, median temperatures appear to be generally higher during critical (dry) water years, when there is less water in the river, than during wet/above-normal water years. At the San Joaquin River at Mossdale Bridge monitoring site (the site closest to the proposed project), monthly average temperatures range from 49°F in December to 76°F in July.

Ammonia

The distribution of ammonia in fresh waters is highly variable regionally, seasonally, and spatially within rivers and lakes and depends upon the level of productivity of the water body and the extent of inputs from organic matter. At high concentrations for short periods (i.e., hours), ammonia may be acutely toxic.

Lower concentrations may also cause chronic (long-term) effects if the period of exposure is sufficiently long (weeks or months). Ammonia toxicity also varies with pH, and EPA standards for ammonia concentrations follow a sliding scale based on pH.

Monitoring data indicate that ammonia concentrations at the seven monitoring sites analyzed (Table 4.8-9) are below levels that would cause either acute or chronic toxicity. These sites have a 100% frequency of compliance with EPA standards (Table 4.8-10). Maximum observed ammonia levels were highest in the San Joaquin River just upstream of the Stockton Deep Water Ship Channel (5.9 mg/l) and in the ship channel itself (2.1 mg/l).

However, if somewhat elevated ammonia concentrations exist during a 1-month period of elevated river pH (exceeding 8.6), these ambient ammonia levels could exceed EPA ammonia chronic criteria (30-day average). During such periods, the potential would exist for sensitive aquatic organisms to be adversely affected by ammonia. Although review of ambient toxicity testing results reveals no confirmed occurrences of ammonia toxicity in the San Joaquin River or the Delta, the available data indicate that conditions for such toxicity may occasionally occur.

Copper and Other Trace Elements

Trace elements (metals and minerals) may affect aquatic organisms directly or may affect human health or wildlife through water consumption or through bioaccumulation in fish or shellfish consumed by humans or high-end predators. The state is currently developing a TMDL program for mercury in the Delta that would result in the identification of regulatory target(s), determination of sources and their associated loads, development of a quantitative model to predict loading, and implementation of a mercury control program to achieve load reductions that would lead to compliance with water quality objectives.

Available data for dissolved copper indicate 97.8% compliance with CTR water quality objectives in the San Joaquin River near Vernalis (Table 4.8-10). While dissolved boron data were collected at several of the monitoring sites, no assessment of regulatory compliance can be made because the Basin Plan specifies a criterion only for total boron. Similarly, dissolved selenium data were collected at several sites, but total selenium is the fraction of the metal regulated by both the Basin Plan and the California Toxics Rule; therefore, no estimates of regulatory compliance can be made for this constituent. No other trace elements are included on the 303(d) list for the Delta.

Trace Organics

Delta waterways are 303(d) listed for several trace organics, including the pesticides diazinon and chlorpyrifos, DDT, PCBs, dioxins, and Group A chlorinated pesticides. Diazinon and chlorpyrifos are listed due to concerns regarding periodic aquatic toxicity to invertebrates that may disrupt the food chain. DDT and Group A pesticides (banned substances) have been observed in fish at levels of concern to humans and aquatic predators. The Stockton Deep Water Channel is listed for dioxin, furans, and PCBs.

Project Site-Specific Water Quality

San Joaquin River, Old River, and Paradise Cut

Site-specific data were collected from 1999 to 2001 by HSI Hydrologic Systems (HSI) and ENGEO in the three waterways adjacent to the project site (San Joaquin River, Old River, and Paradise Cut). This information is summarized in Tables 4.8-11 through 4.8-15. Water quality can deteriorate in all of these waterways, particularly in a dead-end channel such as Paradise Cut. The San Joaquin River carries high concentrations of nitrates, selenium, nickel, manganese, and boron. Agricultural drainage comprises a significant portion of the flows of all of these waterways during the irrigation season. Agricultural return water is typically saline and has high concentrations of organic compounds and high levels of nutrients (nitrates and sulfates) derived from fertilizers.

Mass Loading from the RID Area to Paradise Cut

A mass loading analysis was conducted to determine the existing total constituent loading from the RID Area to Paradise Cut. Water quality analyses were performed on samples collected from the discharge pumps at the southwestern corner of the RID Area. These analyses were conducted on March 22, 2002, and April 15, 2002, by HSI. The contaminants collected and their concentrations are shown in Table 4.8-16. The concentrations for each constituent were multiplied by the mean monthly volume discharged from the area to estimate the mean monthly loading to Paradise Cut (Table 4.8-17). Table 4.8-18 is a summary of the annual constituent loading to Paradise Cut based on the monthly volumes and concentrations.

Groundwater Quality

Groundwater quality in shallow aquifers in the Lathrop area is generally considered poor because of saltwater intrusion and because of infiltration of runoff from the San Joaquin River, agricultural areas, and urban areas. Groundwater in the area often has concentrations of chloride above 300 mg/l and TDS above 500 mg/l (and in many instances exceeding 1,000 mg/l). The recommended secondary TDS standard for drinking water is 500 mg/l, although the upper limit is 1,000 mg/l for long-term use and 1,500 mg/l for short-term use. However, the poor-quality shallow groundwater in the area is not used for drinking water purposes. Groundwater used for drinking water in the Lathrop area is generally obtained from depths of 100–250 feet (i.e., the deep aquifer). TDS levels in water from the City's wells have averaged from 245 mg/l to 422 mg/l, with an overall average of 297 mg/l (EDAW 2001). Additional groundwater quality data are available in the Master Plan (EDAW 2001).

LOCAL WATER SUPPLIES

The City of Lathrop currently draws its entire drinking water supply from groundwater wells. The City has five municipal groundwater wells, four of which are currently active. The City currently pumps approximately 2,100 af per year of groundwater to meet municipal water demand. The six-month high demand period for water in the City occurs from May through October (approximately 65% of annual demand). Several large industrial operations (such as the Sharpe Defense Distribution Depot) and agricultural operations currently pump groundwater in the project area. These wells are privately owned and operated. Several privately owned agricultural operations on Stewart Tract utilize surface water from the San Joaquin River, Old River, and Paradise Cut (via riparian water rights) as a source of irrigation water.

The availability of surface water as a municipal water source for the City of Lathrop has affected and would continue to affect the quantity of groundwater pumping required. The City does not currently obtain any municipal water supplies from surface water. While the City does not currently obtain municipal water supplies from surface water, plans have been approved to convey surface water to the City for municipal use. The South San Joaquin Irrigation District's (SSJID's) South County Surface Water Supply Project (SCSWSP) is a joint project of SSJID and the cities of Lathrop, Manteca, Escalon, and Tracy to supply treated potable water to these cities. The project involves construction and operation of a new surface water treatment plant near Woodward Reservoir in Stanislaus County, and a 36.5-mile water transmission pipeline with pumping facilities to transport treated water to turnouts at each city. The SCSWSP's source of water is the Stanislaus River. Construction of the project is scheduled to begin in 2003, with initial deliveries starting in 2005. The quantity of water to be supplied by the SCSWSP to the City of Lathrop would range from 2,050 af per year in 2005 to 11,791 af per year in 2025.

The City does not currently generate or use recycled wastewater as a municipal water supply. However, plans call for the widespread use of recycled water for landscape and agricultural irrigation in the near future. Use of recycled water as a municipal water source could reduce the quantity of groundwater pumping required.

4.8.3 Environmental Impacts

Analysis Methodology

Information obtained from previous CEQA documents prepared for other projects in the vicinity of the project area (see list of documents at the beginning of this section); onsite water quality sampling; and various hydrologic, hydraulic, and water quality modeling output (Appendices E through I) were used to assess impacts on hydrology and water quality from the proposed project. The effects of the proposed project were compared to environmental baseline conditions (i.e., existing conditions) to determine the character and extent of impacts. The proposed project represents a substantial change in land use in the RID Area, transforming the area from agricultural production to mixed-use employment/residential/commercial development. The analysis of effects on the existing hydrology and water quality conditions focused on changes to the waterways surrounding Stewart Tract (San Joaquin River, Old River, and Paradise Cut) resulting from land use changes in the RID Area, as well as modifications to the size and capacity of Paradise Cut and its function as a flood bypass. Delta or CVP- and SWP-wide operations modeling was unnecessary because the proposed project is very localized, does not affect CVP or SWP operations, and does not affect available relevant water supplies.

Project-related effects generally fall into seven primary impact mechanisms:

- project-induced drainage and water quality changes in the RID Area,

- project-induced hydrologic changes in water diversions (magnitude and timing) into the RID Area,
- project-induced hydrologic changes in water discharges (magnitude and timing) from the RID Area,
- project-induced changes in quality of water discharges from the RID Area,
- project-induced hydrologic changes to flows in surrounding waterways,
- project-induced hydrologic changes to floodflows in surrounding waterways, and
- project-induced changes to sedimentation/water quality from construction in or near waterways.

A project-level analysis of hydrology and water quality was conducted for both Phase 1 and Phase 2 of the proposed project, rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. Although in some instances, Phase 2 project features are not as highly defined as those in Phase 1, these are not typically the types of features that affect hydrology and water quality (e.g. individual parcel sizes, lot placements). Project elements that might affect hydrology and water quality (discharge volumes and timing, flood control features) and associated mitigation measures would either be the same for both phases or more intense during Phase 2, in which case the analysis focused on this worst-case condition.

PRIOR WLSP EIR ANALYSIS

The WLSP EIR concluded that there are potentially significant impacts on water supply, drainage and flood control, and interior lake management that would be mitigated to a less-than-significant level by measures outlined in the WLSP EIR. Mitigation measures include making additional levee improvements, removing elevated groundwater through pumping when necessary, and adopting specific lake management guidelines.

The River Islands project differs from the WLSP in several respects related to hydrology and water quality, including the widening of Paradise Cut and the creation of water treatment wetlands around the central lake. In addition, new site-specific and regional water quality and hydrologic data have been collected since completion of the WLSP EIR. Given these conditions, a new and independent analysis of hydrology and water quality is included in this SEIR.

THRESHOLDS OF SIGNIFICANCE

The River Islands project would cause a significant impact on hydrology or water quality if it would:

- violate any water quality standards or waste discharge requirements, including violating NPDES waste discharge or stormwater runoff requirements, state or federal antidegradation policies, enforceable water quality standards contained in the Central Valley Basin Plan or statewide water quality control plans, or federal rulemakings to establish water quality standards in California;

- substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a substantial lowering of the local groundwater table level;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation onsite or offsite;
- create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- substantially degrade water quality;
- place housing within a 1-in-100-AEP flood hazard area as mapped on a federal flood hazard boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- place within a 1-in-100-AEP flood hazard area structures that would impede or redirect flood flows;
- expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam;
- create inundation by seiche, tsunami, or mudflow; or
- measurably reduce water supplies to other water users.

IMPACT ANALYSIS

Impact
4.8-a

Hydrology and Water Quality - RID Area Construction Sediment and Water Quality Contamination. *Drainage and water quality impacts could result from construction activities in the RID Area. Project impacts on interior water quality due to construction sediment are considered* ***potentially significant****.*

General construction activities within the RID Area would be extensive. The interior drainage system would be substantially modified and replaced with a system consisting of the central lake, golf course ponds, pipelines, wetlands, and a network of parks and paseos. The existing drainage system is designed to accommodate agricultural operations. Replacing the existing system with the proposed system would not alter the drainage pattern of the site in a manner that would result in substantial erosion or siltation onsite or offsite.

The existing surface water within the RID Area consists primarily of agricultural return water and is not high quality. The potential for this existing surface water to seep through the levees is minimal. This water typically does seep into the groundwater table and is pumped as discharge water into Paradise Cut.

During construction activities, surface water pumped and discharged from the RID Area could be of poorer quality than the existing agricultural return flow due to sediment or contaminants (fuels, equipment lubricants) entering the drainage system during construction. Therefore, the proposed project, without mitigation, could violate water quality standards or agency waste discharge requirements.

Construction of the proposed project, without mitigation, could also substantially degrade water quality. This particular impact is related exclusively to construction activities in the RID Area, but is considered to be potentially significant because construction activities can have severe and substantial adverse impacts on water quality if mitigation measures are not provided.

Impact
4.8-b

Hydrology and Water Quality - Interior Lake Water Quality*. Project operations in the RID Area could adversely affect water quality in the interior lake. Because water from the interior lake would come into contact with groundwater and would be pumped into Paradise Cut, these waters also could be adversely affected. However, multiple best management practices (BMPs) are proposed that would protect and manage water quality in the interior lake. This impact is considered* ***less than significant****.*

Water from the interior lake would eventually come into contact with groundwater, would be discharged into Paradise Cut, or would evaporate. Consequently, properly managing stormwater runoff and maintaining good water quality in the interior lake are important design concepts.

The proposed project would address stormwater runoff and water quality from two perspectives. The first is through the management of stormwater runoff. The second is through water quality management of interior lake water. To manage stormwater runoff, specific BMPs have been developed to minimize the pollutant loading to the lake. The goal in designing the proposed project was to ensure that the water entering the interior lake would not have a significant adverse impact on the health of the lake and its aquatic ecosystem and subsequently adversely affect Paradise Cut and the Delta during lake water releases. The goal was to design the interior drainage to minimize the volume of storm water released into the surrounding rivers and maximize the quality of all storm drainage water that must be discharged to the Delta or come into contact with groundwater. More detailed information on the River Islands interior drainage design and analysis is presented in Appendices F, G, and H.

The methodology for designing stormwater BMPs for the proposed project relies on standard procedures and practices recommended by the EPA, RWQCB, and Center for Watershed Protection. The methodology was drawn from various studies from across the country to better understand the effect that various BMPs would have on different constituents in storm water runoff. The ability for each BMP to remove various pollutants from storm water runoff was estimated from field data collected from over 150 sites, including data from the cities of Stockton and Fresno (see Appendix H for more information).

Stormwater runoff from urban and commercial areas can contain a wide variety of contaminants. The type of contaminant that may be present and the corresponding concentration is highly variable. What contaminants are detected and their concentration can change dramatically from one location to the next within the same development. Even at a single location, the water quality can vary considerably when measured throughout the year. Older and more urbanized developments tend to have greater contaminant loads. The density of a particular development can also affect the level of contaminants that are present. The contaminant concentration is typically higher for the first few rain events of the season because the pollutants accumulated over the watershed over the long dry summer period. These first rain events are often referred to as the "first flush."

Before discharge into the interior lake, the stormwater runoff would be filtered through a variety of stormwater BMPs that include swales, detention ponds, and wetlands. The drainage system has been designed to maximize redundancy in the system so that wherever possible the runoff would flow through two or more treatment facilities before entering the lake. Approximately 35 acres of man-made wetlands would be created in several locations along the central lake edge (Exhibit 3-15). Swales, ponds, parks, and paseos would be designed throughout the RID Area (Exhibit 3-15). Whenever possible, runoff would be routed through one or more of these features to improve the level of treatment. This redundancy not only improves the level of treatment, but also allows for treatment of a broader spectrum of contaminants since some BMPs are more effective than others at treating some pollutants.

During the summer months, water in the internal lake would continue to be treated by being pumped into the project wetlands. Recirculating the lake water over the project wetlands would help to keep the wetlands productive and also provide for continuous water polishing for the lake water during the summer months.

The percentage of the RID Area that would be exposed to the various BMP treatment combinations before entering the central lake is as follows:

- none - 6%
- pond only - 5%
- wetland only - 24%
- swale then wetland - 13%
- pond then wetland - 52%

Due to limitation in the topography and grading, a small percentage of the proposed project (6%) would not be able to drain to a BMP before reaching the lake. This volume of water would achieve some level of treatment from the circulation of the lake water through the project wetlands during the summer months.

Exhibits 4.8-11 and 4.8-12 show final estimated contaminant concentrations in the interior lake. Appendix H provides additional information on how BMPs were developed for the proposed project, removal efficiencies of various pollutants in subbasins in the RID Area, total estimated mass loading to the interior lake, and final contaminant concentration estimates after BMPs are applied.

Additional lake management actions would be implemented to maintain water quality as well as minimize lake level fluctuations. For example, when lake levels are low, and water quality is more susceptible to algal blooms, eutrification, and odors, water would be pumped into the lake from the surrounding rivers to maintain elevations and minimize water quality effects. The lake bottom would be below the existing groundwater table, thereby placing the lake in continuous direct contact with groundwater. This exchange would also ameliorate water quality effects within the lake.

Boating in the internal lake system would be restricted to human-powered boats (e.g., rowboats, paddleboats, canoes), electric boats, and small sailboats. No internal combustion engines would be allowed to operate (other than those related to emergency services) to minimize water quality effects. Because gasoline- and diesel-powered boats would not be allowed, other than those related to emergency services (fire, rescue), minor to no pollution would be associated with boating on the internal water system. Swimming also would not be permitted in the internal lake system.

The proposed project has been designed with an extremely high rate of treatment through BMPs incorporated into the project. The treatment of stormwater runoff would be higher than under the existing conditions, where there is no treatment of stormwater runoff. In addition, conditions of future discharge permits required for the proposed project would likely include regular testing of lake water quality and the quality of water discharged to Paradise Cut, which does not occur under existing conditions. The proposed project would not create additional sources of polluted runoff or substantially degrade water quality because of the implementation of the project BMPs. For these reasons, impacts on offsite water quality associated with discharges from the internal lake are considered less than significant.

Impact
4.8-c

Hydrology and Water Quality - Earth Moving in or Adjacent to Water Bodies. *Earth moving associated with levee breaching and back bay development along the surrounding waterways could result in streambed and riverbank disturbance, sediment input, and contaminant input, thereby affecting water quality. This impact is considered* ***significant****.*

This impact addresses potential water quality effects of levee improvements and other earth-moving activities. Hydrologic effects of proposed levee modifications are described under Impact 4.8-m.

Substantial modifications to the existing levee system on Paradise Cut and development of back bays along the San Joaquin and Old Rivers are proposed. These activities require extensive earth moving adjacent to these water bodies; however, in almost all cases existing levees would separate construction activities from the water bodies. Levee setbacks would not involve any construction adjacent to the waterways. Levees would be strengthened and high-ground corridors would be constructed by placing soil on the landward side of the levees, minimizing the likelihood of discharges of sediment into the rivers and Paradise Cut and avoiding impacts on water quality. Proposed man-made aquatic features, such as the back bays and increased channel width and depths in Paradise Cut, would be excavated inside the levees prior to their connection with the adjacent waterway, also minimizing the likelihood of discharges of sediment into the rivers and Paradise Cut and avoiding impacts on water quality.

Some minor in-river work would be required to allow water to flow into the newly created aquatic areas. This activity could cause substantial impacts on water quality on a short-term basis because the work is in, or adjacent to, the waterways. The initial breaching of existing levees during the construction of the back bays and backwater channels could increase short-term turbidity in surrounding waterways. Levee breaching activities would likely cause sediment to enter and become temporarily suspended in the water along the west side of the San Joaquin River and the south side of Old River. After the back bays are filled with water, some backwash of water contaminated with sediment would flow back into the rivers.

Earth moving would be required near the Paradise Cut channel to lower the earthen bench near the Paradise Weir and to construct the removable levee segment near I-5. Erosion and sedimentation of the channel could result from these activities.

Spills and leaks of fuels and hydraulic fluids from construction equipment used for these construction activities could also adversely affect water quality.

Although water quality impacts associated with levee breaching would be localized and temporary, they could have a substantial adverse short-term effect on water quality and potentially violate water quality standards or waste discharge requirements. Therefore, this impact is considered significant.

Impact
4.8-d

Hydrology and Water Quality - In-Water Project Features. *Constructing bridges and docks on the San Joaquin River, Old River, and/or Paradise Cut could cause sedimentation and water quality impacts. This impact is considered* ***significant****.*

Constructing the Bradshaw's Crossing and Golden Valley Parkway Bridges across the San Joaquin River would involve in-water construction activities. Construction of the Golden Valley Parkway Bridge across Paradise Cut may also involve in-water work. Individual docks associated with the external water system would be built in various locations along the perimeter of the RID Area (river edge and in back bays) and would accommodate up to 751 boats. Docks along the river edges (i.e., outside of back bays) would consist of floating platforms running parallel to the bank for individual boats and would be attached to the banks with detachable connectors, allowing the docks to be removed. Group docks would be located only in back bays and Paradise Cut and would accommodate up to 170 boats.

Placing bridge pillars and docks in the San Joaquin River, Old River, and/or Paradise Cut would have similar water quality effects from construction activities as described for Impacts 4.8-c and 4.8-j, but to a substantially lesser degree. Without mitigation, the proposed project could violate water quality standards, waste discharge requirements, and substantially degrade water quality during construction of in-water features. Therefore, this impact is considered significant. After installation, these facilities would have virtually no effect on water quality.

Impact
4.8-e

Hydrology and Water Quality - Utility Crossings. *The proposed directional boring of a natural gas line under the San Joaquin River could result in short-term degradation of water quality from accidental seepage of drilling slurry into the river. This impact is considered* ***potentially significant****.*

A single directional boring under the San Joaquin River is proposed to install a natural gas pipeline to serve Phase 1a and Phase 1 development in the RID Area. During directional boring/drilling, a bentonite slurry (bentonite is a naturally occurring, nontoxic clay) is used to lubricate drilling tools and to help to remove cuttings from the borehole. Bentonite has been approved as a drilling fluid additive by the National Sanitation Foundation (NSF) in accordance with NSF 60 and 40 CDF 141.111.

During directional boring, the bentonite slurry is pumped under pressure through the borehole. This pressure can cause the slurry to escape to the soil surface through a fracture in the substrate (commonly referred to as a "frac-out"). This would most likely occur near the bore entry or exit point due to the bore head's proximity to the surface at these locations. However, a frac-out also could occur beneath the San Joaquin River, resulting in a discharge of the drilling slurry and associated bentonite into the water. Although bentonite is an inert substance, if a sufficient amount of bentonite were released, it could potentially affect the water quality of the San Joaquin River through increased turbidity and sedimentation. If a frac-out were to occur, the bentonite release could substantially degrade water quality in the San Joaquin River. This impact is considered potentially significant.

Impact
4.8-f

<u>Hydrology and Water Quality - Diversion Effects on Old River Hydrology.</u> *Under the proposed project less water would be pumped from Old River into the RID Area, and diversions would be shifted to a period when demand from agricultural users is less. This is considered a **beneficial** impact on hydrology.*

Tables 4.8-4 and 4.8-5 and Exhibits 4.8-4 and 4.8-5 present water volumes pumped into the RID Area under existing conditions (agricultural production). Exhibits 4.8-13 and 4.8-14 present the estimated postproject annual volume of water pumped from Old River into the interior lake and from the interior lake into Paradise Cut. The volumes presented in these exhibits represent an allowable lake fluctuation of 4 feet. There are several lake management scenarios under consideration for the project that would affect the volume of water pumped from Old River. Each scenario involves a different allowable fluctuation in lake level. If the lake level were allowed to fluctuate between elevation +2.0 and +6.0 feet NGVD (4 feet of fluctuation), then water would have been pumped into the lake during 11 of the last 18 years (based on models using past water year data), and no pumping from Old River would have occured in 7 of the 18 simulated years (Exhibit 4.8-13). If the lake level were managed to a tighter schedule, allowing for a 3-foot or a 2-foot range, the volume of water required to be pumped into or out of the lake would change. However, in no instance would the lake be managed under the proposed project in such a way that the volume of water pumped into (or out of) the lake would be allowed to exceed the pre-project volumes. Table 4.8-19 shows the volume of water that would be pumped into and out of the lake under different lake regulation schedules. This particular table represents the volume of water that would be pumped if 64,000 gpm of pumping capacity were available. If more or less pumping capacity were used, the volumes shown in this table would change slightly.

Under existing conditions, the average annual pumping volume into the RID Area is 13,696 af (Table 4.8-4). Depending on the exact pumping scenario selected for the project, the mean annual pumping volume from Old River could range from 404 to 7,996 af (Table 4.8-19). Therefore, the volume of water currently being pumped onto the RID Area from the Delta would decrease by 41%-97%, depending on the allowable lake fluctuation, the range of the fluctuation, and the pumping capacity provided.

Water would be pumped from Old River primarily in October and November, rather than primarily during April through August under existing conditions (Exhibit 4.8-15). Therefore, under post project conditions, diversions from Old River would be shifted to a time when water demand from agricultural users is less, allowing water to be diverted during a time when more water is available in the Delta. Postproject conditions shown in Exhibit 4.8-15 also reflects the assumption that the lake level would have a 4-foot allowable fluctuation range and that 16,000 gpm of pumping capacity would be available. This combination provides a conservatively large estimate of the required pumping.

Under the proposed project less water is diverted annually from Old River, diversions would not occur every year (as under current conditions), and diversions are shifted to a period of decreased agricultural demand. Therefore the proposed project is considered to have a beneficial impact on the hydrology of Old River.

Impact **4.8-g**

Hydrology and Water Quality - Diversion Effects on Old River Water Quality. *Under the proposed project less water would be pumped from Old River and diversions would be shifted to primarily to October and November, when local agricultural water demands and water quality concerns are reduced. This is considered a* ***beneficial*** *impact on water quality.*

As indicated above for Impact 4.8-f, water diversions from Old River would be reduced under the proposed project and shifted from the spring and summer to fall (primarily October and November). Consequently, there would be a slight and immeasurable beneficial effect on Old River water quality because less overall water would be diverted from Old River, and diversions would occur outside the summer low flow period when water quality in Old River is critical. Therefore, the proposed project is considered to have a beneficial effect on water quality in Old River.

Impact **4.8-h**

Hydrology and Water Quality - Water Discharges to the Delta (Hydrology). *Less water would be discharged into Paradise Cut under the proposed project than under existing conditions; potentially altering the hydrology of the Paradise Cut channel. However, the proposed widening of the Paradise Cut channel would compensate for any changes by allowing greater tidal circulation. This impact is considered* ***less than significant****.*

Under existing conditions, the mean annual discharge from the RID Area into Paradise Cut is 8,712 af (Table 4.8-6 and Exhibit 4.8-6). Exhibit 4.8-13 presents the estimated annual volume of water discharged from the RID Area into Paradise Cut under the proposed project based on models using data from past water years. For this scenario, with 16,000 gpm of pumping capacity and a 4-foot allowable lake fluctuation, water would have been discharged in 14 of the last 18 years, with a mean annual discharge of 443 af (Table 4.8-19). Currently, water is discharged every year into Paradise Cut from the agricultural runoff.

Under existing conditions water is pumped into Paradise Cut from the RID Area in the spring and summer, primarily from April through September (Table 4.8-5 and Exhibit 4.8-7). For the proposed project water would be discharged into Paradise Cut during the winter and spring, primarily from December through April (Exhibit 4.8-14). Exhibit 4.8-15 summarizes the preproject and postproject monthly volumes discharged from the RID Area into Paradise Cut.

Under the proposed project, the mean annual discharge volume into Paradise Cut would range between 292 and 4,287 af, depending on the final lake management scenario selected for the project (Table 4.8-19). Therefore, the water discharged into Paradise Cut would be decreased from 51% to 97% relative to existing conditions.

Overall, substantially less water is discharged into Paradise Cut under the proposed project, in large part because substantially less water is diverted into the RID Area (see Impact 4.8-f). However, compared to existing conditions, the proposed project would increase discharge volumes in December through March, but substantially curtail discharges during the summer. The continuing tidal flushing action in the Delta would minimize potential changes in Paradise Cut hydrology associated with the altered discharges. The proposed deepening and widening of the Paradise Cut canal would also bring more water year-round into Paradise Cut through increased tidal flushing volumes. The net effect would be little change in Paradise

Cut hydrology with the project compared to without the project. Consequently, it is concluded that hydrologic impacts from reduced RID Area discharges into Paradise Cut would be less than significant.

Impact
4.8-i

Hydrology and Water Quality - Water Discharges to the Delta (Water Quality). *The quality of the water discharged into Paradise Cut from the internal project lake would generally be improved under the proposed project relative to existing conditions. However, some individual water quality parameters would be in higher concentrations in post project discharges. All post project contaminant concentrations that would be increased fall within regulatory water quality standards. This impact is considered* ***less than significant or beneficial*** *for individual parameters and beneficial overall to water quality.*

Complete drainage and water quality analyses for discharges into Paradise Cut are presented in Appendices E through H Information from these appendices is summarized in this impact discussion. The pre-project water quality conditions presented below are based on analysis of surface water runoff from the RID Area in March and April 2002. During these months discharges from the RID Area are expected to have superior water quality since water diverted into the area from the surrounding waterways is of better quality and a portion of the discharge is comprised of runoff from precipitation. Therefore, to a certain degree, water quality parameters described for the existing condition reflect a best case scenario.

Tables 4.8-20 and 4.8-21 and Exhibits 4.8-16 through 4.8-33 compare existing annual discharge loadings of major contaminants with projected postproject mean annual loadings for the period, 1990-2000. Tables 4.8-22 and 4.8-23 and Exhibits 4.8-34 through 4.8-51 compare existing mean monthly discharge loadings of major contaminants with projected postproject mean monthly loadings. As shown in Table 4.8-24, annual loadings for the anticipated discharges from the internal project lake into Paradise Cut are reduced with the project for 12 of 18 parameters: total dissolved solids (-52%), hardness (-51%), ammonia (-95%), phosphorus (-47%), dissolved phosphorus (-92%), dissolved arsenic (-90%), total arsenic (-80%), dissolved copper (-68%), dissolved nickel (-70%), dissolved selenium (-76%), dissolved zinc (-23%), and total selenium (-80%). Annual loadings are increased for 6 parameters: nitrate (+17%), total copper (+75%), dissolved lead (+118%), total lead (+212%), total nickel (+40%), and total zinc (+182%).

To determine the impact of the six increased contaminants, the postproject concentration was compared to the regulatory requirements of the EPA and the RWQCB. Table 4.8-25 compares the estimated low year, wet year, and dry year concentrations of the contaminants to the allowable concentration as specified by the Numeric Criteria for Toxic Pollutants for the State of California (California Toxics Rule [CTR]). The CTR limits the concentration of the contaminants in the dissolved phase, where they are most harmful to aquatic organisms. As can be seen in the table, the post project concentrations are all well within the allowable limits.

Potential impacts are further reduced because discharges to Paradise Cut would occur in the winter months (Exhibit 4.8-14, Table 4.8-22), when the higher flows in Paradise Cut, and the Delta as a whole, would further reduce the postproject concentrations. Under the existing condition, most of the contaminant load is discharged to Paradise Cut during the summer months (Table 4.8-22), when the flow in Paradise Cut is limited and the Delta background contaminant concentrations are higher. In addition, post project discharges from the interior lake would be the greatest during wet years, when precipitation and dilution is highest.

Concentrations of water quality constituents are compared preproject and postproject in Table 4.8-26. Concentrations mirror the results found for mass loadings, as the mass loadings are derived from the actual and estimated concentrations. Most of the water quality constituents fall within acceptable ranges when compared to established water quality criteria.

Water temperature of the existing agricultural discharges from the project site can be relatively high because the discharges consist of agricultural runoff mostly during late spring and throughout the summer. The proposed project, however, would shift the discharges primarily into the months of December through April, when ambient water temperatures both within and surrounding the RID Area would be cool. Consequently, water temperature is not considered to be an issue with the proposed discharges into the Paradise Cut and the Delta, and the project's effects on water temperature could be beneficial.

Similar to water temperature, dissolved oxygen concentrations in discharges would be improved simply because discharges under the proposed project would occur primarily during the winter months. High temperatures reduce the oxygen carrying capacity of water. Therefore, spring and summer discharges under current conditions would be expected to contain lower concentrations of dissolved oxygen then fall and winter discharges under the proposed project.

The proposed project would have an overall beneficial impact on the water quality of RID Area discharges, with improved mass loading and concentrations for a majority of water quality parameters/contaminants (Table 4.8-24). For the six contaminants where concentrations and mass loading would increase under the proposed project, the increased levels of these contaminants would not violate any water quality standards or waste discharge requirements. Given these conclusions, the proposed project is considered to have less-than-significant impacts on nitrate, total copper, dissolved lead, total lead, total nickel, and total zinc. Benefits occur relative to overall water quality, total dissolved solids, hardness, ammonia, phosphorus, dissolved phosphorus, dissolved arsenic, total arsenic, dissolved copper, dissolved nickel, dissolved selenium, total selenium, temperature, and dissolved oxygen.

Impact
4.8-j

<u>Hydrology and Water Quality - Maintenance Dredging of Back Bays.</u> *Maintenance dredging of back bays may release sediments and increase turbidity, adversely affecting water quality in the San Joaquin and Old Rivers. This impact is considered* ***significant****.*

The nine proposed back bays would be periodically dredged to preserve boat access. The frequency of the dredging would vary depending on the site-specific hydraulic conditions at each site but would be expected to occur approximately once every 5–10 years.

Dredging mobilizes sediments, which suspends particles into the water column and increases turbidity. High levels of turbidity can have adverse effects on fish and other aquatic organisms and their habitats (see section 4.14, "Fisheries"), disrupt biological processes, impede recreation uses, and create visual impacts. The resuspension of any contaminated sediments that contain toxic materials can also occur.

However, DWR in planning for in-river work/dredging on Old River anticipates that sediment contaminants are relatively low and total oil and grease might be mobilized at concentrations of approximately 100 mg/kg (DWR 1995). Dredging also briefly decreases dissolved oxygen (DO) levels near the dredge site as organic materials are released during the dredging process. This depletion is normally temporary and does not extend far outside the dredge plume. The extent of oxygen depression depends on the amount of oxygen-demanding matter present in the dredged material and background DO levels.

The type of dredging employed has an important bearing on the resulting sedimentation. Suction dredges reduce many of the adverse impacts associated with other dredging methods. Only a small turbidity plume typically emanates from the cutterhead into the surrounding water.

Regardless of the dredging method used, sediment releases associated with maintenance dredging of the back bays could violate water quality standards or waste discharge requirements and substantially degrade water quality. This impact is considered significant.

Impact
4.8-k

Hydrology and Water Quality - Increased Boat Traffic. *Development in the RID Area and associated installation of docks on the San Joaquin River, Old River, and Paradise Cut would increase boat traffic in these waterways. Increased erosion from boat wakes and fuel spills from the use and storage of these boats may adversely affect water quality in the surrounding waterways. This impact is considered* ***significant****.*

The wakes produced by boats propagate outward until they dissipate at the shoreline. Wave height and other characteristics vary with speed, size, type of watercraft, size of engine, hull displacement, and distance from shore. The resulting waves have the potential to deliver large amounts of erosive energy to the shoreline in a short period of time. The rate at which this erosion occurs depends largely on the shoreline substrate and the frequency and magnitude of the waves produced. Shoreline erosion may affect water clarity in near-shore areas through increased turbidity and total dissolved solids.

Boating traffic that could affect water quality in surrounding waterways would originate from up to 921 boats associated with the external docks, and from any increased boat traffic from other sources throughout the Delta that visit the River Islands area. Increased erosion from boat wakes would increase turbidity and sedimentation, the detrimental effects of which were described previously.

The proposed project calls for establishing "no-wake zones" where docks are installed around the RID Area, with speed limits of 5 mph posted. This would substantially reduce the erosion potential in these areas. The docks themselves and riparian vegetation enhancement resulting from the proposed project would also ameliorate the erosional effects of boat wakes. Despite these mitigating circumstances adding nearly 1,000 boats to the San Joaquin River, Old River, and Paradise Cut during summer, when boating activities are highest, would be expected to add to degradation of water quality in these waterways. The erosion effects of wave action emanating from these boats would be considered a significant impact.

Water quality also could be affected by fuel spills associated with watercraft owned by project residents or visitors. Spills during boat fueling are a major contributor to gas and oil pollution of United States waterways (EPA 2001). No refueling stations are associated with the project, but refueling small watercraft by hand (with gas cans) may occur. Some trash can also be expected to enter the surrounding waterways from recreational boaters. There is also the potential for sewage releases from larger boats that contain bathrooms/heads. The tidal currents in the channels surrounding the RID Area would serve to disperse most contaminants relatively quickly, unlike in a static water body. Nonetheless, fuel spills, trash, and sewage releases represent a potentially significant impact on the waterways surrounding the RID Area.

Increased boat traffic associated with the proposed project could result in substantial degradation of water quality from shoreline erosion and fuel spills as well as violations of water quality standards. Therefore, this impact is considered significant.

Impact **4.8-l**

Hydrology and Water Quality - Flood Protection for the RID Area. *The RID Area is currently completely within the 1-in-100-AEP floodplain, but would be removed from the floodplain by increasing Paradise Cut flow volumes and capacity, strengthening levees, creating high-ground corridors, and constructing back bays. This impact is considered **beneficial**.*

The proposed RID Area lies entirely in the FEMA 1-in-100-AEP floodplain. The proposed project, however, is being designed to allow the RID Area to safely pass a flood that has a 1-in-200 AEP while maintaining 3 feet of levee freeboard by strengthening and setting back levees and creating high-ground corridors. In addition, floodflows would be increased in Paradise Cut by widening the flow area in the cut and removing existing flow restrictions near the Paradise Weir on the San Joaquin River. More details regarding these flood control features are provided in Chapter 3, "Description of the Proposed Project."

FEMA requires new development to be protected from a 1-in-100-AEP flood; consequently, the proposed project would exceed the minimum required level of flood protection for its residents. No housing, people, or structures would be placed within a 1-in-100-AEP hazard area, and no people or structures would be exposed to a significant risk of loss, injury, or death involving flooding from this project. This impact is considered beneficial for the RID Area.

The current condition of the existing levees is highly variable and potentially unstable. The proposed project would include the complete construction of new levees and the buttressing of some existing levees. The proposed buttresses have been designed to protect the project assuming a failure of the existing levee system. In addition, groundwater elevations within the levees are expected to be lower than the existing profiles because of the addition of the toe subdrains.

Impact **4.8-m**

Hydrology and Water Quality - Surrounding Flood Stage Elevations. *Providing 1-in-200-AEP level flood protection to the RID Area could result in increases to flood stage elevations in the surrounding area during severe flood events. However, increases would be minor and infrequent. This impact is considered **less than significant**.*

Complete hydraulic analyses related to this impact are presented in Appendix I. The following discussion summarizes these analyses.

Under current conditions levee failures along Stewart Tract during flood events result in flooding of the entire island, allowing the island in effect to function as off-stream storage. Therefore, when Stewart Tract levees do fail, flood elevations downstream of the island are typically lower than when the island does not flood. Under the proposed project the RID Area would be removed from the 1-in-100-AEP floodplain, thereby reducing the off-stream flood storage capacity of Stewart Tract and potentially raising flood stage elevations in surrounding waterways. As stated in section 4.8.2, "Existing Conditions," recorded levee failures on Stewart Tract occurred three times during the last 74 years (1938, 1950, and 1997). The 1997 failure occurred during a flood event considered to have an AEP of 1 in 89, which also resulted in numerous levee breaks in and around the area.

Additional levee breaks would be among the most severe consequences of potential increases in flood stage elevations resulting from the proposed project. Table 4.8-27 presents the results of preproject and postproject hydraulic model simulations for levee breaks. Levee breaks are assumed to occur when the water surface elevation in the river channel reaches a defined failure trigger point (3 feet below the top of the levee for this analysis). The analysis indicates that in the 1-in-50-AEP flood, there is one levee failure (San Joaquin River left bank levee downstream of Old River) under preproject conditions but no levee failures under postproject conditions. In the 1-in-100- and 1-in-200-AEP floods, the same levee failures occur under both preproject and postproject conditions.

Table 4.8-28 summarizes the impacts on the overbank floodplain areas. Overbank flooding occurs when levee failures occur during large flood events and inundate overbank areas on the land sides of the levees. As noted in the preceding paragraph, there is one levee failure in the 1-in-50-AEP flood under preproject conditions but no levee failures under postproject conditions. Therefore, based on the criteria used in the hydraulic analysis, in the 1-in-50-AEP flood, the project would result in a beneficial effect of potentially preventing overbank flooding. In the 1-in-100-AEP flood, there are only negligible changes to the San Joaquin River overbank flood depth and duration.

Because of the presence of the cross levee under the proposed project, floodwaters during a levee failure along the eastern portion of Stewart Tract would be prevented from leaving RD 2107 (Remaining Stewart Tract) and entering RD 2062 (the RID Area) (Exhibits 3-5 and 4.8-52), as has occurred in the past. A levee failure during a 1-in-100-AEP flood would increase the peak flood stage by approximately 0.7 foot between I-5 and the western UPRR in Remaining Stewart Tract (RD 2107). At the end of the simulation study period, 10 days after inundation of RD 2107 started, the flood stage in RD 2107 would be 1.2 feet higher with the project, indicating that the project has the potential to increase the depth and duration of flooding. The frequency of flooding in RD 2107, which is dependent on levee failures, would not change.

To ensure that the existing 1-in-100-AEP flood elevation and flood duration in RD 2107 would not be increased as a result of the proposed project, a removable levee segment would be constructed as an offsite feature along the northern Paradise Cut levee between I-5 and the western UPRR tracks. A slurry wall would be constructed on an approximately 100-foot segment of the levee. The top of the slurry wall would be 9 feet below the top of the levee. If the remaining portion of Stewart Tract floods, the 9 feet of levee soil above the slurry wall could be removed, allowing water to drain from Remaining Stewart Tract into Paradise Cut without compromising the overall levee integrity. The removable levee segment would be built to USACE standards and would provide flood protection equal to or better than the existing adjacent levee segments. In addition, the project proponent would purchase portable pumps to be used as needed to facilitate flood drainage in this area. Therefore, specific flooding impacts related to RD 2107 are considered less than significant.

The potential exists with any levee that boils can occur from seepage. In the RID Area, the existing nonlevee site elevations range from a high of approximately +16 feet NGVD to an elevation of approximately +3 feet NGVD. Existing groundwater elevations are maintained, through a system of open trenches and sump pumps, to a low elevation of approximately -3 feet NGVD. The proposed development would result in habitable property with a minimum elevation of +10 feet NGVD and include the construction of levee toe-drains and an open lake with an operational level of approximately +6 feet NGVD. Therefore, the proposed project generally would result in a longer flow path and an overall reduction in head differential between the river and dry sides of the levees. The increased flow path, head reduction, and increased width of the levees would serve to decrease the groundwater flow rate and reduce the potential for soil boils to occur.

Table 4.8-29 presents additional model simulation results showing flow splits between the San Joaquin River, Old River, and Paradise Cut at various flows. For the 1-in-4- to the 1-in-100-AEP floods, the project results in more water flowing into Paradise Cut and less water flowing into Old River and down the San Joaquin River. Flows in all channels are higher for the 1-in-200-AEP flood, which is described more fully below. The project results in additional floodflows moving west of Stewart Tract (combined Paradise Cut and Old River flows) from 0.5% to 4.1% for the 1-in-4- to 1-in-100-AEP floods.

Table 4.8-30 presents the proposed project's impacts on the maximum water surface elevations predicted by hydraulic model simulations for various locations in the project vicinity and flood recurrence intervals. Exhibits 4.8-53 through 4.8-57 present the same information graphically. There is no information presented herein for flood events more frequent than the 1-in-10-AEP flood because flooding potential would be unchanged with the proposed project. Results are discussed below for each affected waterway.

It should be noted that in an independent review commissioned by RD 17 of the hydraulic model used for this analysis, it was found that the model reliably simulates floodflows in the project vicinity. Results from the model can also be considered conservative, with simulated flood elevations expected to exceed actual conditions in the range of 0.50 foot (Orlob, pers. comm., 2002).

San Joaquin River - The project decreases the peak stage at all San Joaquin River locations for floods smaller than the 1-in-100-AEP flood (Table 4.8-30). The estimated 1-in-100-AEP peak flow in the San Joaquin River near Vernalis is approximately 77,000 cfs and has only a 1% chance of being equaled or exceeded in a given year. In the 1-in-50-AEP flood, which closely approximates the USACE design flow condition of 52,000 cfs, the project would result in a maximum decrease in the peak stage of 0.35 foot in the San Joaquin River. In the 1-in-200-AEP flood, which has a 0.5% chance of being equaled or exceeded in a given year, the project would increase the peak stage at all locations, with a maximum increase of 0.26 foot in the San Joaquin River at Paradise Cut. The benefits of decreasing peak stages for more common floodflows outweigh the negative impact of increasing peak stages for very rare events. For example, the project would have reduced San Joaquin River stages throughout the study area if it had been in place during the January 1997 event. The very rare flood events would result in substantial systemwide flooding either with or without the project. The much more common flood event (1-in-50-AEP flood) would be better contained in the local area with the proposed project compared to existing conditions. The project would not place housing, people or structures within the San Joaquin River's 1-in-100-AEP floodplain, nor would it expose people or structures downstream to a significant risk of loss, injury, or death involving flooding from this project. Therefore, potential impacts on San Joaquin River levees and flooding potential are considered to be less than significant.

Paradise Cut - During a 1-in-10-AEP flood, peak stages are increased throughout Paradise Cut except for a short reach immediately downstream of the weir. These increases in stage are less than significant because they occur at a relatively low flow for which there is 9–10 feet of freeboard at all locations. During a 1-in-50-AEP flood, the peak stages are reduced for the most part with a very small increase of less than 0.1 foot downstream of Paradise Road. During the 1-in-100-AEP flood, peak stages at the UPRR and downstream are increased by up to 0.66 foot, depending on the location in Paradise Cut. During a 1-in-200-AEP flood, the peak stages are increased by up to 2.16 feet, depending on the location in Paradise Cut. Once again, the benefit of decreasing peak stages for more common floodflows outweighs the negative impact of increasing peak stages for very rare events. Although Paradise Cut levees would be substantially strengthened adjacent to the RID Area, their heights (elevations) would still not be higher than the Paradise Cut levees on the side opposite the RID Area. No people or structures would be placed within a 1-in-100-AEP hazard area, and no people or structures would be exposed to a significant risk of loss, injury, or death involving flooding from this project. Therefore, potential impacts on Paradise Cut levees and flooding potential are considered to be less than significant.

Old River and Grant Line Canal - During a 1-in-10-AEP flood, peak stage changes are very small in Old River and the Grant Line Canal (Table 4.8-30) and the minimum 3 feet of available freeboard remains. During a 1-in-50-AEP or 1-in-100-AEP flood, peak stages in Old River at Middle River are nearly unchanged, with small increases of 0.14 foot or less downstream from the Paradise Cut-Old River confluence. During a 1-in-200-AEP flood, peak stages are increased by up to 0.66 foot, depending on the location along Old River. Less water flows into Old River from the San Joaquin River during all but the rare 1-in-200-AEP flood, but the increased Paradise Cut flows add to the Old River and Grant Line Canal stages downstream of Middle River. There is the minimum 3 feet of freeboard available at all flows up to, and including, the 1-in-200-AEP flood. The level of stage increase is small except with the rare 1-in-200-AEP flood. No people or structures would be placed within a 1-in-100-AEP hazard area, and no people or structures would be exposed to a significant risk of loss, injury, or death involving flooding from this project. Therefore, potential impacts on Old River and Grant Line Canal levees and flooding potential are considered to be less than significant.

Middle River - During a 1-in-10-AEP flood, peak stages on Middle River are decreased under the proposed project (Table 4.8-30). Stage reductions occur for all floods with an AEP of less than approximately 1 in 60. Peak stages experience small increases at floodflows with an AEP greater than 1 in 60. These increases (up to 3.6 inches) are relatively minor at a 200-year level. No people or structures would be placed within a 1-in-100-AEP hazard area, and no people or structures would be exposed to a significant risk of loss, injury, or death involving flooding from this project. Stage increases are relatively small, and the minimum 3 feet of freeboard is maintained at the 1-in-200-AEP flood. Therefore, impacts on Middle River levees and flooding potential are considered to be less than significant.

In summary, the net impact on flooding from the proposed project would result in benefits at floods up to the 1-in-100 AEP and only minor increases in flood elevations during floods greater than the 1-in-200 AEP. Based on the conservative nature of the hydraulic model, these increases could be expected to be even less than described in this analysis. Because the beneficial affects would occur much more frequently than potential impacts, and when impacts do occur they would result in only minor increases in flood elevations, this impact is considered less than significant.

Higher flow velocities in the downstream channels could exacerbate erosion during flooding and thereby contribute to levee failure, even if levee overtopping does not occur. Table 4.8-31 presents peak velocities in the various surrounding waterways for different levels of flood events.

For the San Joaquin River, velocities are increased by 3% (11.59 to 11.93 feet per second) during the 1-in-200-AEP flood event. Velocities are decreased by 12%, however, at the 1-in-50-AEP flood event and essentially unchanged at the 1-in-100-AEP flood event. Results for Paradise Cut are generally in the opposite direction, with flow velocities increased up to the 1-in-100 AEP but decreased at the 1-in-200 AEP. There is very little change whatsoever in velocities in Old River at Stewart Tract and downstream of Stewart Tract. Velocities at Grant Line Canal are relatively unchanged, except during the 1-in-200-AEP flood event, when velocities are increased by 9% (4.95 to 5.42 feet per second).

These results do not indicate a substantial change in velocities that would increase the risk of flooding to any measurable degree. Velocities generally are unchanged and are increased to any measurable degree only during the extremely rare 1-in-200 AEP on the San Joaquin River and Grant Line Canal. Based on the conservative nature of the hydraulic model used for this analysis, these increases could be expected to be even less than presented in this analysis. For these reasons, impacts on levees from increased velocities are considered less than significant.

Impact
4.8-n

Hydrology and Water Quality - Nonflood Hydrology in Surrounding Waterways.
Although the project results in minor changes to hydrologic conditions in the surrounding waterways, nonflood hydrology is not substantially affected. These impacts are considered ***less than significant***.

Under the proposed project, nonflood water volumes in the San Joaquin River would not be affected; because water would not be flowing over the Paradise Weir, there would be a net increase in water volume left in Old River because of reduced diversions into the RID Area (see Impact 4.8-f), and the volume of drain water discharged from the RID Area into Paradise Cut would be reduced (see Impact 4.8-h). Because of the widening and deepening of the Paradise Cut canal the canal's tidal prism would increase, resulting in greater flow exchange with Old River into and out of Paradise Cut. Although these hydrologic changes would occur, they are minor relative to the overall water volumes within the system and would not substantially alter the drainage pattern of the area or the flows in the surrounding waterways. Consequently, nonflood hydrologic impacts on surrounding waterways are considered to be less than significant.

Impact 4.8-o

Hydrology and Water Quality - Groundwater Quality During Construction. *During project construction, excavation activities could intersect shallow groundwater and result in sediments or contaminants entering the groundwater. This impact is considered* ***potentially significant****.*

Project construction activities, specifically excavations, could intersect with shallow groundwater and require dewatering. In particular this is expected to occur when constructing the central lake, the backbays, and deepening and widening of the Paradise Cut canal. Sediments and contaminants could enter the groundwater directly from construction activities where the groundwater table is breached. Some lateral movement of the affected groundwater in the shallow groundwater aquifer could also result, although such movement would be expected to be minor and not substantially change water quality. However, excavations and dewatering would cover a large area and would occur over a relatively long period (several months). Multiple small incidents of contamination, or larger single releases (e.g., fuel spill) could result in adverse affects to the shallow aquifer. Therefore, construction-related impacts on groundwater quality are considered potentially significant.

As previously mentioned, the proposed project would include constructing an interior lake. Fines migration into the lake is anticipated to be similar, or less than, the current condition that exists in the onsite open drainage ditches. The drainage ditches artificially depress the groundwater to an elevation of approximately -3 feet NGVD under current conditions. The proposed lake elevation would be approximately +6 feet NGVD (9 feet higher than the existing condition). Turbidity and total suspended solid measurements of the groundwater currently flowing in the ditches range from 73 to 160 parts per million (ppm) and from 32 to 230 ppm, respectively. Based on the relatively low percentage of fines migration under the current condition, and the reduction in head under the proposed condition, significant fines migration into the lake, which would affect groundwater, is not anticipated.

Impact 4.8-p

Hydrology and Water Quality - Groundwater Quality and Supply During Project Operation. *During project operation groundwater quality could be adversely affected through contaminants entering the Central Lake or the Paradise Cut Canal. Use of municipal water originating from City wells could affect groundwater supplies and quality if overdraft conditions or increases in total dissolved solids (TDS) occurred. However, available information indicates that adverse effects on groundwater quality and supply would not occur. This impact is considered* ***less than significant****.*

During project operation the proposed project would intersect groundwater at two locations, the central lake and the expanded Paradise Cut canal. Both these features would be set below the existing groundwater table, placing them in continuous direct contact with groundwater. However, these shallow groundwater tables are well above (75 feet or more) deeper groundwater tables used for potable water.

Groundwater could be adversely affected if improperly treated recycled water used for irrigation on the project site entered the Central Lake or the Paradise Cut Canal. However, recycled water to be used on the project site would meet all applicable water quality standards for Title 22 disinfected tertiary-treated effluent and the waste discharge and application requirements for its use. These standards and requirements are health based and designed to avoid public health hazards. Because the recycled water would be treated to a tertiary levels, it would be applied following Title 22 standards, and the depth to potable groundwater is substantial (75 feet or more), the proposed use of recycled water would not result in the percolation of pollutants to potable groundwater used for local private or municipal wells.

As described in Impact 4.8-b "Interior Lake Water Quality", potential impacts to water quality in the Central Lake related to stormwater are considered less than significant due to installation of multiple BMPs to treat stormwater before it enters the lake. Therefore, potential groundwater quality impacts resulting from direct contact with water in the lake would also be considered less than significant.

Water supply for the proposed project would come from a combination of groundwater and treated surface water, in accordance with the Lathrop Water, Wastewater, and Recycled Water Master Plan (Nolte Associates 2001). Regional trends show a gradual lowering of potable groundwater elevations and a more saline groundwater table. Cones of depression in the region are affecting groundwater flow, and a regional overdraft of groundwater supplies countywide continue to increase (Grunwald & Associates 1995). However, the analysis in the EIR evaluating the Master Plan found that groundwater extractions proposed in the plan would not have a significant affect on groundwater quality or supplies. (See impact 4.11-b in section 4.11, "Public Utilities," for a description of the Master Plan EIR analysis.) Because water filling the central lake would originate only from its intersection with the shallow groundwater table, stormwater runoff from the RID Area, and diversions from Old River, creation and operation of the central lake would not affect the City's groundwater supply.

Based on the conditions and information described above potential impacts to groundwater quality and supply associated with project operation are considered less than significant.

Impact
4.8-q

Hydrology and Water Quality - Water Supplies to Other Users. *Project operations could directly or indirectly affect water supplies to other water users. However, in most instances, the proposed project would have a beneficial effect on available water supplies. This impact is considered* ***less than significant****.*

The proposed project could directly affect the water supplies of others through two mechanisms; using regional supplies, thereby making them unavailable for others, or using local supplies, making them unavailable to others. Using regional supplies for the proposed project could affect others if such supplies are not appropriately planned. The City of Lathrop has taken proactive steps to secure its own future water supply through a combination of groundwater and surface water supplies that it is legally entitled to receive. Using these supplies for the proposed project makes these supplies unavailable for others to possibly use. Since the City of Lathrop has secured its water supplies legally and has rights to use its water supply, this impact is considered less than significant.

Using local supplies from surrounding waterways could also affect other water users. As evaluated under Impacts 4.8-f and 4.8-h, the proposed project would divert less water from the Delta for lake operations than for existing agricultural operations. The total reduction in use could be up to roughly 6,500 af annually. The project applicant is legally entitled to these local supplies via riparian and appropriative rights, but would be diverting less water locally with the project compared to existing conditions and diverting the water during times (i.e., late fall, winter) when water supply needs for local agriculture are not as high (i.e., winter). This is considered to be a beneficial effect.

The proposed project could indirectly affect the water supply of others through three other mechanisms: decreased water quality, decreased water surface elevations in the South Delta, or decreased water supply because of increased special-status fish mortalities.

Decreased water quality could affect supplies of other Delta users by making surface waters unsuitable for the desired uses (domestic water, irrigation). However, the proposed project would have a net benefit to water quality (see Impact 4.8-i) relative to current agricultural discharges. Consequently, the proposed project would not adversely affect water quality in a manner that would affect the water supply of other Delta users.

Decreased water surface elevations in the South Delta have been a serious concern for water users in the region. When the CVP and SWP export water, water levels in local channels are drawn down, making it difficult for some agricultural interests in the South Delta to divert water. However, as described above, under the proposed project, direct diversions from surrounding waterways would be reduced by up to roughly 6,500 af annually, resulting in a slight net increase in water available in surrounding waterways. The proposed levee and channel modifications would also not adversely affect water surface elevations during nonflood flows. The presence and operation of either the current temporary or proposed permanent fish barrier at the head of Old River (which is used in part to help manage South Delta surface water elevations) also would not be affected by the proposed project. The project would affect South Delta water surface elevations only during very infrequent floodflows when surface elevations might be raised slightly as a result of the proposed project. However, this would not affect available water supply.

Decreased water supply because of increased special-status fish mortalities could occur if the proposed project caused additional take of special-status species over and above what is experienced under existing conditions. Currently, the CVP and SWP exports can be substantially reduced if their prescribed take limits for certain species are approached, reached, or exceeded. Overall, the proposed project would have a long-term net benefit to Delta fisheries because of improvements to fish habitat, flows, fish screens, and water quality (see section 4.15, "Fisheries"). It is expected that the improved conditions from the proposed project, although relatively small, would nonetheless result in maintenance of existing populations of special-status species or slightly increase those populations. Any fish population or fish habitat benefits serve to promote recovery of special-status species that, in turn, benefits all Delta water users. The only mechanism of the proposed project to potentially affect fish populations in a way that might indirectly decrease water supply occurs when the proposed project would induce a slightly greater volume of flood flows to flow toward the CVP and SWP pumps in the South Delta rather than to flow down the San Joaquin River. These conditions are rare and would occur when river and Delta flows are substantial, primarily during the winter and early spring of high flow years only. The very infrequent and small potential effects are too speculative to conclude that there is any measurable effect. Consequently, reductions in available CVP or SWP water supplies are not expected to occur as a result of higher flood flows (and possibly fish) toward the export pumps.

Through each of these mechanisms, individually and combined, the proposed project does not measurably reduce water supplies to other water users. Therefore, this impact is considered less than significant.

4.8.4 MITIGATION MEASURES

No mitigation measures are necessary for the following beneficial or less-than-significant impacts.

4.8-b	Interior Lake Water Quality
4.8-f	Diversion Effects on Old River Hydrology
4.8-g	Diversion Effects on Old River Water Quality
4.8-h	Water Discharges to the Delta (Hydrology)
4.8-i	Water Discharges to the Delta (Water Quality)
4.8-l	Flood Protection for the RID Area
4.8-m	Surrounding Flood Stage Elevations
4.8-n	Nonflood Hydrology in Surrounding Waterways
4.8-p	Groundwater Quality and Supply During Project Operation
4.8-q	Water Supplies to Other Users

The following mitigation measures are provided for significant and potentially significant impacts.

4.8-a **RID Area Construction Sediment and Water Quality Contamination.** General construction activities within the RID Area could impair existing water bodies. Two key plans will be prepared and implemented: a Stormwater Pollution Prevention Plan (SWPPP) (including an erosion control and construction plan) and an environmental monitoring and mitigation compliance and reporting program. Development and implementation of both plans would be coordinated. The City shall ensure the following measures are completed:

- Prepare and implement a SWPPP prior to any construction activities that meets the requirements for the California General Permit for construction projects regulated under the NPDES and includes specific BMPs to avoid and minimize impacts on water quality during construction activities. The goals of the SWPPP will generally be to protect water quality; establish procedures to minimize accelerated soil erosion; minimize accelerated sedimentation into the internal drainage system, the San Joaquin River, Old River, and Paradise Cut; minimize non-stormwater runoff; and ensure long-term reestablishment of preconstruction site conditions where practical. The SWPPP will include measures to prevent, control, and minimize impacts from a spill of hazardous, toxic, or petroleum substances during construction of the proposed project, as well as a description of potentially hazardous and non-hazardous materials that could be accidentally spilled, potential spill sources, potential spill causes, proper storage and transport methods, spill containment and recovery measures, agency notification, and responsible parties. All water quality, erosion, and sediment control measures included in the SWPPP will be implemented in accordance with the guidelines set forth in the

SWPPP. The SWPPP will also identify responsibilities of all parties, contingency measures, agency contacts, and training requirements and documentation for those personnel responsible for installation, inspection, maintenance, and repair of BMPs, as well as those responsible for overseeing, revising, and amending the SWPPP.

Also addressed in the SWPPP will be identification construction sites, activities, and schedules; temporary storage and borrow areas; construction materials handling and disposal; dewatering and treatment and disposal of groundwater removed from excavations; discharges; equipment washing; inspection and maintenance measures; final stabilization and clean up; and appropriate use of seeding, mulching, erosion control blankets, and other erosion control measures.

The SWPPP would include an erosion control plan. The general goals of this plan would be to minimize runoff from leaving construction sites, remove sediment from onsite runoff before it leaves the site, slow runoff rates across construction sites, and provide soil stabilization during and after construction.

- Prepare and implement a comprehensive environmental monitoring and mitigation compliance and reporting program for construction and operations of the entire project. The plan will focus on required mitigation measures and will establish clear standards for environmental compliance, construction inspection and monitoring, environmental awareness training, contractor and agency roles and responsibilities, compliance levels and reporting procedures, variance request and response procedures, and communications protocols. The goal is to ensure that mitigation and all required permit terms and conditions are implemented.

The project proponent would also obtain all necessary permits and meet all requirements specified by local, state, or federal agencies in whole or in part responsible for water quality protection, including, but not limited to:

- California Department of Fish and Game Code 1600 Lake and Streambed Alteration Agreement
- RWQCB Section 401 certification or waiver
- NPDES Storm Water Pollution Prevention Permit for General Construction
- Clean Water Act Section 404 and Rivers and Harbors Act Section 10 compliance through the USACE
- Incidental take authorization from the U.S. Fish and Wildlife Service and National Marine Fisheries Service regarding endangered species
- California State Lands Use Lease Permit (Public Trust), Reclamation Board Encroachment Permit.

Spills from construction equipment could release contaminates to waterways. To avoid contamination, the project applicant shall comply with the measures mentioned above, at a minimum, and implement the following best management practices:

- Ensure proper storage and handling of hazardous materials, chemicals, fuels, and oils during construction. No storage of such materials will be permitted within 150 feet of any drainage, wetland, water supply well, spring, or other water feature.

- No fueling of mobile construction equipment will be performed within 150 feet of any drainage, wetland, water supply well, spring, or other water feature. Stationary equipment (e.g., directional drilling rigs) may be refueled at the site of operation using proper BMPs and containment measures.

- Make efforts to store only enough product necessary to complete the job.

- Store onsite hazardous materials within double-containment per RCRA requirements in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure to provide secondary containment.

- Keep products in their original containers with the original manufacturer's label.

- Do not mix substances with one another unless recommended by the manufacturer.

- Do not dispose of containers with residual hazardous materials without proper sealing.
- Follow manufacturer's recommendations for proper use and disposal of a product. All pertinent information can be found on the Material Safety Data Sheets (MSDS) for each product. The MSDS sheets should be kept with each product container.

- If surplus product must be disposed of, the manufacturer-recommended or the local- and state-recommended methods for proper disposal will be followed.

- Dispose of all hazardous and non-hazardous products (fuels and petroleum products, fertilizers, chemicals, sanitary wastes, etc.) in a proper manner offsite and not within the RID Area.

- Onsite vehicles will be monitored for fluid leaks and receive regular maintenance to reduce the chance of leakage. Drip pans for construction equipment will be used.

- Bulk storage tanks having a capacity of more than 55 gallons will have secondary containment (a prefabricated temporary containment mat, a temporary earthen berm, or other measure can provide containment). After any rainfall, the contractor will inspect the contents of any secondary containment area. If there is no visible sheen on collected water, it can be pumped onto the ground in a manner that does not cause scouring. If sheen is present, it must be cleaned up prior to discharge of the water.

Implementation of Mitigation Measure 4.8-a would reduce potential water quality impacts related to construction in the RID Area to less-than-significant levels.

4.8-c **Earth Moving in or Adjacent to Water Bodies.** Levee breaching and earth moving adjacent to the San Joaquin River, Old River, and Paradise Cut could increase short-term turbidity and release small quantities of construction-related contaminants within the local disturbance area. To reduce turbidity impacts, the project proponent shall, to the extent possible:

- Perform breaching operations and all other in-river work, or work immediately adjacent to the rivers, during low tide and during low flows.

- Work in Paradise Cut only when floodwaters from the San Joaquin River are not present in the cut and there is no immediate threat of floodwaters overtopping the Paradise Weir.

- Perform all interior dredging, grading, and construction of in-water facilities (e.g. dock installation) in the back bays and the widened Paradise Cut channel before breaching levees to the adjacent water body. Soils that will be inundated after breaching will be stabilized to the extent possible to minimize erosion and sediment backwash as these constructed water bodies initially fill.

- Adhere to all local, state, and federal regulations regarding turbidity reduction measures applicable to this activity, including developing and implementing a SWPPP.
- Adhere to applicable requirements in Mitigation Measure 4.8-a.

Implementation of Mitigation Measure 4.8-c would reduce impacts associated with breaching levees and back bay construction to less-than-significant levels.

4.8-d **In-Water Project Features.** Implementation of Mitigation Measures 4.8-a and 4.8-c would reduce potential sedimentation/water quality impacts associated with constructing bridges and docks on the San Joaquin River, Old River, and/or Paradise Cut to less-than-significant levels.

4.8-e **Utility Crossings.** Based on the assumption that a frac-out may occur during directional drilling under the San Joaquin River, the following detection, containment, and prevention procedures will be implemented by the project applicant to mitigate the potential effects of a frac-out:

- Provide an environmental monitor during all boring operations. A drill site orientation meeting will be held before drilling begins involving the drill crew and the environmental monitor. During the meeting, the drill crew members will be made aware of sensitive resources in the area and will be trained on how to respond in the event a frac-out occurs.

- Before a drilling operation begins, a reconnaissance survey will be made by the drill crew chief and environmental monitor to identify conditions that may indicate a greater likelihood for frac-outs, and site features that may be affected should a frac-out occur (e.g. San Joaquin River, levees, irrigation canals). The reconnaissance survey will then be used to establish the final drill location and the level of monitoring for the drill site.

- If substrates in the bore area are considered particularly sensitive to frac-outs, boring measures will be implemented that reduce the potential for a frac-out (e.g., using extra low pressures and nontoxic leak sealants).

- Detection of a frac-out may come about from observed loss in drilling pressure, slowdown in the volume of returned drilling slurry, or visual observation of drilling slurry escaping into water or land. In the event that a frac-out is detected, drilling operations will cease immediately and the environmental monitor will be notified. Treatment of the frac-out after the drilling operation is stopped involves containing any extruded drilling slurry, reporting, and cleanup. In rare instances the best approach may be to continue boring while the frac-out occurs and containing/cleaning-up drilling slurry as it is released. Circumstances leading to adoption of this approach (e.g. risk of the drill-head seizing if drilling stops, the bore is almost complete) should be identified with the environmental monitor prior to initiating drilling and described to the appropriate permitting agencies.

- The environmental monitor will immediately notify by telephone the appropriate office of the CDFG, RWQCB, and other appropriate permitting agencies of any frac-out that may affect areas under their jurisdictions.
- The contractor will also follow relevant measures contained in Mitigation Measures 4.8-a and 4.8-c as appropriate to avoid sediment entering the San Joaquin River at bore hole entrance and exit points.

Implementation of Mitigation Measures 4.8-e would reduce potential impacts associated with the directional bore under the San Joaquin River to less-than-significant levels.

4.8-j **Maintenance Dredging of Back Bays.** Maintenance dredging of back bays could increase short-term turbidity and release small quantities of construction-related contaminants within the local disturbance area every time the back bays are dredged. To reduce turbidity impacts, the project proponent shall, to the extent possible:

- Perform dredging during low tide and during low flows.

- Use suction dredging to minimize sediment releases.

- Adhere to all local, state, and federal regulations regarding turbidity reduction measures and dredged material disposal applicable to this activity, including developing and implementing a SWPPP.

- Adhere to Mitigation Measure 4.8-a.

Implementation of Mitigation Measures 4.8-j would reduce potential turbidity and contamination impacts associated with maintenance dredging of back bays to less-than-significant levels.

4.8-k **Increased Boat Traffic.** The project applicant would limit boat speeds by establishing "no-wake zones" with maximum 5-mph speeds in all back bays and in locations where docks are installed along the San Joaquin River, Old River, and Paradise Cut. In addition, the project applicant shall implement the following mitigation measures to further decrease wave action on levees surrounding the project area and minimize fuel spills and associated boat-related discharges:

- Post waterway markers for no-wake zones in accordance with the State's Waterway Marking System regulations (CCR §7000 et seq.).

- Provide project residents boater education materials that could include pollution prevention guides developed by the San Francisco Estuary Project and the San Francisco RWQCB, maps identifying the locations of pumpout and fueling facilities in Delta, and the effects of boat wakes on shoreline erosion and water quality. These materials would also be made available at public docks at Lathrop Landing and the backbays.

- Post information on pertinent local, state, and federal laws regarding procedures and equipment for fueling watercraft at all River Islands docks on the external water system (Old River, San Joaquin River, Paradise Cut).

- Post waste discharge requirements and describe proper methods for disposing of waste at all River Islands docks on the external water system.

- Provide and maintain waste collection receptacles (e.g. trash cans) at all group docks on the external water system.

Implementation of Mitigation Measure 4.8-k would reduce impacts associated with wake induced shoreline erosion and boat-related discharges from increased boat traffic to less-than-significant levels.

4.8-o **Groundwater Quality during Construction.** The SWPPP developed and implemented as part of Mitigation Measure 4.8-a must specifically include measures to prevent/minimize sediment and contaminant releases into groundwater during excavations and methods to clean up releases if they do occur. These may include using temporary berms or dikes to isolate portions of central lake construction activities; using vacuum trucks to capture contaminant releases; and maintaining floating booms, absorbent pads, and other containment and cleanup materials onsite to allow an immediate response to contaminant releases if they occur.

Implementation of Mitigation Measures 4.8-o would reduce potentially significant impacts to groundwater quality during construction to a less-than-significant level.

4.8.5 RESIDUAL SIGNIFICANT IMPACTS

No residual significant impacts on water quality or hydrology would occur with implementation of the mitigation measures recommended in this section.

Table 4.8-1
Waste Discharge Requirements for the Mountain House Project

Constituent	Units	Method of Disposal		
		Surface Water (San Joaquin River)	Discharge to Land	
			Minimum Public Access [1]	Significant Public Access [2]
Biochemical oxygen demand, 5-day	mg/l	10	30	10
Suspended solids	mg/l	10	--	--
Settleable solids	mg/l	0.1	0.2	--
Total coliform	MPN/100 ml	2.2 / 23 [3]	23 [4]	2.2 / 23 [5]
Turbidity	NTU [6]	2	--	2
Acute toxicity	% survival	70 / 90 [7]	--	--
Chlorine	mg/l	<0.01	--	--
Residual oil and grease	mg/l	10	--	--

1 Examples of land application with minimum public access include the irrigation of fodder and fiber crops.
2 Examples of land application with significant public access include irrigation of golf courses, parks, playgrounds, school yards, and residential landscaping.
3 First value represents monthly median; second value represents daily maximum.
4 Monthly median value.
5 First value represents 7-day median; second value represents 7-day maximum.
6 Nephelometric Turbidity Unit.
7 First value represents minimum survivability for one bioassay; second value represents median survivability for three or more consecutive bioassays.

Source: EDAW 2001

Table 4.8-2
1998 California Section 303(d) Listed (Impaired) Water Bodies in the Project Area

Water Body	Pollutant/Stressor	Listed Source
Delta waterways	Chlorpyrifos DDT Diazinon Electrical conductivity Group A pesticides [1] Mercury Organic enrichment/low dissolved oxygen Unknown toxicity	Agriculture, urban runoff Agriculture Agriculture Agriculture Agriculture Abandoned mines Municipal point sources Source unknown
Lower San Joaquin River	Boron Chlorpyrifos DDT Diazinon Electrical conductivity	Agriculture Agriculture Agriculture Agriculture Agriculture
Stockton Deep Water Channel	Dioxin Furans PCBs	Point source (EPA listing) Point source (EPA listing) Point source (EPA listing)

[1] Group A pesticides include the following organochlorine pesticides: aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexane (including lindane), endosulfan, and toxaphene. Many of these pesticides have been banned from use.

Source: EDAW 2001

Table 4.8-3
Title 22 Disinfected Tertiary Recycled Water Standards for Unrestricted Use

Constituent	Standard
Turbidity	24-hour average: < 2 NTU Less than 5% of values: > 5 NTU At all times: < 10 NTU
Total coliform bacteria	Running 7-day median: < 2.2 MPN/100 ml Once every 30 days: > 23 MPN/100 ml At all times: < 240 MPN/100 ml
Biochemical oxygen demand, 5-day	At all times: < 10 mg/l
Total suspended solids	At all times: < 10 mg/l

Source: EDAW 2001

Table 4.8-4
Estimated Annual Volume of Irrigation Water Pumped into the RID Area for Irrigation

Water Year	Volume Pumped (af)
1984	13,333
1985	14,198
1986	11,647
1987	16,547
1988	16,584
1989	13,536
1990	13,380
1991	12,531
1992	13,306
1993	15,605
1994	15,889
1995	12,868
1996	14,382
1997	11,830
1998	10,396
1999	12,711
2000	14,096
Minimum	10,396
Mean	13,696
Maximum	16,584

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-5
Estimated Mean Monthly Volume of Water Pumped into the RID Area for Irrigation

Month	Volume Pumped (af)
January	114
February	201
March	632
April	1,342
May	1,780
June	2,633
July	3,030
August	2,375
September	821
October	178
November	181
December	132
Minimum	114
Mean	1,118
Maximum	3,030

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-6 Estimated Annual Drain Pump Discharge into Paradise Cut	
Year	Annual Volume Pumped (af)
1990	9,316
1991	7,300
1992	10,349
1993	6,440
1994	7,961
1995	9,311
1996	11,341
1997	6,799
1998	10,507
1999	8,860
2000	7,651
Mean annual	8,712
Source: HSI Hydrologic Systems 2002a	

Table 4.8-7 Estimated Mean Monthly Drain Pump Discharge into Paradise Cut			
Month	**Average Total Monthly Usage**		**Adjusted Volume Pumped (af)**
	(KWh)	**(HP-hrs)**	
January	4,760	6,381	280
February	6,950	9,316	408
March	6,734	9,026	396
April	10,737	14,393	631
May	18,784	25,180	1,104
June	24,895	33,371	1,463
July	27,027	36,229	1,588
August	22,233	29,803	1,306
September	13,474	18,062	792
October	6,085	8,157	358
November	2,865	3,841	168
December	2,662	3,569	156
Mean monthly	12,267	16,444	721
Source: HSI Hydrologic Systems 2002a			

Table 4.8-8 Monthly Frequency of Flood Flows Entering Paradise Cut			
Month	Number of Mean Daily Flow Records[1]	Number of Days Water Would Flow across Paradise Weir[2]	Percent of Days Water Would Flow across Paradise Weir
January	744	82	11.0%
February	678	100	14.7%
March	744	119	16.0%
April	720	130	18.1%
May	744	95	12.8%
June	720	54	7.5%
July	713	20	2.8%
August	713	0	0
September	690	0	0
October	713	0	0
November	690	0	0
December	713	31	4.3%

[1] January 1979 through June 2002. Period of record since last significant flood control reservoir was constructed in San Joaquin River basin.

[2] Number of days in which the mean daily flow in the San Joaquin River near Vernalis was equal to or exceeded 18,000 cfs.

Source: Data received from MBK Engineers 2002

Table 4.8-9
Water Quality Monitoring Sites in the Vicinity of River Islands

Monitoring Program	Site Description	General Period of Monitoring Data [1]
DWR-MWQI	San Joaquin River near Vernalis	Jan 1990 - Aug 1999
DWR-MWQI and DWR-D-1485	San Joaquin River at Mossdale Bridge	Jan 1990 - Jun 1999
DWR-MWQI	San Joaquin River at Highway 4	Nov 1997 - Aug 1999
City of Stockton	San Joaquin River at RWCF-R2	Jan 1997 - Mar 2000
City of Stockton	San Joaquin River at RWCF-R5 (in Stockton Deep Water Channel)	Jan 1997 - Mar 2000
DWR-MWQI	Delta-Mendota Canal intake at Lindemann Road	Jan 1990 - May 1999
DWR-MWQI	Old River near Byron (MWQI Station #9)	Jan 1990 - Aug 1999

[1] Dates shown represent maximum time periods covered by certain data sets.

Source: EDAW 2001

Table 4.8-10
Comparisons of Surface Water Quality with Water Quality Criteria

Parameter	Minimum Relevant WQ Criteria	Regulatory Source	Frequency of Compliance[1]	Monitoring Sites
Total dissolved solids	None	n/a	n/a	All DWR-MWQI sites listed in Table 4.8-9
Total organic carbon	None	n/a	n/a	SJR near Vernalis SJR at Hwy 4 Old River near Byron
Fecal coliform	200 MPN/100 ml	**Basin Plan**	55.5% 60.0% 81.8% 90.9%	SJR near Vernalis SJR at Mossdale Bridge DMC Intake at Lindemann Road Old River near Byron
Dissolved oxygen	5 mg/l 5 mg/ 5 mg/l	**Basin Plan**	100% 100% 98.9%	SJR near Vernalis SJR at Mossdale Bridge SJR at Stockton RWCF-R2
	5 mg/l **6 mg/l**	Dec 1 - Aug 31 Sept 1 - Nov 30	76.8% 36.8%	SJR at Stockton RWCF-R5 SJR at Stockton RWCF-R5
	5 mg/l 5 mg/l		99.2% 100%	DMC intake at Lindemann Road Old River near Byron
Electrical conductivity (as specific conductance) Objectives for San Joaquin River near Vernalis	A. [3] 700 μmhos/cm Apr 1 - Aug 31 B. [3] 1,000 μmhos/cm Sept 1 - Mar 31	**Basin Plan**	**A, B** 62.0%, 89.8% 57.1%, 93.3% 100%, 100% 97.7%, 98.0% 93.2%, 100% 79.0%, 100% 87.2%, 100%	 SJR near Vernalis SJR at Mossdale Bridge SJR at Hwy 4 SJR at Stockton RWCF-R2 SJR at Stockton RWCF-R5 DMC intake at Lindemann Road Old River near Byron
pH	6.5-8.5 standard units	**Basin Plan**	98.2% 89.1% 100% 100% 100% 98.6% 97.3%	SJR near Vernalis SJR at Mossdale Bridge SJR at Hwy 4 SJR at Stockton RWCF-R2 SJR at Stockton RWCF-R5 DMC Intake at Lindemann Road Old River near Byron
Temperature	None	n/a	n/a	All monitoring sites listed in Table 4.8-9
Ammonia, dissolved as N	Ammonia toxicity sliding scale based on pH	**EPA**	100%	No ammonia toxicity observed at any monitoring site listed in Table 4.8-9
Copper, dissolved	5.12 μg/l [2]	**CTR**	97.8%	SJR near Vernalis

[1] Frequency of compliance calculated as percent of data in compliance with relevant water quality criterion.
[2] Dissolved copper criterion is based on specific calculation where field-measured hardness = 52.0 mg/l. Only a single exceedence of the CTR hardness-based dissolved copper criterion was observed for the San Joaquin River near Vernalis data set.
[3] The Basin Plan has two EC objectives for the locations noted and are a function of the time of year. The A value reflects the Basin Plan objective for April 1 - August 31. The B value reflects the Basin Plan objective for September 1 - March 31. The corresponding percentages reflect the frequency of compliance of the receiving water with the seasonal objective.
n/a = not applicable
SJR = San Joaquin River
DMC = Delta-Mendota Canal

Source: EDAW 2001

Table 4.8-11
Existing Spring and Summer Water Quality Conditions in San Joaquin River, Old River, and Paradise Cut - Metals

	Season	Date	Sample Filtered	Metals								
				Aluminum (μg/l)	Nickel (μg/l)	Copper (μg/l)	Zinc (μg/l)	Arsenic (μg/l)	Selenium (μg/l)	Barium (μg/l)	Thallium (μg/l)	Lead (μg/l)
San Joaquin River	Spring	May 21, 2001	N	1,420	3.20	3.42	3.69	1.92	1.27	45.6	0.024	0.764
	Summer	August 2, 2001	N	532	3.28	3.29	3.36	3.24	3.07	56.8	0.01	0.652
		Average	N	976	3.24	3.36	3.53	2.58	2.17	51.2	0.01	0.708
	Spring	May 21, 2001	Filtered	5.8	1.46	1.56	1.50	1.71	1.72	34.3	0.021	0.331
	Summer	August 2, 2001	Filtered	4.8	1.56	1.82	1.45	2.95	3.41	47.0	0.001	0.256
		Average	Filtered	5.3	1.51	1.69	1.48	2.33	2.565	40.7	0.011	0.294
Old River	Spring	May 21, 2001	N	1,040	2.47	3.23	3.77	1.88	1.48	35.1	0.014	0.702
	Summer	August 2, 2001	N	283	2.44	2.69	2.22	3.48	3.20	53.9	0.005	0.573
		Average	N	662	2.46	2.96	3.00	2.68	2.34	44.5	0.0095	0.638
	Spring	May 21, 2001	Filtered	6.9	1.36	1.43	2.12	1.51	1.27	27.1	0.011	0.344
	Summer	August 2, 2001	Filtered	3.5	1.33	1.76	1.26	3.07	3.63	47.6	<0.001	0.254
		Average	Filtered	5.2	1.35	1.60	1.69	2.29	2.45	37.35	0.006	0.299
Paradise Cut	Spring	May 21, 2001	N	333	4.63	4.66	2.96	4.74	4.53	75.3	0.014	1.93
	Summer	August 2, 2001	N	312	3.89	4.30	1.24	5.33	5.01	109	0.005	0.65
		Average	N	323	4.26	4.48	2.10	5.04	4.77	92	0.010	1.29
	Spring	May 21, 2001	Filtered	2.3	3.86	3.28	0.48	3.86	4.77	67.4	0.011	0.204
	Summer	August 2, 2001	Filtered	7.6	3.41	3.12	0.92	3.06	4.89	97.0	<0.001	0.342
		Average	Filtered	5.0	3.64	3.20	0.7	3.46	4.83	82.2	0.006	0.27

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-12
Existing Spring and Summer Water Quality Conditions in San Joaquin River, Old River, and Paradise Cut - Nutrients

	Season	Date	Nutrients								
			Ammonium (μg/l)	Nitrate-Nitrite as Nitrate (μg/l)	Total Phosphorus (μg/l)	Soluble Reactive Phosphorus (μg/l)	Ammonia as NH_3 (mg/l)	Phosphorus (mg/l)	Nitrate as NO_3 (mg/l)	Nitrite as NO_2 (mg/l)	Phosphate (mg/l)
San Joaquin River	Spring	May 21, 2001	45	1,100	220	100	N/A	N/A	N/A	N/A	N/A
	Summer	August 16, 2001	N/A	N/A	N/A	N/A	4.8	0.12	8.3	ND	0.69
		Average	26	1,100	220	100	4.8	0.12	8.3	ND	0.69
Old River	Spring	May 21, 2001	39	890	160	91	N/A	N/A	N/A	N/A	N/A
	Summer	August 16, 2001	N/A	N/A	N/A	N/A	3.9	0.14	8.8	ND	0.69
		Average	29	845	160	91	3.9	0.14	8.8	ND	0.69
Paradise Cut	Spring	May 21, 2001	270	860	240	61	N/A	N/A	N/A	N/A	N/A
	Summer	August 16, 2001	N/A	N/A	N/A	N/A	4.6	0.095	6.7	ND	0.87
		Average	250	805	240	61	4.6	0.095	6.7	ND	0.87

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-13
Existing Spring and Summer Water Quality Conditions in San Joaquin River, Old River, and Paradise Cut – Conventional Constituents

	Season	Date	Conventional Constituents					
			Hardness (ppm)	Total Alkalinity (ppm)	Chloride (ppm)	pH	EC (μmhos/cm)	Temperature (degrees F)
San Joaquin River	Spring	May 21, 2001	130	68	55	7.3	1,420	82.0
	Summer	August 16, 2001	190	290	97	8.2	N/A	N/A
		Average	160	179	76	7.8	1,420	82.0
Old River	Spring	May 21, 2001	100	53	43	8.7	2,022	86.5
	Summer	August 16, 2001	190	120	97	8.4	N/A	N/A
		Average	145	86.5	70	8.5	2,022	86.5
Paradise Cut	Spring	May 21, 2001	450	200	240	7.9	412	75.3
	Summer	August 16, 2001	380	170	240	7.6	N/A	N/A
		Average	415	185	240	7.7	412	75.3

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-14
Existing Year-Round Water Quality Conditions in
San Joaquin River, Old River, and Paradise Cut - Conventional Constituents

	Sample Site	Date	Time	Conventional Constituents						
				Water Temperature (degrees F)	pH	Specific Conductivity (μmhos/cm)	DO (mg/l)	Turbidity (NTU)	BOD (mg/l)	TDS
San Joaquin River	SW-SJ2	February 23, 1999	15:10	54.5	8.3	184	10.55		N/A	345
	SW-SJ2	July 22, 1999	10:45	74.8	8.3	573	10.15		ND	380
	SW-SJ2	September 9, 1999	7:35	72.1	8.2	644	8.30	32	11.1	277
	SW-SJ2	October 21, 1999	9:45	61.2	7.8	535	8.50		1.4	476
	SW-SJ2	December 7, 1999	9:10	48.9	8.0	802	10.15		<1.0	482
	SW-SJ2	February 2, 2000	9:40	54.0	7.8	830	8.50	37	3	500
Old River	SW-OR2	February 13, 1999	12:30	50.4	8.2	159	10.25		ND	191
	SW-OR2	March 15, 1999	15:00	53.6	8.0	267	10.75		ND	191
	SW-OR3	July 22, 1999	13:30	74.8	7.5	656	7.60		3.7	334
	SW-OR2	September 9, 1999	9:40	73.4	8.0	634	7.10	45	<1.0	372
	SW-OR2	October 21, 1999	10:25	61.0	7.7	578	8.45		1.3	288
	SW-OR2	December 7, 1999	9:50	50.2	7.7	788	10.00		<1.0	459
	SW-OR2	February 2, 2000	10:10	54.3	7.7	838	8.15	36	1.8	470
Paradise Cut	SW-PA5	February 13, 1999	14:20	50.0	7.8	1,463	9.00		8.94	713
	SW-PA5	March 15, 1999	13:00	55.2	7.9	1,073	10.50		8.94	713
	SW-PA5	July 22, 1999	13:40	72.3	6.9	1,228	4.00		11.4	777
	SW-PA5	September 9, 1999	11:00	70.9	7.7	1,192	5.25	49	23.7	733
	SW-PA5	October 21, 1999	12:10	61.0	7.7	1,470	7.05		10.6	986
	SW-PA5	December 7, 1999	10:55	49.6	7.4	1,840	7.20		<1.0	1,115
	SW-PA5	February 2, 2000	11:35	53.2	7.4	1,885	5.60	37	<1.0	1,200

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-15
Existing Year-Round Water Quality Conditions in San Joaquin River, Old River, and Paradise Cut - Chemical Constituents

			General Minerals	Conventional Chemistry Parameters											Anions		
	Sample Location	Date	Hardness (mg/l)	Ammonia as NH_3 (mg/l)	Nitrate as NO_3 (mg/l)	TKN (mg/l)	COD (mg/l)	TOC (mg/l)	MBAS (mg/l)	Total Alkalinity (mg/l)	Volatile Solids (mg/l)	Total Solids (mg/l)	Total Suspended Solids (mg/l)	Chloride (mg/l)	Flouride (mg/l)	Sulfate as SO_4 (mg/l)
San Joaquin River	SW-SJ2	July 22, 1999		ND	8.73	ND	ND	4.29						77.0		
	SW-SJ2	September 9, 1999		ND	9.4	<0.5		3.51			89.0	402		79.9		
	SW-SJ2	October 21, 1999		0.172	6.37	0.818		3.28			69.0	331.0				
	SW-SJ2	December 7, 1999		0.257	7.6	<0.5		3.37			190.0		21.0			
	SW-SJ2	February 2, 2000		0.323	8.54	1.27					100.0		46.0			
	SW-SJ1	February 2, 2000		0.524	8.35	1.55		5.63			85.0		48.0	107		
Old River	SW-OR3	February 23, 1999	68.3	ND		ND	30.5	2.94	0.0521	44.1				46		40
	SW-OR3	March 15, 1999	68.3	ND		ND	30.5	2.94	0.0521	44.1				46		40
	SW-OR3	July 22, 1999		ND	8.35	ND	ND	4.13						71		
	SW-OR2	September 9, 1999		0.336	8.55	<0.5		3.68			110.0	401.0		74.9		
	SW-OR2	October 21, 1999		0.505	5.89	<0.5		3.38			150	311		54.2		
	SW-OR2	December 7, 1999		0.175	7.89	<0.5		3.33			300.0		17.0	109.0		
	SW-OR2	February 2, 2000		0.208	8.89	1.14					110.0		36.0			
	SW-OR3	February 2, 2000	165	0.216	9.28	0.774		5.33	0.0689	126	87.0		18.0	109.0	<1.0	110.0
Paradise Cut	SW-PA5	February 23, 1999	346	ND		0.21	22.2	3.64	ND	117				210.0		120.0
	SW-PA5	March 15, 1999	346	ND		0.21	22.2	3.64	ND	117				210.0		120.0
	SW-PA5	July 22, 1999		0.587	7.54	2.2	ND	7.31						213		
	SW-PA3	July 22, 1999		0.424	7.22	2.09	ND	8.41						213		
	SW-PA5	September 9, 1999		0.20	5.17	0.66		5.38			200	786		191		
	SW-PA3	September 9, 1999		0.90	6.20	0.51		5.25		161	160	764		195	<1.0	142
	SW-PA5	October 21, 1999		<0.1	3.28	0.83		4.9			430	985		274		
	SW-PA3	October 21, 1999	441	<0.1	3.71	1.89		4.82	ND	171	430	1,000		269	7.0	161
	SW-PA5	December 7, 1999		<0.1	8.30	<0.5		3.45			340		7	343		
	SW-PA3	December 7, 1999	462	<0.1	8.29	0.77		3.45	<0.05	157	360		9	349	<1.0	
	SW-PA5	February 2, 2000		0.14	4.47	<0.5		3.20			280		29	345		
	SW-PA3	February 2, 2000	520	0.15	4.32	<0.5		3.08	<0.05	151	380		32	373	<1.0	203

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-16
Surface Water Monitoring at the RID Area Drainage Pump

Chemical Class (Testing Location)	Constituent	Units	March 22, 2002 Concentrations	April 15, 2002 Concentrations	Average Concentrations	Detection Limit of Equipment
Conventional (onsite)	Dissolved oxygen	mg/l	10.4	11.7	11.05	
	Turbidity	NTU	48	149	98.5	
	Electrical conductivity	ms/cm	2.37	0	1.185	
	Temperature	degrees F	61.3	54.3	57.8	
	Temperature	degrees C	16.3	12.4	14.35	
Conventional (Lab 1)	Total alkalinity	mg/l	250	220	235	
	Ammonia as NH_3	mg/l	1.6	3.8	2.7	
	pH	pH units	7.67	7.46	7.57	
	TSS	mg/l	50	32	41	
	Hardness	mg/l	170	400	285	
	Chloride	mg/l	610	250	430	
	Nitrate as NO_3	mg/l	0.46	1.6	1.03	
	Nitrite as NO_2	mg/l	ND	ND	ND	1.0
	Orthophosphate as PO_4	mg/l	ND	0.99	0.99	0.50
	Phosphorus	mg/l	0.16	0.67	0.415	
	Aluminum	μg/l	1,050	544	797	
	Nickel	μg/l	4.87	6.28	5.58	
	Copper	μg/l	3.89	3.48	3.69	
	Zinc	μg/l	1.50	9.74	5.62	
	Arsenic	μg/l	6.55	12.20	9.38	
	Selenium	μg/l	8.08	4.88	6.48	
	Barium	μg/l	143	80.4	111.7	
	Thallium	μg/l	0.018	0.026	0.022	
	Lead	μg/l	0.577	0.821	0.699	
	Aluminum	μg/l	7.5	1.1	4.3	
	Nickel	μg/l	3.55	4.53	4.04	
	Copper	μg/l	2.91	2.81	2.86	
	Zinc	μg/l	0.71	7.49	4.10	
	Arsenic	μg/l	5.18	9.40	7.29	
	Selenium	μg/l	8.07	5.05	6.56	
	Barium	μg/l	136	62.4	99.2	
	Thallium	μg/l	0.007	0.025	0.016	
	Lead	μg/l	0.101	0.102	0.1015	
	Aldrin	μg/l	ND	ND	ND	0.025
	alpha-BHC	μg/l	ND	ND	ND	0.025

Table 4.8-16 Surface Water Monitoring at the RID Area Drainage Pump						
Chemical Class (Testing Location)	Constituent	Units	March 22, 2002 Concentrations	April 15, 2002 Concentrations	Average Concentrations	Detection Limit of Equipment
	beta-BHC	μg/l	ND	ND	ND	0.025
	delta-BHC	μg/l	ND	ND	ND	0.025
	gamma-BHC (Lindane)	μg/l	ND	ND	ND	0.025
	Chlordane	μg/l	ND	ND	ND	0.50
	4,4'-DDD	μg/l	ND	ND	ND	0.15
	4,4'-DDE	μg/l	ND	ND	ND	0.050
	4,4'-DDT	μg/l	ND	ND	ND	0.15
	Dieldrin	μg/l	ND	ND	ND	0.050
	Endosulfan I	μg/l	ND	ND	ND	0.050
	Endosulfan II	μg/l	ND	ND	ND	0.050
	Endosulfan sulfate	μg/l	ND	ND	ND	0.15
	Endrin	μg/l	ND	ND	ND	0.050
	Endrin aldehyde	μg/l	ND	ND	ND	0.15
	Endrin ketone	μg/l	ND	ND	ND	0.15
	Heptachlor	μg/l	ND	ND	ND	0.025
	Heptachor epoxide	μg/l	ND	ND	ND	0.025
	Methoxychlor	μg/l	ND	ND	ND	0.50
	Toxaphene	μg/l	ND	ND	ND	2.0
	Azinphos methyl	μg/l	ND	ND	ND	0.96
	Bolstar	μg/l	ND	ND	ND	0.48
	Chlorpyrifos	μg/l	ND	ND	ND	0.48
	Coumaphos	μg/l	ND	ND	ND	0.96
	Demeton	μg/l	ND	ND	ND	0.48
	Diazinon	μg/l	ND	ND	ND	0.48
	Dichlorvos	μg/l	ND	ND	ND	0.48
	Dimethoate	μg/l	ND	ND	ND	0.96
	Disulfoton	μg/l	ND	ND	ND	0.48
	Ethion	μg/l	ND	ND	ND	0.48
	Ethoprop	μg/l	ND	ND	ND	0.48
	EPN	μg/l	ND	ND	ND	0.48
	Fensulfothion	μg/l	ND	ND	ND	0.48
	Fenthion	μg/l	ND	ND	ND	0.48
	Malathion	μg/l	ND	ND	ND	0.48
	Merphos	μg/l	ND	ND	ND	0.48
	Mevinphos	μg/l	ND	ND	ND	0.48
	Monocrotophos	μg/l	ND	ND	ND	2.4
	Naled	μg/l	ND	ND	ND	0.96
	Parathion-ethyl	μg/l	ND	ND	ND	0.48

Table 4.8-16
Surface Water Monitoring at the RID Area Drainage Pump

Chemical Class (Testing Location)	Constituent	Units	March 22, 2002 Concentrations	April 15, 2002 Concentrations	Average Concentrations	Detection Limit of Equipment
	Parathion-methyl	μg/l	ND	ND	ND	0.48
	Phorate	μg/l	ND	ND	ND	0.48
	Ronnel	μg/l	ND	ND	ND	0.48
	Stirophos	μg/l	ND	ND	ND	0.96
	Sulfotep	μg/l	ND	ND	ND	0.48
	Thionazin	μg/l	ND	ND	ND	0.48
	Tokuthion (Prothiofos)	μg/l	ND	ND	ND	0.48
Chlorinated Herbicides (Lab 1)	2,4-D	μg/l	ND	ND	ND	1.0
	2,4-DB	μg/l	ND	ND	ND	1.0
	2,4,5-T	μg/l	ND	ND	ND	1.0
	2,4,5-TP (Silvex)	μg/l	ND	ND	ND	1.0
	Dalapon	μg/l	ND	ND	ND	1.0
	Dicamba	μg/l	ND	ND	ND	1.0
	Dichlorprop	μg/l	ND	ND	ND	1.0
	Dinoseb	μg/l	ND	ND	ND	1.0
	MCPA	μg/l	ND	ND	ND	500
	MCPP	μg/l	ND	ND	ND	500

Testing Locations: Onsite testing using a U-10 Horiba Water Quality Checker; Lab 1 Sequoia Analytical in Walnut Creek, California; and Lab 2 Frontier Geosciences in Seattle, Washington.
Source: HSI Hydrologic Systems 2002a

Table 4.8-17
Mean Monthly Constituent Loading to Paradise Cut from the RID Area Discharge Pumps

Month	Volume (af)	Conventional Constituents (kg)								Total Metals (kg)									Dissolved Metals (kg)								
		Ammonia as NH_3	TSS	Hardness as $CaCO_3$	Chloride	NO_3-N	Nitrite as NO_2	PO_4-P	TP	Aluminum	Nickel	Copper	Zinc	Arsenic	Selenium	Barium	Thallium	Lead	Aluminum	Nickel	Copper	Zinc	Arsenic	Selenium	Barium	Thallium	Lead
		2.7 mg/l	41 mg/l	285 mg/l	430 mg/l	1.03 mg/l	ND mg/l	0.99 mg/l	0.415 mg/l	797 μg/l	5.58 μg/l	3.69 μg/l	5.62 μg/l	9.38 μg/l	6.48 μg/l	112 μg/l	0.022 μg/l	0.699 μg/l	4.3 μg/l	4.04 μg/l	2.86 μg/l	4.10 μg/l	7.29 μg/l	6.56 μg/l	99 μg/l	0.016 μg/l	0.102 μg/l
January	280	932	14,145	98,327	148,354	80	--	112	143	275	1.92	1.27	1.94	3.23	2.24	38.54	0.01	0.24	1.48	1.39	0.99	1.41	2.52	2.26	34.22	0.01	0.04
February	408	1,360	20,652	143,553	216,589	117	--	163	209	401	2.81	1.86	2.83	4.72	3.26	56.26	0.01	0.35	2.17	2.03	1.44	2.07	3.67	3.30	49.97	0.01	0.05
March	396	1,318	20,008	139,083	209,844	114	--	158	203	389	2.72	1.80	2.74	4.58	3.16	54.51	0.01	0.34	2.10	1.97	1.40	2.00	3.56	3.20	48.41	0.01	0.05
April	631	2,101	31,904	221,769	334,599	181	--	251	323	620	4.34	2.87	4.37	7.30	5.04	86.92	0.02	0.54	3.35	3.14	2.23	3.19	5.67	5.10	77.19	0.01	0.08
May	1,104	3,676	55,816	387,990	585,389	317	--	440	565	1,085	7.59	5.02	7.65	12.76	8.82	152.06	0.03	0.95	5.85	5.50	3.89	5.58	9.92	8.93	135.05	0.02	0.14
June	1,463	4,871	73,973	514,200	775,810	420	--	583	749	1,438	10.06	6.65	10.14	16.91	11.69	201.53	0.04	1.26	7.76	7.29	5.16	7.40	13.15	11.84	178.98	0.03	0.18
July	1,588	5,289	80,308	558,239	842,255	455	--	633	813	1,561	10.92	7.22	11.01	18.36	12.69	218.79	0.04	1.37	8.42	7.91	5.60	8.03	14.28	12.85	194.31	0.03	0.20
August	1,306	4,351	66,065	459,231	692,876	375	--	520	669	1,284	8.98	5.94	9.06	15.11	10.44	179.99	0.04	1.13	6.93	6.51	4.61	6.61	11.75	10.57	159.84	0.03	0.16
September	792	2,637	40,038	278,314	419,913	227	--	316	405	778	5.44	3.60	5.49	9.16	6.33	109.08	0.02	0.68	4.20	3.95	2.79	4.00	7.12	6.41	96.87	0.02	0.10
October	358	1,191	18,082	125,693	189,643	103	--	143	183	352	2.46	1.63	2.48	4.13	2.86	49.26	0.01	0.31	1.90	1.78	1.26	1.81	3.22	2.89	43.75	0.01	0.04
November	168	561	8,514	59,183	89,293	48	--	67	86	166	1.16	0.77	1.17	1.95	1.35	23.20	0.00	0.15	0.89	0.84	0.59	0.85	1.51	1.36	20.60	0.00	0.02
December	156	521	7,911	54,992	82,970	45	--	62	80	154	1.08	0.71	1.08	1.81	1.25	21.55	0.00	0.13	0.83	0.78	0.55	0.79	1.41	1.27	19.14	0.00	0.02
Totals	**8,648**	**28,805**	**437,416**	**3,040,576**	**4,587,535**	**2,482**	**0**	**3,448**	**4,428**	**8,503**	**59**	**39**	**60**	**100**	**69**	**1,192**	**0.230**	**7**	**46**	**43**	**31**	**44**	**78**	**70**	**1,058**	**0.18**	**1**
Mean Monthly	**721**	**2,400**	**36,451**	**253,381**	**382,295**	**207**	**0**	**287**	**369**	**709**	**5**	**3**	**5**	**8**	**6**	**99**	**0.02**	**1**	**4**	**4**	**3**	**4**	**6**	**6**	**88**	**0.015**	**0.09**

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-18
Current Estimated Annual Constituent Loading in Drainage Water from Agricultural Operations in the RID Area

Constituent	Loading (kg)	Constituent	Loading (kg)	Constituent	Loading (kg)
Total alkalinity as $CaCO_3$	2,507,141	Aluminum	8,503	Dissolved aluminum	56
Ammonia as NH_3	218,805	Nickel	59	Dissolved nickel	43
TSS	437,416	Copper	39	Dissolved copper	31
Hardness as $CaCO_3$	3,040,576	Zinc	60	Dissolved zinc	44
Chloride	4,587,535	Arsenic	100	Dissolved arsenic	78
Nitrate as NO_3	10,989	Selenium	69	Dissolved selenium	70
Nitrite as NO_2	0, ND	Barium	1,192	Dissolved barium	1,058
Orthophosphate as PO_4	10,562	Thallium	0.23	Dissolved thallium	0.18
Phosphorus	4,428	Lead	7	Dissolved lead	1

Source: HSI Hydrologic Systems 2002a

Table 4.8-19
Pumping Requirements for Alternative Lake Regulation Schedules

Range of Fluctuation (ft)	Lake Level Range		Inflow to Lake from Old River			Outflow from Lake to Paradise Cut			Lake Mean Elevatioon (ft)	Total Volume Pumped (af)
	Low (ft)	High (ft)	Peak Biweekly (af)	18-Year Total (af)	Mean Annual (af)	Peak Biweekly (af)	18-Year Total (af)	Mean Annual (af)		
1	2.0	3.0	4,302	59,745	3,319	3,790	77,163	4,287	2.63	136,908
	3.0	4.0	4,302	97,383	5,410	3,790	58,031	3,224	3.56	155,414
	4.0	5.0	4,302	143,923	7,996	3,339	49,620	2,757	4.49	193,543
2	1.5	3.5	3,861	24,918	1,384	2,214	52,867	2,937	2.78	77,785
	2.0	4.0	4,302	37,092	2,061	2,214	37,421	2,079	3.14	74,513
	2.5	4.5	4,302	54,650	3,036	2,062	29,642	1,647	3.53	84,292
	2.6	4.6	4,302	58,324	3,240	2,062	29,029	1,613	3.60	87,352
	2.8	4.8	4,302	68,096	3,783	1,633	25,766	1,431	3.76	93,862
	3.0	5.0	4,302	76,993	4,277	1,633	22,791	1,266	3.94	99,784
3	1.0	4.0	2,783	12,521	696	2,214	37,073	2,060	2.98	49,594
	1.5	4.5	3,861	22,624	1,257	2,062	26,057	1,448	3.25	48,681
	2.0	5.0	4,302	35,146	1,953	2,062	17,552	975	3.49	52,698
	2.5	5.5	4,302	52,705	2,928	1,512	12,812	712	3.82	65,516
	3.0	6.0	4,302	75,746	4,208	1,130	7,634	424	4.16	83,380
4	2.5	6.5	4,302	52,705	2,928	899	5,259	292	3.94	57,964
	2.0	6.0	4,302	35,146	1,953	1,130	7,973	443	3.65	43,119
	1.5	5.5	3,861	22,624	1,257	1,848	10,130	563	3.52	32,754
	1.0	5.0	2,783	12,521	696	2,062	17,148	953	3.34	29,669
	0.5	4.5	2,181	7,266	404	2,062	28,265	1,570	3.17	35,531

Source: HSI Hydrologic Systems 2002d

Table 4.8-20
Comparison of Preproject and Postproject Contaminant Discharge to the Delta (with the Simulated Loading from the River Islands Lake) for Water Years 1990–2000 - Conventional Constituents

Year	Volume Discharged to the Delta (af)		Mean Annual Mass Loading Discharged to the Delta (kg)											
			TDS		Hardness as $CaCO_3$		Ammonia as N		Nitrate as NO_3		Phosphorous		Dissolved Phosphorous	
	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject
1990	9,316	1,075	8,714,775	1,082,430	3,274,935	409,891	25,551	305	11,836	3,582	4,769	650	3,712	76
1991	7,300	0	6,829,416	0	2,566,434	0	20,023	0	9,275	0	3,737	0	2,909	0
1992	10,349	1,075	9,680,985	1,082,430	3,638,028	409,891	28,383	305	13,148	3,582	5,297	650	4,124	76
1993	6,440	7,528	6,024,193	7,577,011	2,263,838	2,869,236	17,662	2,136	8,182	25,071	3,296	4,550	2,566	529
1994	7,961	0	7,447,462	0	2,798,690	0	21,835	0	10,115	0	4,075	0	3,172	0
1995	9,311	7,528	8,710,413	7,577,011	3,273,296	2,869,236	25,538	2,136	11,830	25,071	4,766	4,550	3,710	529
1996	11,341	4,302	10,609,159	4,329,721	3,986,828	1,639,563	31,105	1,220	14,409	14,326	5,805	2,600	4,519	302
1997	6,799	6,452	6,360,502	6,494,581	2,390,220	2,459,345	18,648	1,831	8,638	21,489	3,480	3,900	2,709	454
1998	10,507	8,603	9,828,869	8,659,442	3,693,602	3,279,127	28,817	2,441	13,349	28,653	5,378	5,200	4,187	605
1999	8,860	2,151	8,288,433	2,164,860	3,114,720	819,782	24,301	610	11,257	7,163	4,535	1,300	3,531	151
2000	7,651	4,302	7,157,458	4,329,721	2,689,709	1,639,563	20,985	1,220	9,721	14,326	3,917	2,600	3,049	302
Mean annual	8,712	3,911	8,150,151	3,936,110	3,062,755	1,490,512	23,895	1,109	11,069	13,024	4,460	2,364	3,472	275

Source: HSI Hydrologic Systems 2002d

Table 4.8-21
Comparison of Preproject and Postproject Contaminant Discharge to the Delta (with the Simulated Loading from the River Islands Lake) for Water Years 1990-2000 - Metals

Year	Volume Discharged to the Delta (af)		Mean Annual Mass Loading Discharged to the Delta (kg)																							
			Dissolved Arsenic		Total Arsenic		Dissolved Copper		Total Copper		Dissolved Lead		Total Lead		Dissolved Nickel		Total Nickel		Dissolved Selenium		Total Selenium		Dissolved Zinc		Total Zinc	
	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject
1990	9,316	1,075	84	2	108	5	33	3	42	19	1.2	0.7	8	7	46	3	64	23	75	5	74	4	47	9	65	47
1991	7,300	0	66	0	84	0	26	0	33	0	0.9	0	6	0	36	0	50	0	59	0	58	0	37	0	51	0
1992	10,349	1,075	93	2	120	5	37	3	47	19	1.3	0.7	9	7	52	3	71	23	84	5	83	4	52	9	72	47
1993	6,440	7,528	58	16	75	38	23	19	29	135	0.8	4.6	6	48	32	24	44	162	52	32	51	28	33	65	45	326
1994	7,961	0	72	0	92	0	28	0	36	0	1.0	0	7	0	40	0	55	0	64	0	64	0	40	0	55	0
1995	9,311	7,528	84	16	108	38	33	19	42	135	1.2	4.6	8	48	46	24	64	162	75	32	74	28	47	65	65	326
1996	11,341	4,302	102	9	131	22	40	11	52	77	1.4	2.7	10	28	57	14	78	92	92	18	91	16	57	37	79	186
1997	6,799	6,452	61	14	79	33	24	16	31	115	0.9	4.0	6	41	34	21	47	138	55	28	54	24	34	56	47	279
1998	10,507	8,603	94	19	122	44	37	21	48	154	1.3	5.3	9	55	52	28	72	185	85	37	84	32	53	75	73	372
1999	8,860	2,151	80	5	103	11	31	5	40	38	1.1	1.3	8	14	44	7	61	46	72	9	71	8	45	19	61	93
2000	7,651	4,302	69	9	89	22	27	11	35	77	1.0	2.7	7	28	38	14	53	92	62	18	61	16	39	37	53	186
Mean annual	8,712	3,911	78	8	101	20	31	10	40	70	1.1	2.4	8	25	43	13	60	84	70	17	70	14	44	34	60	169

Source: HSI Hydrologic Systems 2002d

Table 4.8-22
Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Conventional Constituents

Month	Volume Discharged to the Delta (af)		Mean Annual Mass Loading Discharged to the Delta (kg)											
			TDS		Hardness as $CaCO_3$		Ammonia as N		Nitrate as NO_3		Phosphorous		Dissolved Phosphorous	
	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject
October	358	0	334,441	--	125,680	--	981	--	454	--	183	--	142	--
November	168	0	157,471	--	59,176	--	462	--	214	--	86	--	67	--
December	156	358	146,321	360,810	54,986	136,630	429	102	199	1,194	80	217	62	25
January	280	597	261,627	601,350	98,317	227,717	767	169	355	1,990	143	361	111	42
February	408	1,016	381,962	1,022,295	143,538	387,119	1,120	288	519	3,383	209	614	163	71
March	396	836	370,068	841,890	139,068	318,804	1,085	237	503	2,786	203	506	158	59
April	631	418	590,078	420,945	221,746	159,402	1,730	119	801	1,393	323	253	251	29
May	1,104	119	1,032,353	120,270	387,949	45,543	3,027	34	1,402	398	565	72	440	8
June	1,463	60	1,368,168	60,135	514,145	22,772	4,011	17	1,858	199	749	36	583	4
July	1,588	60	1,485,345	60,135	558,180	22,772	4,355	17	2,017	199	813	36	633	4
August	1,306	0	1,221,910	- -	459,183	--	3,582	--	1,660	--	669	--	520	--
September	792	60	740,531	60,135	278,285	22,772	2,171	17	1,006	199	405	36	315	4

Source: HSI Hydrologic Systems 2002d

Table 4.8-23
Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Metals

Month	Volume Discharged to the Delta (af)		Mean Annual Mass Loading Discharged to the Delta (kg)																							
			Dissolved Arsenic		Total Arsenic		Dissolved Copper		Total Copper		Dissolved Lead		Total Lead		Dissolved Nickel		Total Nickel		Dissolved Selenium		Total Selenium		Dissolved Zinc		Total Zinc	
	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject
October	358	0	3.2	--	4.1	--	1.3	--	1.6	--	0.04	--	0.3	--	1.8	--	2.5	--	2.9	--	2.9	--	1.8	--	2.5	--
November	168	0	1.5	--	1.9	--	0.6	--	0.8	--	0.02	--	0.1	--	0.8	--	1.2	--	1.4	--	1.3	--	0.9	--	1.2	--
December	156	358	1.4	0.8	1.8	1.8	0.6	0.9	0.7	6.4	0.02	0.22	0.1	2.3	0.8	1.1	1.1	7.7	1.3	1.5	1.3	1.3	0.8	3.1	1.1	15.5
January	280	597	2.5	1.3	3.2	3.0	1.0	1.5	1.3	10.7	0.04	0.37	0.2	3.8	1.4	1.9	1.9	12.8	2.3	2.5	2.2	2.2	1.4	5.2	1.9	25.9
February	408	1,016	3.7	2.2	4.7	5.1	1.4	2.5	1.9	18.2	0.05	0.63	0.4	6.5	2.0	3.3	2.8	21.8	3.3	4.3	3.3	3.7	2.1	8.8	2.8	44.0
March	396	836	3.6	1.8	4.6	4.2	1.4	2.1	1.8	15.0	0.05	0.52	0.3	5.4	2.0	2.7	2.7	18.0	3.2	3.6	3.2	3.1	2.0	7.3	2.7	36.2
April	631	418	5.7	0.9	7.3	2.1	2.2	1.0	2.9	7.5	0.08	0.26	0.5	2.7	3.1	1.3	4.3	9.0	5.1	1.8	5.0	1.5	3.2	3.6	4.4	18.1
May	1,104	119	9.9	0.3	12.8	0.6	3.9	0.3	5.0	2.1	0.14	0.07	1.0	0.8	5.5	0.4	7.6	2.6	8.9	0.5	8.8	0.4	5.6	1.0	7.7	5.2
June	1,463	60	13.2	0.1	16.9	0.3	5.2	0.1	6.7	1.1	0.18	0.04	1.3	0.4	7.3	0.2	10.1	1.3	11.8	0.3	11.7	0.2	7.4	0.5	10.1	2.6
July	1,588	60	14.3	0.1	18.4	0.3	5.6	0.1	7.2	1.1	0.20	0.04	1.4	0.4	7.9	0.2	10.9	1.3	12.8	0.3	12.7	0.2	8.0	0.5	11.0	2.6
August	1,306	0	11.7	--	15.1	--	4.6	--	5.9	--	0.16	--	1.1	--	6.5	--	9.0	--	10.6	--	10.4	--	6.6	--	9.1	--
September	792	60	7.1	0.1	9.2	0.3	2.8	0.1	3.6	1.1	0.10	0.04	0.7	0.4	3.9	0.2	5.4	1.3	6.4	0.3	6.3	0.2	4.0	0.5	5.5	2.6

Source: HSI Hydrologic Systems 2002d

Table 4.8-24
Percent Change in Contaminant Loading for Postproject Condition

Constituent	Volume Weighted Postproject Change
TDS	-52%
Hardness	-51%
Ammonia as N	-95%
Nitrate as NO_3	17%*
Phosphorus	-47%
Dissolved phosphorus	-92%
Dissolved arsenic	-90%
Total arsenic	-80%
Dissolved copper	-68%
Total copper	75% *
Dissolved lead	118% *
Total lead	212% *
Dissolved nickel	-70%
Total nickel	40% *
Dissolved selenium	-76%
Total selenium	-80%
Dissolved zinc	-23%
Total zinc	182% *

* Indicates an increase in loading.

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-27
Simulated Levee Failures

Annual Exceedence Probability	Condition	San Joaquin River			Paradise Cut	Old River
		Vernalis to Paradise Cut	Paradise Cut to Old River	Downstream of Old River		
1 in 10	Preproject	0	0	0	0	0
	Postproject	0	0	0	0	0
1 in 50	Preproject	0	0	1	0	0
	Postproject	0	0	0	0	0
1 in 100	Preproject	8	3	2	0	1
	Postproject	8	3	2	0	1
1 in 200	Preproject	8	3	3	2	2
	Postproject	8	3	3	2	2

Note: Failures occur when water reaches the point 3 feet below the top of the levee. This table presents the total number of levee failures estimated along the particular waterway segment.

Source: MBK Engineers 2002

Table 4.8-25
Evaluation of Postproject Contaminant Concentrations against California Toxics Rule Limits

	Hardness as $CaCO_3$	Dissolved Arsenic	CTR Allowable Dissolved CCC, As	Dissolved Cadmium	CTR Allowable Dissolved CCC, Cd	Dissolved Chromium	CTR Allowable Dissolved CCC, Cr	Dissolved Copper	CTR Allowable Dissolved CCC, Cu	Dissolved Lead	CTR Allowable Dissolved CCC, Pb	Total Mercury	Dissolved Nickel	CTR Allowable Dissolved CCC, Ni	Total Nickel	Dissolved Zinc	CTR Allowable Dissolved CCC, Zn	Total Zinc
	mg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
Dry Year																		
Low runoff concentration	322	1.8	150.0	0.02	5.12	0.12	443.6	1.87	24.0	0.45	8.96	0.00	2.23	138.2	17.9	5.2	312.0	33.6
Median runoff concentration	323	1.8	150.0	0.02	5.13	0.15	444.2	1.99	24.0	0.49	8.98	0.00	2.55	138.4	18.1	6.5	312.4	35.3
High runoff concentration	324	1.8	150.0	0.02	5.13	0.19	445.0	2.34	24.1	0.59	9.01	0.00	3.05	138.7	18.3	9.7	313.1	38.9
Normal Year																		
Low runoff concentration	309	1.8	150.0	0.02	5.00	0.14	431.2	1.88	23.2	0.46	8.55	0.00	2.24	133.8	17.2	5.5	302.3	33.0
Median runoff concentration	309	1.8	150.0	0.02	5.01	0.18	431.8	2.02	23.3	0.50	8.57	0.00	2.62	134.1	17.4	7.1	302.8	35.1
High runoff concentration	310	1.8	150.0	0.03	5.02	0.22	432.9	2.43	23.3	0.62	8.60	0.00	3.21	134.5	17.7	10.9	303.6	39.4
Wet Year																		
Low runoff concentration	284	1.6	150.0	0.03	4.77	0.19	407.4	1.91	21.8	0.47	7.81	0.00	2.28	125.6	15.9	6.2	283.9	32.4
Median runoff concentration	285	1.6	150.0	0.03	4.78	0.25	408.3	2.11	21.8	0.54	7.84	0.00	2.81	126.0	16.3	8.4	284.7	35.2
High runoff concentration	287	1.6	150.0	0.03	4.80	0.31	410.0	2.68	21.9	0.70	7.88	0.00	3.63	126.5	16.6	13.6	285.9	41.2

Note: CCC = Continuous Criterion Concentration, from 40 CFR Part 131. Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. EPA.

Source: Data received from HSI Hydrologic Systems 2002

Table 4.8-26
Comparison of Contaminant Concentrations and Mean Annual Mass Loading to the Delta for the Preproject and Postproject Conditions

			TDS		Hardness as $CaCO_3$		Ammonia as N		Nitrate as NO_3		Phosphorous		Dissolved Phosphorous		Dissolved Arsenic		Total Arsenic		Dissolved Copper		Total Copper		Dissolved Lead		Total Lead		Dissolved Nickel		Total Nickel		Dissolved Selenium		Total Selenium		Dissolved Zinc		Total Zinc	
			Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject	Preproject	Postproject
			Concentration																																			
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
			758.40	816.00	285.00	309.00	2.22	0.23	1.03	2.70	0.42	0.49	0.32	0.06	7.29	1.75	9.38	4.11	2.86	2.00	3.69	14.50	0.10	0.50	0.70	5.20	4.04	2.60	5.58	17.40	6.56	3.46	6.48	2.99	4.10	7.05	5.62	35.09
Volume Discharged to Delta			Mass Loading																																			
Year	Existing (acre-feet)	Proposed (acre-feet)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
1990	9,315.9	1,075.4	8,714,775.4	1,082,430.2	3,274,935.4	409,890.8	25,550.6	305.1	11,835.7	3,581.6	4,768.8	650.0	3,712.2	75.6		2.3	107.8	5.5	32.9	2.7	42.4	19.2	1.2	0.7	8.0	6.9	46.4	3.4	64.1	23.1	75.4	4.6	74.5	4.0	47.1	9.4	64.6	46.5
1991	7,300.5	- -	6,829,416.0	- -	2,566,434.0	- -	20,023.0	- -	9,275.2	- -	3,737.1	- -	2,909.1	- -	65.6	- -	84.5	- -	25.8	- -	33.2	- -	0.9	- -	6.3	- -	36.4	- -	50.2	- -	59.1	- -	58.4	- -	36.9	- -	50.6	- -
1992	10,348.7	1,075.4	9,680,984.6	1,082,430.2	3,638,028.2	409,890.8	28,383.4	305.1	13,148.0	3,581.6	5,297.5	650.0	4,123.8	75.6	93.1	2.3	119.7	5.5	36.5	2.7	47.1	19.2	1.3	0.7	8.9	6.9	51.6	3.4	71.2	23.1	83.7	4.6	82.7	4.0	52.3	9.4	71.7	46.5
1993	6,439.7	7,527.9	6,024,193.3	7,577,011.4	2,263,868.4	2,869,235.9	17,662.1	2,135.7	8,181.6	25,071.0	3,296.5	4,549.9	2,566.1	529.3	57.9	16.2	74.5	38.2	22.7	18.6	29.3	134.6	0.8	4.6	5.6	48.3	32.1	24.1	44.3	161.6	52.1	32.1	51.5	27.8	32.6	65.5	44.6	325.8
1994	7,961.1	- -	7,447,461.8	- -	2,798,690.2	- -	21,835.0	- -	10,114.6	- -	4,075.3	- -	3,172.4	- -	71.6	- -	92.1	- -	28.1	- -	36.2	- -	1.0	- -	6.9	- -	39.7	- -	54.8	- -	64.4	- -	63.6	- -	40.3	- -	55.2	- -
1995	9,311.2	7,527.9	8,710,412.7	7,577,011.4	3,273,295.9	2,869,235.9	25,537.8	2,135.7	11,829.8	25,071.0	4,766.4	4,549.9	3,710.3	529.3	83.7	16.2	107.7	38.2	32.8	18.6	42.4	134.6	1.2	4.6	8.0	48.3	46.4	24.1	64.1	161.6	75.3	32.1	74.4	27.8	47.1	65.5	64.5	325.8
1996	11,340.9	4,301.6	10,609,158.7	4,329,720.8	3,986,827.8	1,639,563.4	31,104.7	1,220.4	14,408.5	14,326.3	5,805.4	2,600.0	4,519.1	302.4	102.0	9.3	131.2	21.8	40.0	10.6	51.6	76.9	1.4	2.7	9.8	27.6	56.5	13.8	78.1	92.3	91.8	18.4	90.6	15.9	57.4	37.4	78.6	186.2
1997	6,799.2	6,452.5	6,360,502.2	6,494,581.2	2,390,220.4	2,459,345.1	18,648.2	1,830.6	8,638.3	21,489.4	3,480.5	3,899.9	2,709.4	453.7	61.1	13.9	78.7	32.7	24.0	15.9	30.9	115.4	0.9	4.0	5.9	41.4	33.9	20.7	46.8	138.5	55.0	27.5	54.3	23.8	34.4	56.1	47.1	279.3
1998	10,506.8	8,603.3	9,828,868.6	8,659,441.6	3,693,601.7	3,279,126.8	28,817.0	2,440.8	13,348.8	28,652.6	5,378.4	5,199.9	4,186.8	604.9	94.5	18.6	121.6	43.6	37.1	21.2	47.8	153.9	1.3	5.3	9.1	55.2	52.4	27.6	72.3	184.6	85.0	36.7	84.0	31.7	53.1	74.8	72.8	372.4
1999	8,860.1	2,150.8	8,288,432.7	2,164,860.4	3,114,719.6	819,781.7	24,300.6	610.2	11,256.7	7,163.1	4,535.5	1,300.0	3,530.6	151.2	79.7	4.6	102.5	10.9	31.3	5.3	40.3	38.5	1.1	1.3	7.6	13.8	44.2	6.9	61.0	46.2	71.7	9.2	70.8	7.9	44.8	18.7	61.4	93.1
2000	7,651.1	4,301.6	7,157,458.3	4,329,720.8	2,689,709.4	1,639,563.4	20,984.7	1,220.4	9,720.7	14,326.3	3,916.6	2,600.0	3,048.8	302.4	68.8	9.3	88.5	21.8	27.0	10.6	34.8	76.9	1.0	2.7	6.6	27.6	38.1	13.8	52.7	92.3	61.9	18.4	61.2	15.9	38.7	37.4	53.0	186.2
Mean annual	**8,712.3**	**3,910.6**	**8,150,151.3**	**3,936,109.8**	**3,062,754.6**	**1,490,512.2**	**23,895.2**	**1,109.4**	**11,068.9**	**13,023.9**	**4,459.8**	**2,363.6**	**3,471.7**	**274.9**	**77.8**	**8.4**	**100.8**	**19.8**	**30.7**	**9.6**	**39.7**	**69.9**	**1.1**	**2.4**	**7.5**	**25.1**	**43.4**	**12.5**	**60.0**	**83.9**	**70.5**	**16.7**	**69.6**	**14.4**	**44.1**	**34.0**	**60.4**	**169.3**

Source: HSI Hydrologic Systems 2002d

Table 4.8-28
Simulated Flooded Overbank Peak Event River Stages (feet NGVD)

Location	1-in-100 AEP			1-in-200 AEP			1997 Flood		
	Preproject	Postproject	Difference	Preproject	Postproject	Difference	Preproject	Postproject	Difference
San Joaquin River right overbank between Trahern levee and Almondwood levee	26.0	25.9	-0.1	29.4	29.6	0.2	26.3	26.3	0.0
San Joaquin River right overbank between Almondwood levee and RD 17 wing levee	25.4	25.4	0.0	28.6	28.8	0.2	25.8	25.8	0.0
San Joaquin River left bank between Durham Ferry Road and Banta Carbona Canal	29.5	29.5	0.0	31.9	32.0	0.1	NA	NA	NA
San Joaquin River left bank between Banta Carbona Canal and UPRR	NA	NA	NA	22.8	23.4	0.6	21.7	21.1	-0.6
Paradise Cut left bank between UPRR and I-5	NA	NA	NA	21.6	22.22	0.6	15.5	15.8	0.3
RD 2107 between San Joaquin River and UPRR	22.8	23.2	0.4	25.0	25.1	0.1	19.8	19.7	-0.1
RD 2107 between UPRR and I-5	22.6	23.1	0.5	24.3	24.6	0.3	19.6	19.7	0.1
RD 2017 between I-5 and former SPRR	22.4	23.1	0.7	23.0	24.1	1.1	19.5	19.7	0.2

NA = Not applicable. Overbank did not flood.

Source: MBK Engineers 2002

Table 4.8-29
Simulated Flood Flow Distributions in the San Joaquin River, Old River, and Paradise Cut at Various Annual Exceedence Probabilities

Annual Exceedence Probability	Flow in the San Joaquin River at Paradise Weir (cfs)	Condition	Diversion to Paradise Cut (cfs)	Flow in Old River at Head (cfs)	Flow in San Joaquin River downstream of Old River (cfs)	Total Flow West of Stewart Tract (cfs)	Project Impact on Total Flow West of Stewart Tract
1 in 4	18,000	Preproject	380	10,360	7,260	9,590	+ 0.5%
		Postproject	360	10,420	7,230	9,640	
?[1]	20,000	Preproject	1,000	11,080	7,930	10,840	+ 0.6%
		Postproject	970	11,150	7,880	10,900	
?[1]	25,000	Preproject	2,230	13,080	9,690	13,880	+ 2.3%
		Postproject	2,850	12,760	9,400	14,200	
1 in 10	32,000	Preproject	3,870	15,970	12,170	18,140	+ 3.1%
		Postproject	5,000	15,360	11,650	18,710	
1 in 50	50,000	Preproject	9,800	22,550	17,680	28,910	+ 2.5%
		Postproject	10,890	22,060	17,060	29,640	
For floods with recurrence intervals greater than 50 years, there is a significant increase in the likelihood of levee failures in the study area. The information provided below is from simulations that assume levee failures occur when the water gets within 3 feet from the top of the levee.							
1 in 100	66,700	Preproject	12,850	27,400	21,670	32,440	+ 4.1%
	63,720	Postproject	14,810	27,620	21,450	33,780	
1 in 200	79,180	Preproject	24,020	37,060	28,290	41,400	+ 11.2%
	79,090	Postproject	25,290	37,510	28,740	46,050	

[1] Recurrence interval not defined for this flow.

Source: Data received from HSI Hydrologic Systems 2002

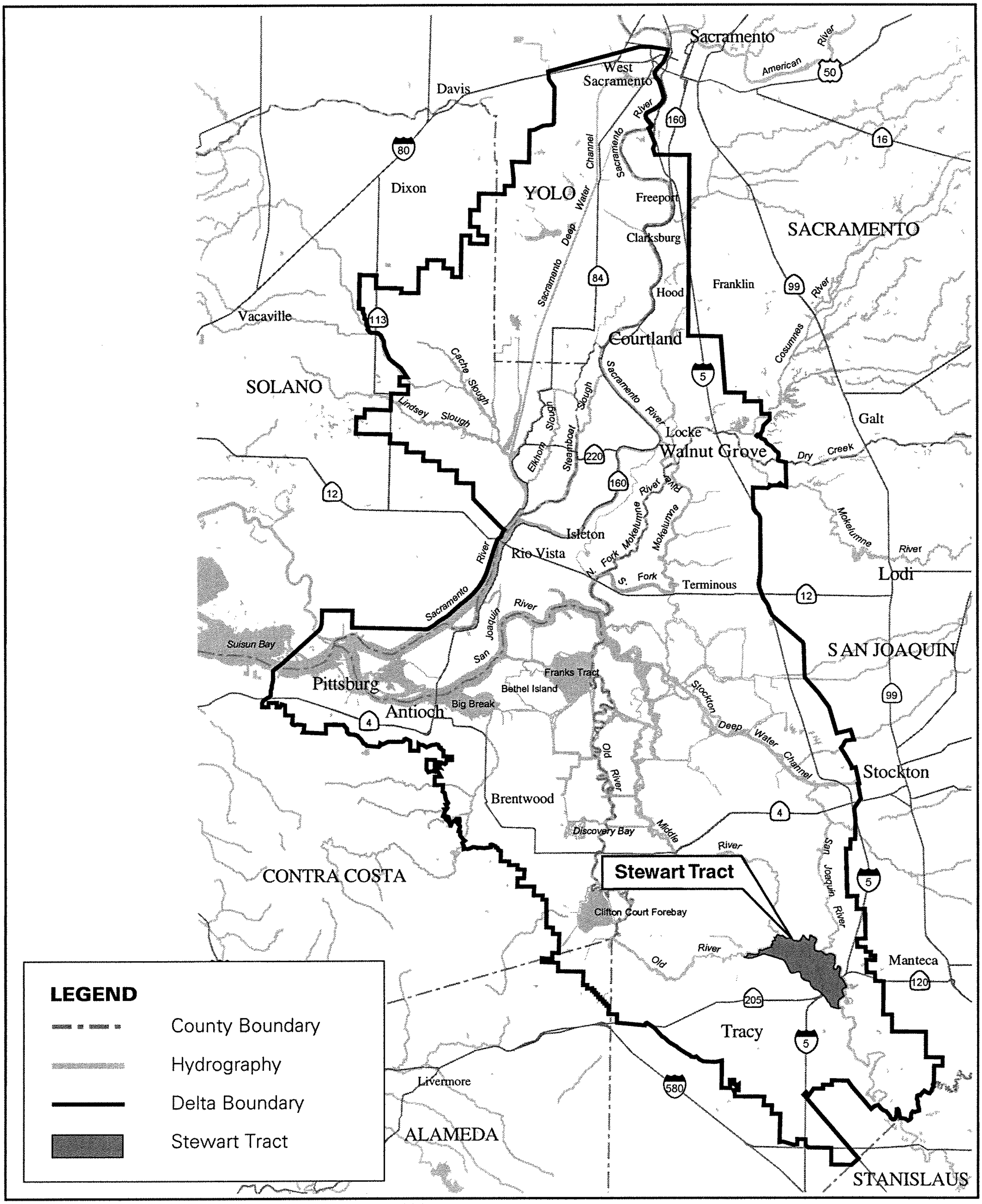
Table 4.8-30
Simulated River Islands Postproject Hydraulic Impacts at Selected Locations (feet)

Location	1-in-10 AEP	1-in-50 AEP	1-in-100 AEP	1-in-200 AEP	January 1997 (1-in-89 AEP)
San Joaquin River					
at Banta Carbona Canal	-0.17	-0.09	-0.02	0.11	-0.06
at Paradise Cut	-0.42	-0.35	-0.06	0.26	-0.34
at Mossdale Gage	-0.37	-0.31	-0.07	0.19	-0.34
at Old River	-0.34	-0.26	-0.09	0.04	-0.33
at Brandt Bridge	-0.24	-0.18	0.00	0.05	-0.26
Paradise Cut					
downstream of weir	-0.67	-0.54	-0.31	0.41	-0.57
at UPRR	0.62	-0.15	0.01	0.77	-0.38
at I-5	0.26	-0.04	0.66	2.16	-0.02
at former SPRR	0.02	-0.23	0.37	1.43	-0.19
at Paradise Road	0.19	0.10	0.19	0.67	0.07
Old River					
midway between San Joaquin River and Middle River	-0.22	-0.14	0.03	0.08	-0.22
at Middle River	-0.09	-0.01	0.11	0.43	-0.09
at Tracy Boulevard	0.05	0.10	0.14	0.66	0.16
5 miles downstream of Tracy Boulevard	0.01	0.03	0.08	0.35	0.08
Middle River					
at Mowry Bridge	-0.05	0.00	0.07	0.30	-0.38
Grant Line Canal					
at Tracy Boulevard	0.07	0.09	0.10	0.51	0.13
4 miles downstream of Tracy Boulevard	0.01	0.02	0.05	0.20	0.05

Source: MBK Engineers 2002

Table 4.8-31
Simulated Floodflow Distributions in the San Joaquin River, Old River, and Paradise Cut at Various Annual Exceedence Probabilities

Annual Exceedence Probability	Flow in the San Joaquin River at Paradise Weir (cfs)	Condition	Diversion to Paradise Cut (cfs)	Flow in Old River at Head (cfs)	Flow in San Joaquin River downstream of Old River (cfs)	Total Flow West of Stewart Tract (cfs)	Project Impact on Total Flow West of Stewart Tract
1 in 4	18000	Pre-Project	380	10360	7260	9590	+ 0.5%
		Post-Project	360	10420	7230	9640	
?	20000	Pre-Project	1000	11080	7930	10840	+ 0.6%
		Post-Project	970	11150	7880	10900	
?	25000	Pre-Project	2230	13080	9690	13880	+ 2.3%
		Post-Project	2850	12760	9400	14200	
1 in 10	32000	Pre-Project	3870	15970	12170	18140	+ 3.1%
		Post-Project	5000	15360	11650	18710	
1 in 50	50000	Pre-Project	9800	22550	17680	28910	+ 2.5%
		Post-Project	10890	22060	17060	29640	
For floods with recurrence intervals greater than 50 years, there is a significant increase in the likelihood of levee failures in the study area. The information provided below is from simulations that assume levee failures occur when the water gets within 3 feet from the top of the levee.							
1 in 100	66700	Pre-Project	12850	27400	21670	32440	+ 4.1%
	63720	Post-Project	14810	27620	21450	33780	
1 in 200	79180	Pre-Project	24020	37060	28290	41400	+ 11.2%
	79090	Post-Project	25290	37510	28740	46050	



Source: California Department of Water Resources 1995

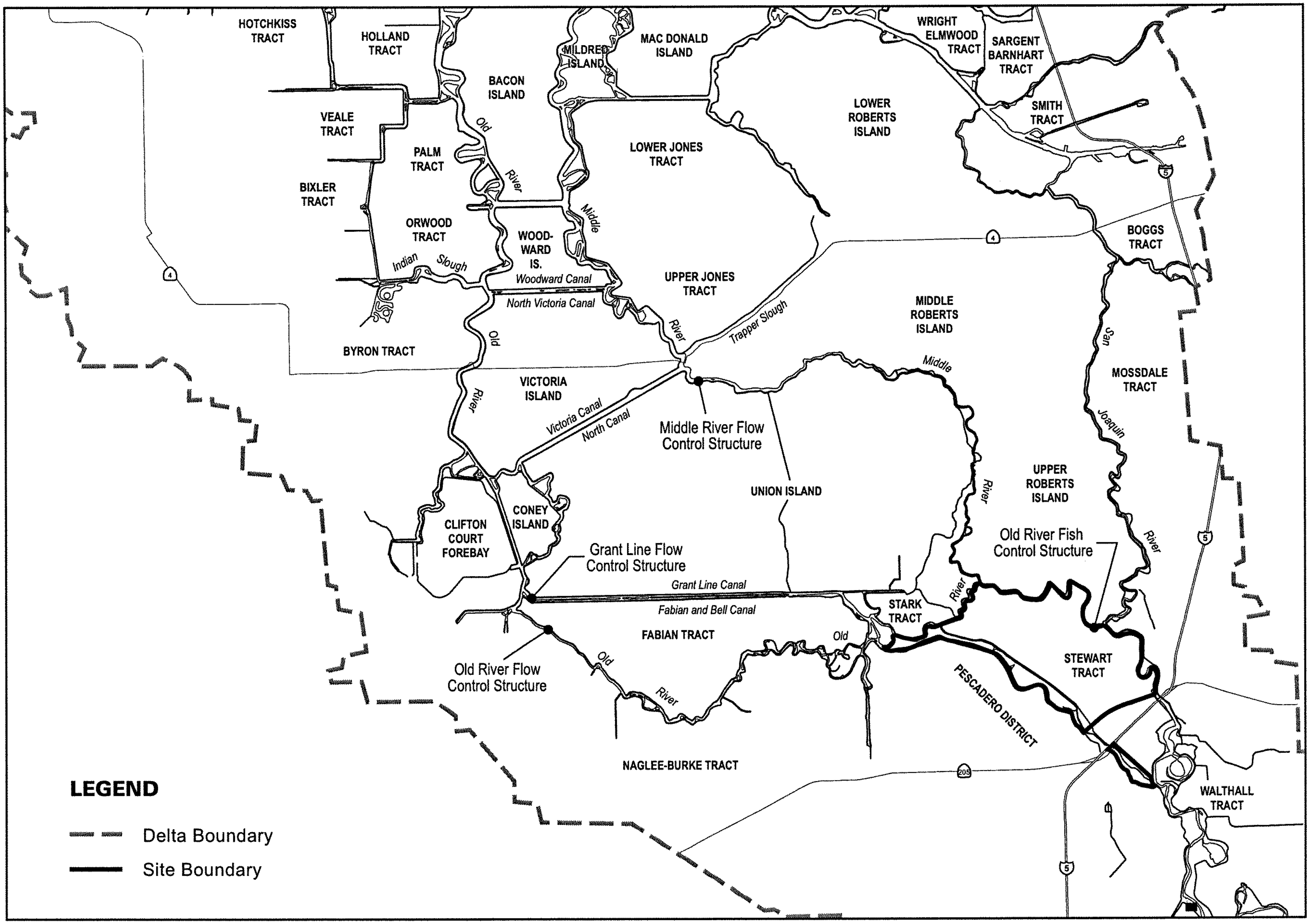
Sacramento-San Joaquin River Delta in Relation to Stewart Tract

EXHIBIT 4.8-1

River Islands at Lathrop
CITY OF LATHROP
JN 1T013.01 9/02

0 2.5 5 10 MILES NORTH

EDAW



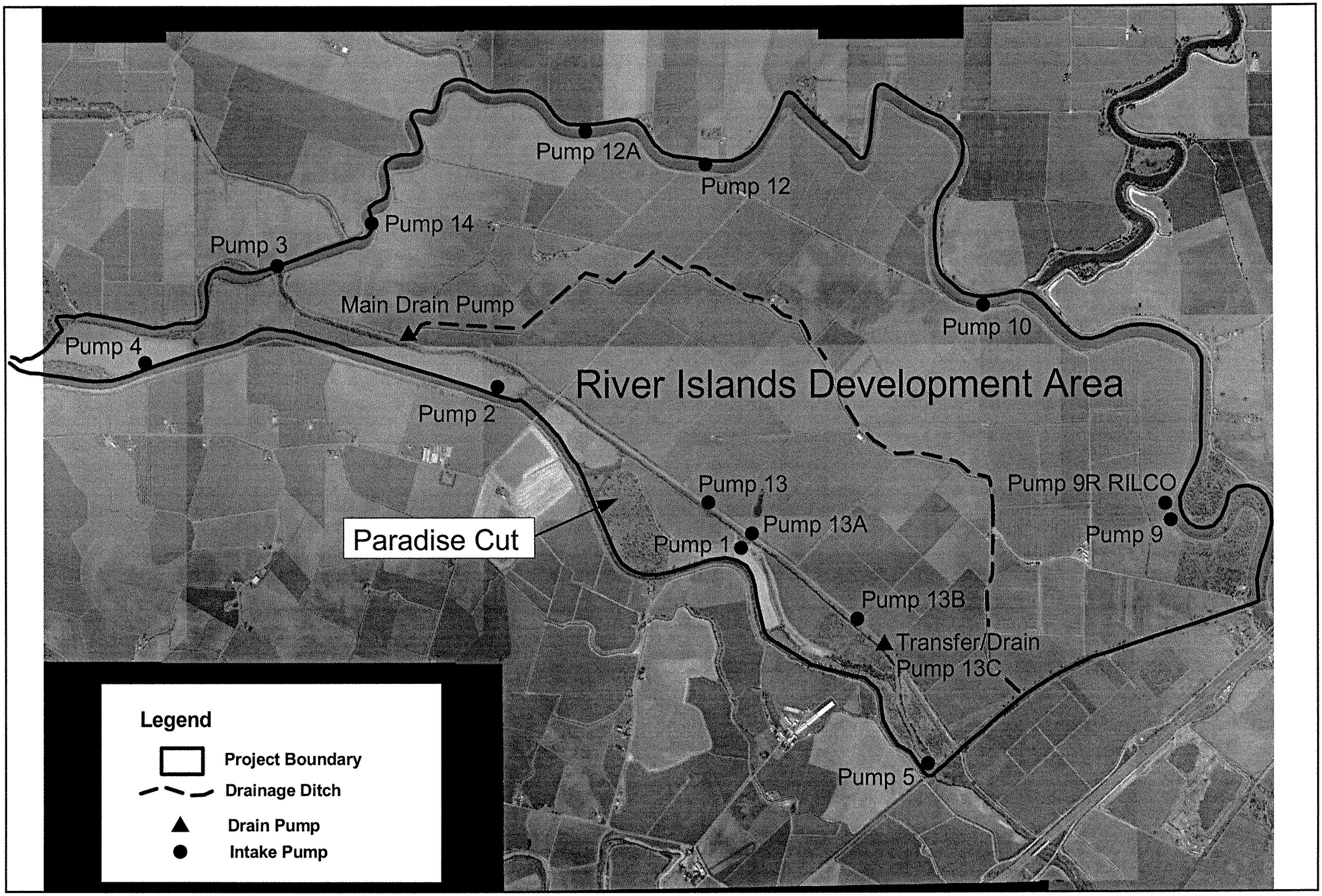
Source: Geographical Information Center

EXHIBIT 4.8-2

South Delta and Temporary Barriers Project Area

River Islands at Lathrop
CITY OF LATHROP
JN 1T013.01 8/02

EDAW



Source: Raw data received from HSI Hydrologic Systems 2002

RID Area and Paradise Cut Irrigation and Drainage Pumps

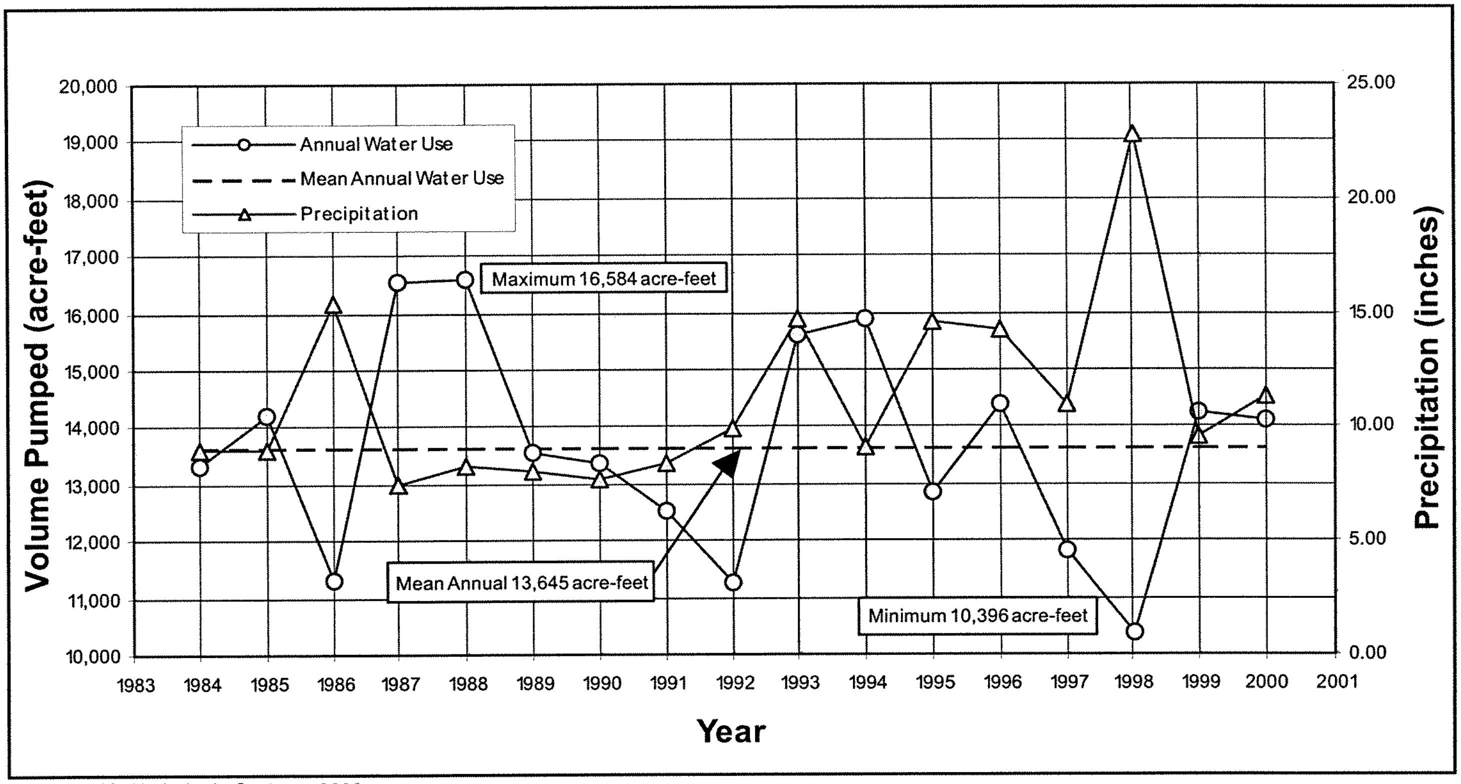
EXHIBIT 4.8-3

River Islands at Lathrop
CITY OF LATHROP
G 1T013.01 9/02

0 1500 3000 6000 FEET

NORTH

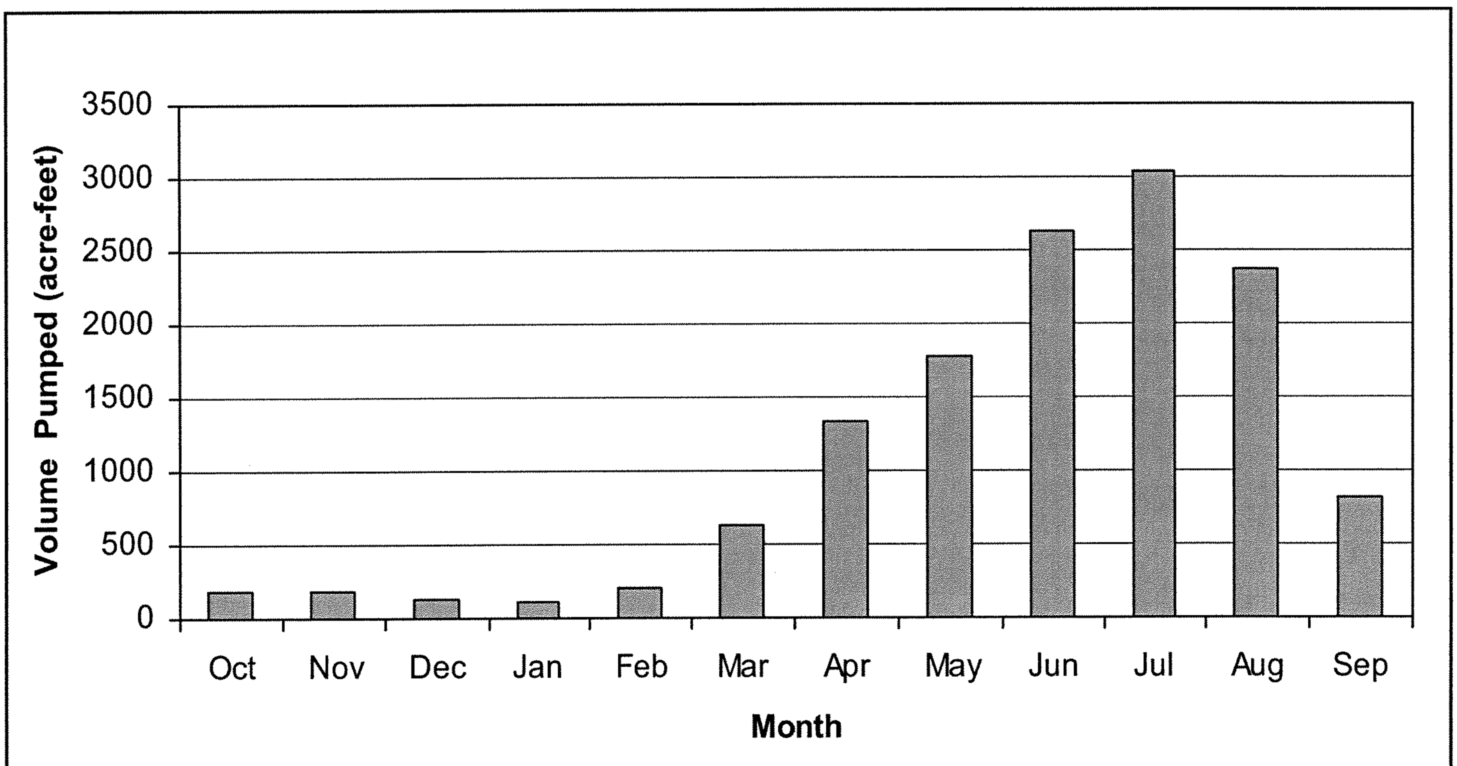
EDAW



Source: HSI Hydrologic Systems 2002a

Annual Volume of Delta Water Pumped in to Meet RID Area Irrigation Demand, 1984-2000

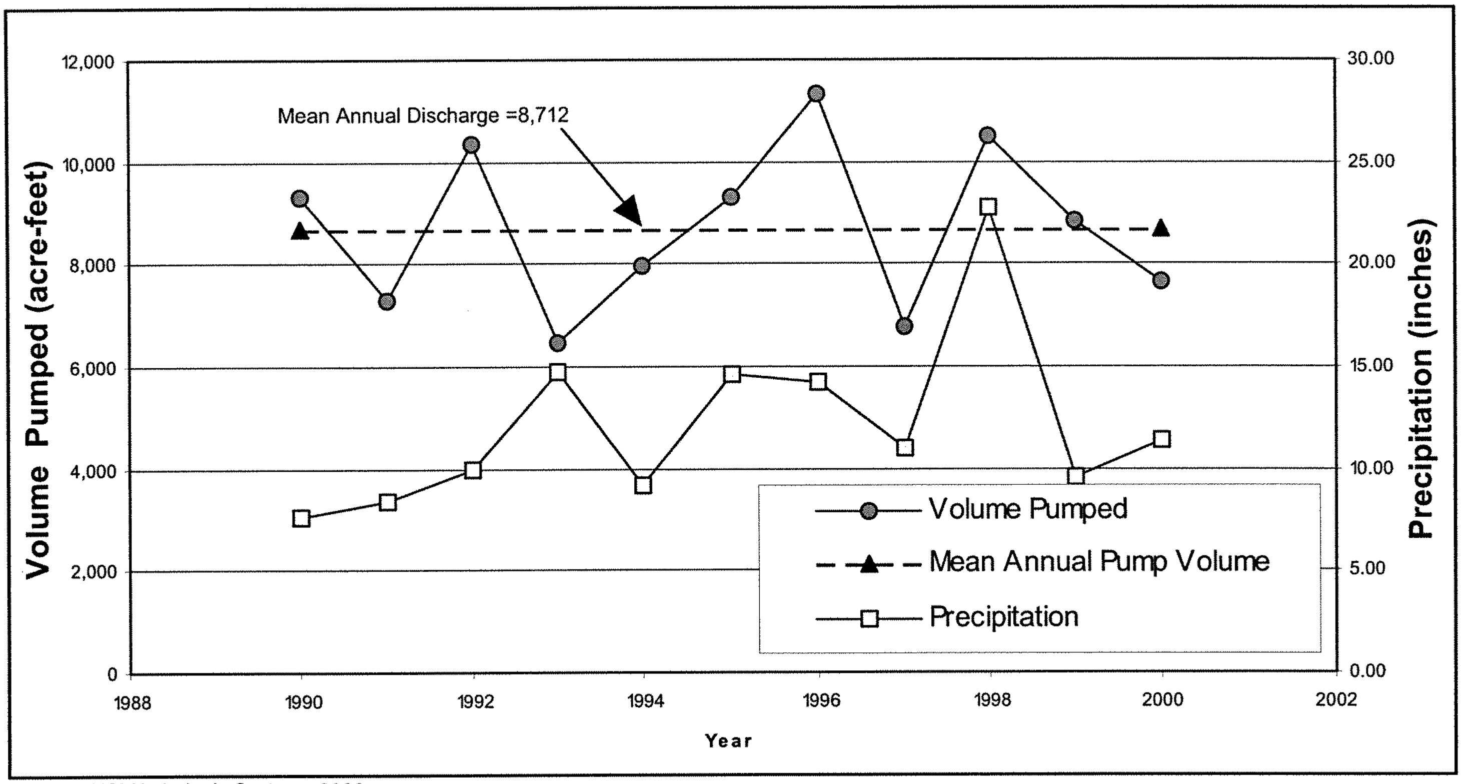
EXHIBIT 4.8-4



Source: Raw data received from HSI Hydrologic Systems 2002

Mean Monthly Volume of Delta Water Pumped in to Meet RID Area Irrigation Demand

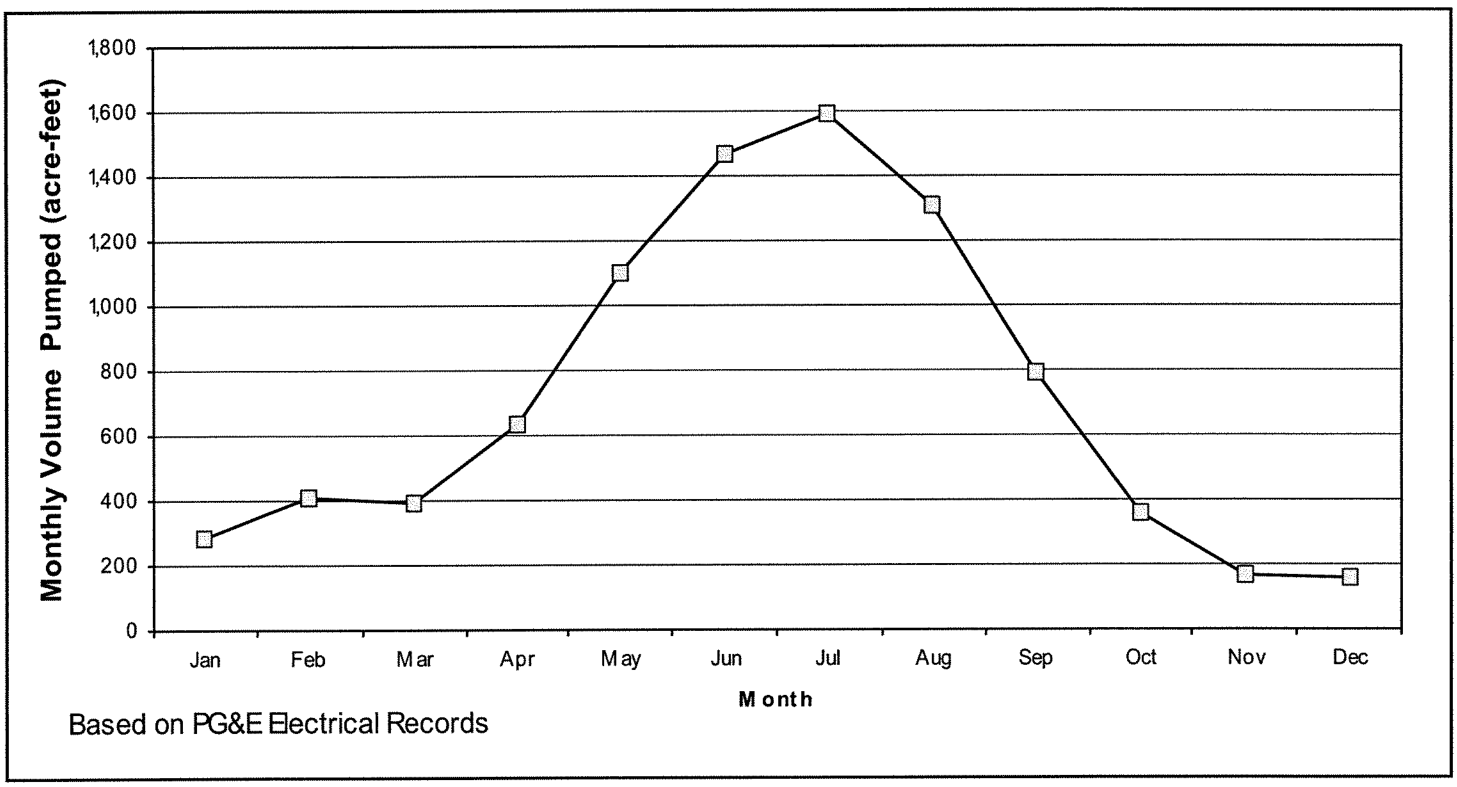
EXHIBIT 4.8-5



Source: HSI Hydrologic Systems 2002a

Estimated Mean Annual Discharge to Paradise Cut

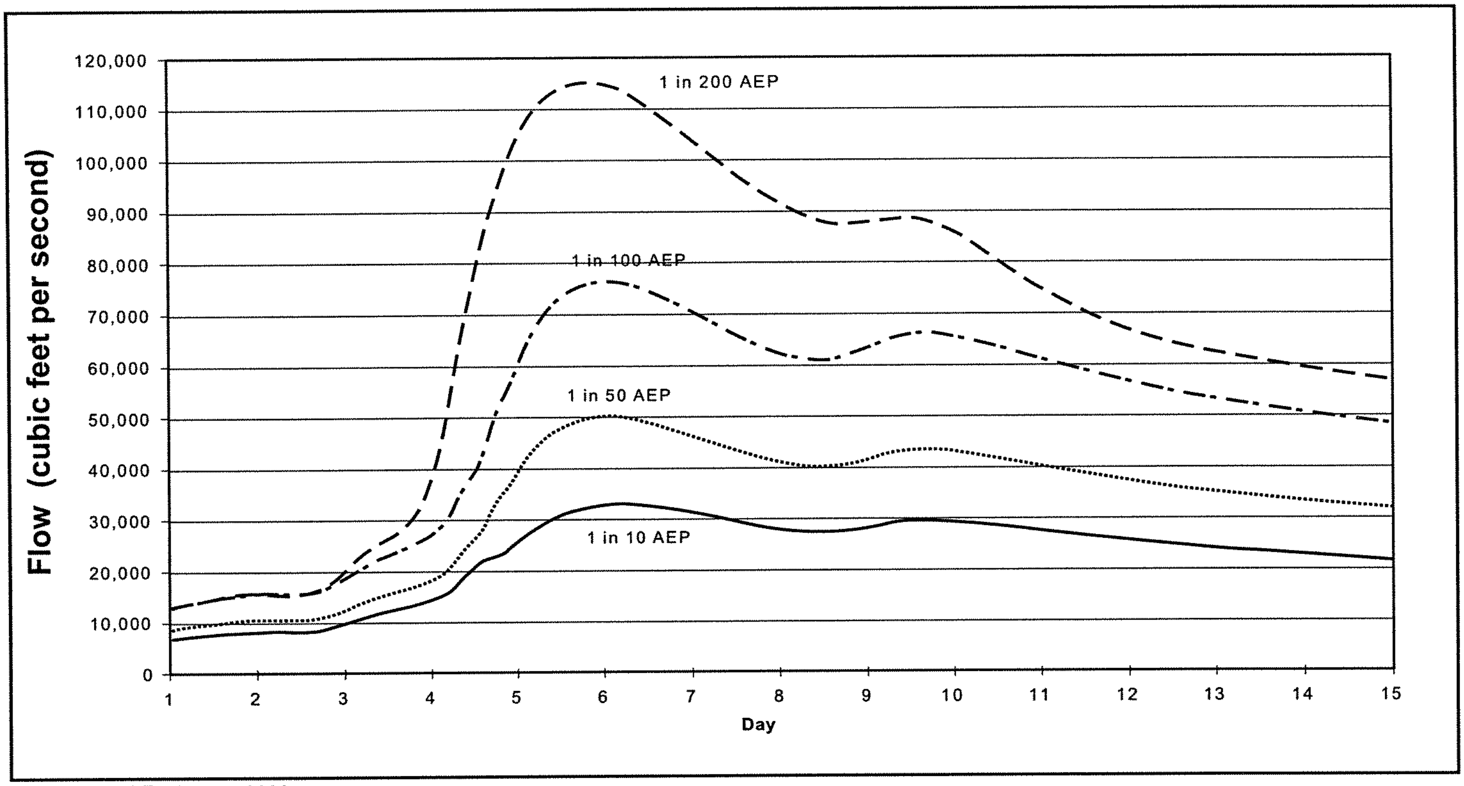
EXHIBIT 4.8-6



Source: HSI Hydrologic Systems 2002a

Estimated Mean Monthly Discharge to Paradise Cut

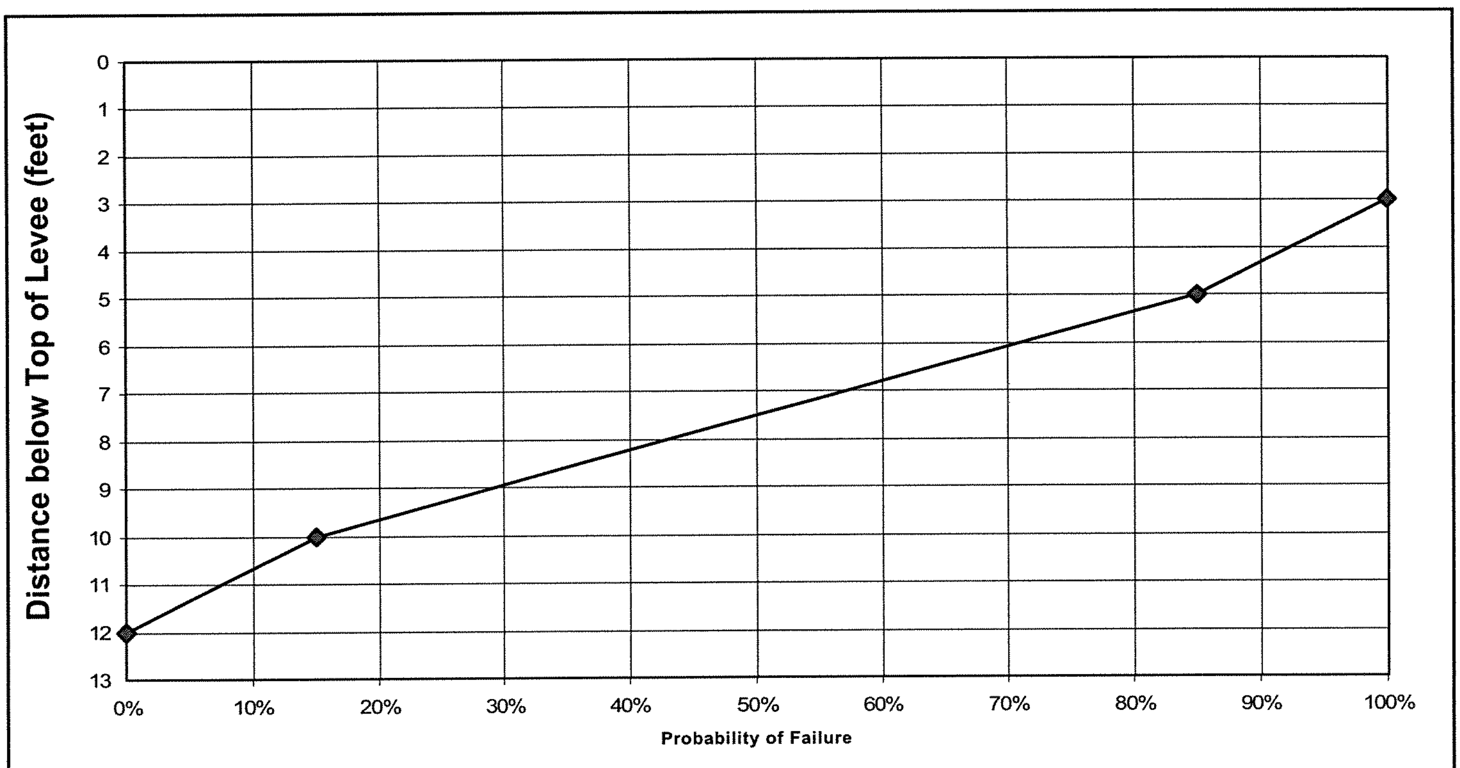
EXHIBIT 4.8-7



Source: MBK Engineers, 2002.

San Joaquin River Flood Flows near Vernalis

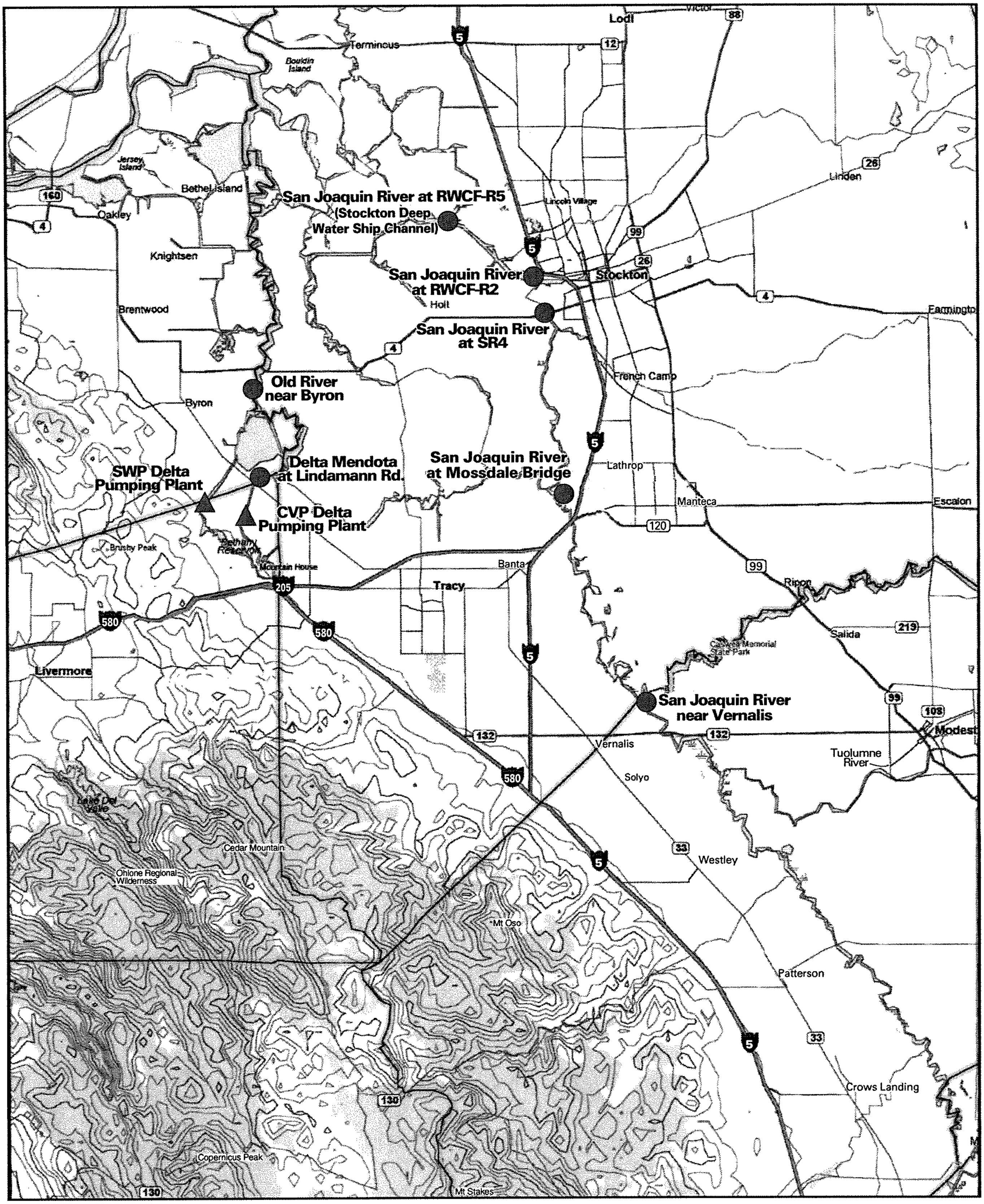
EXHIBIT 4.8-8



Source: MBK Engineers, 2002.

Lower San Joaquin River Probability of Failure Curve

EXHIBIT 4.8-9



Source: EDAW 2001

Water Quality Monitoring Locations in the Vicinity of River Islands

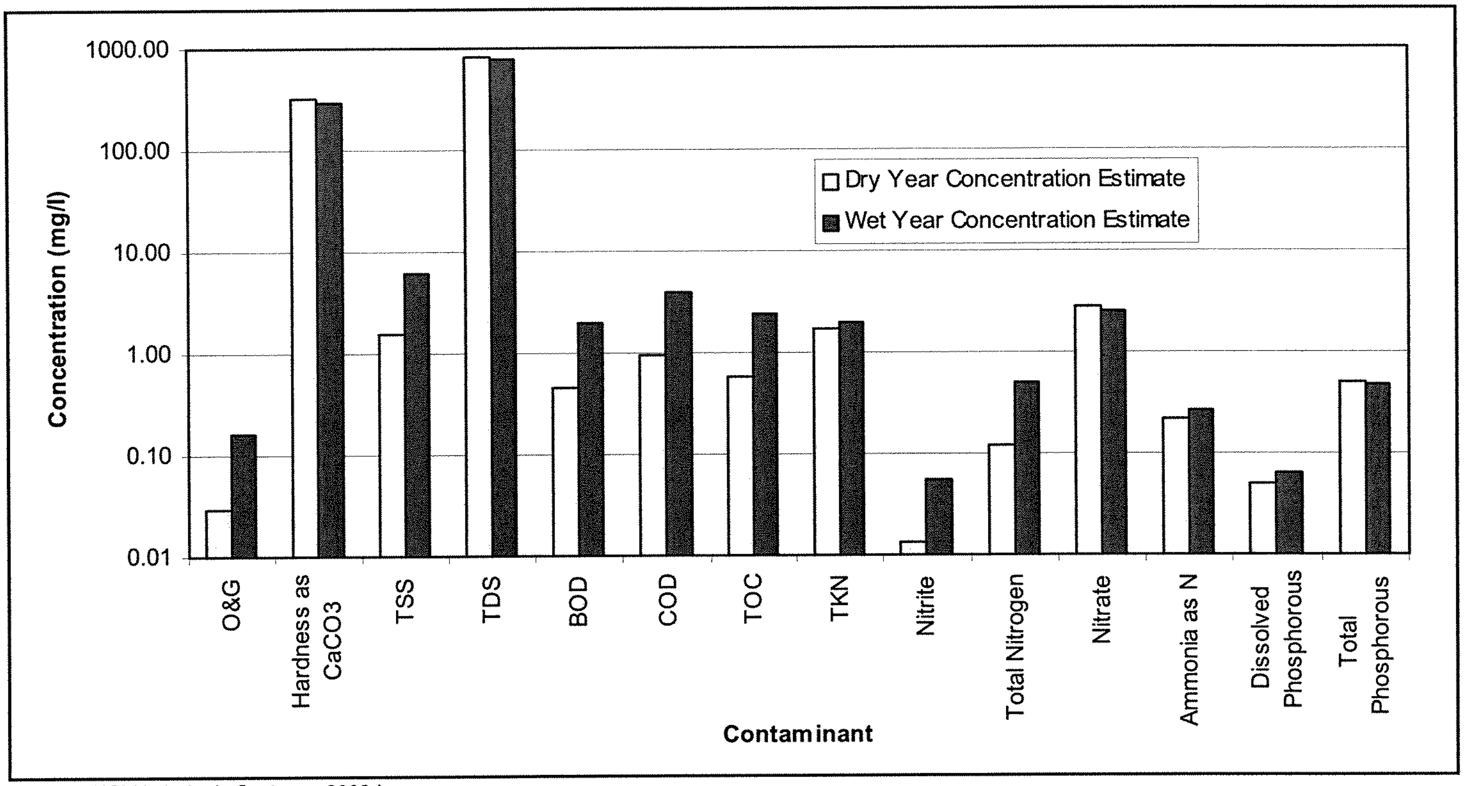
EXHIBIT 4.8-10

River Islands at Lathrop
CITY OF LATHROP
G 1T013.01 10/02

0 2 4 8 MILES

NORTH

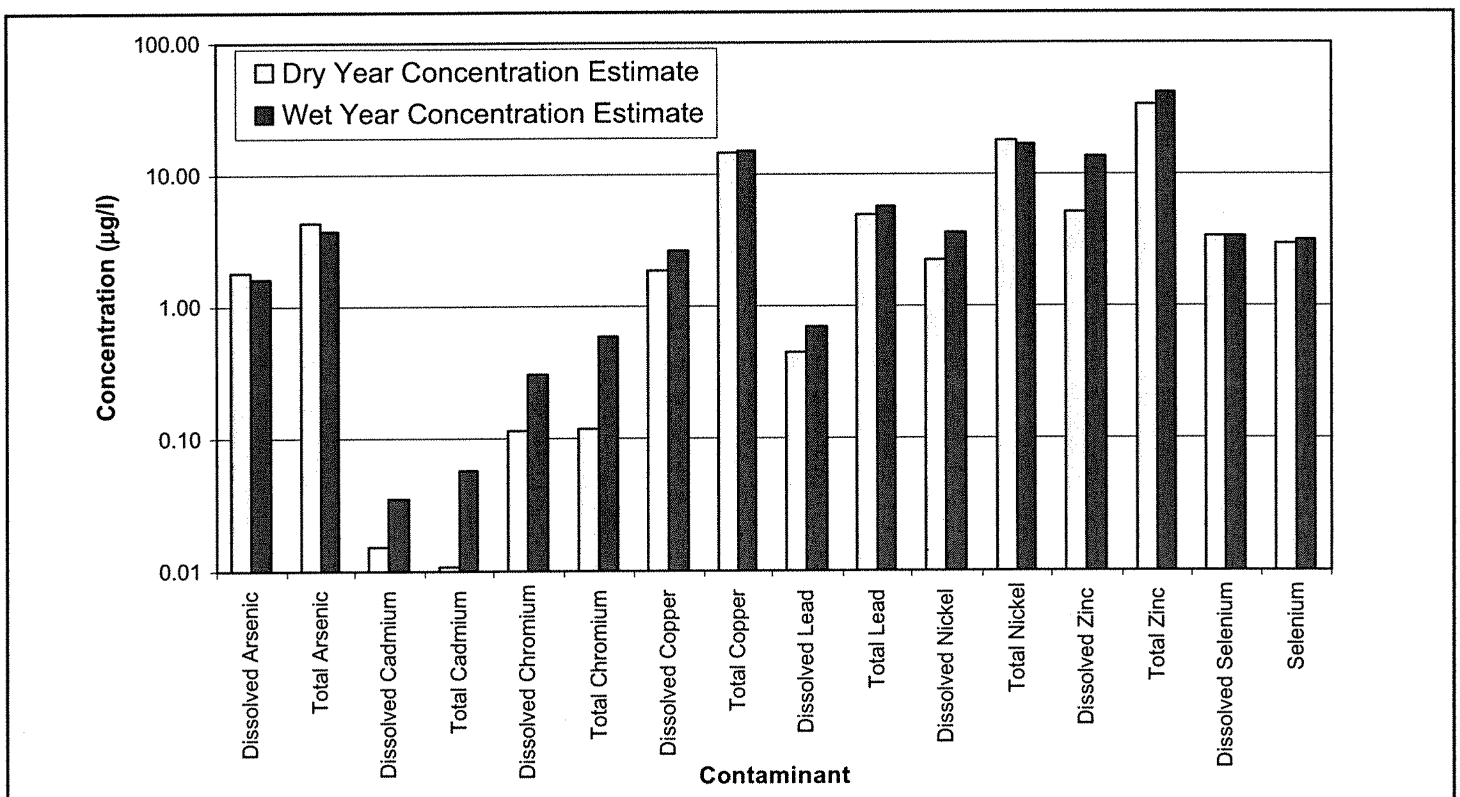
EDAW



Source: HSI Hydrologic Systems, 2002d.

Final Lake Contaminant Concentration Estimates - Conventional Constituents

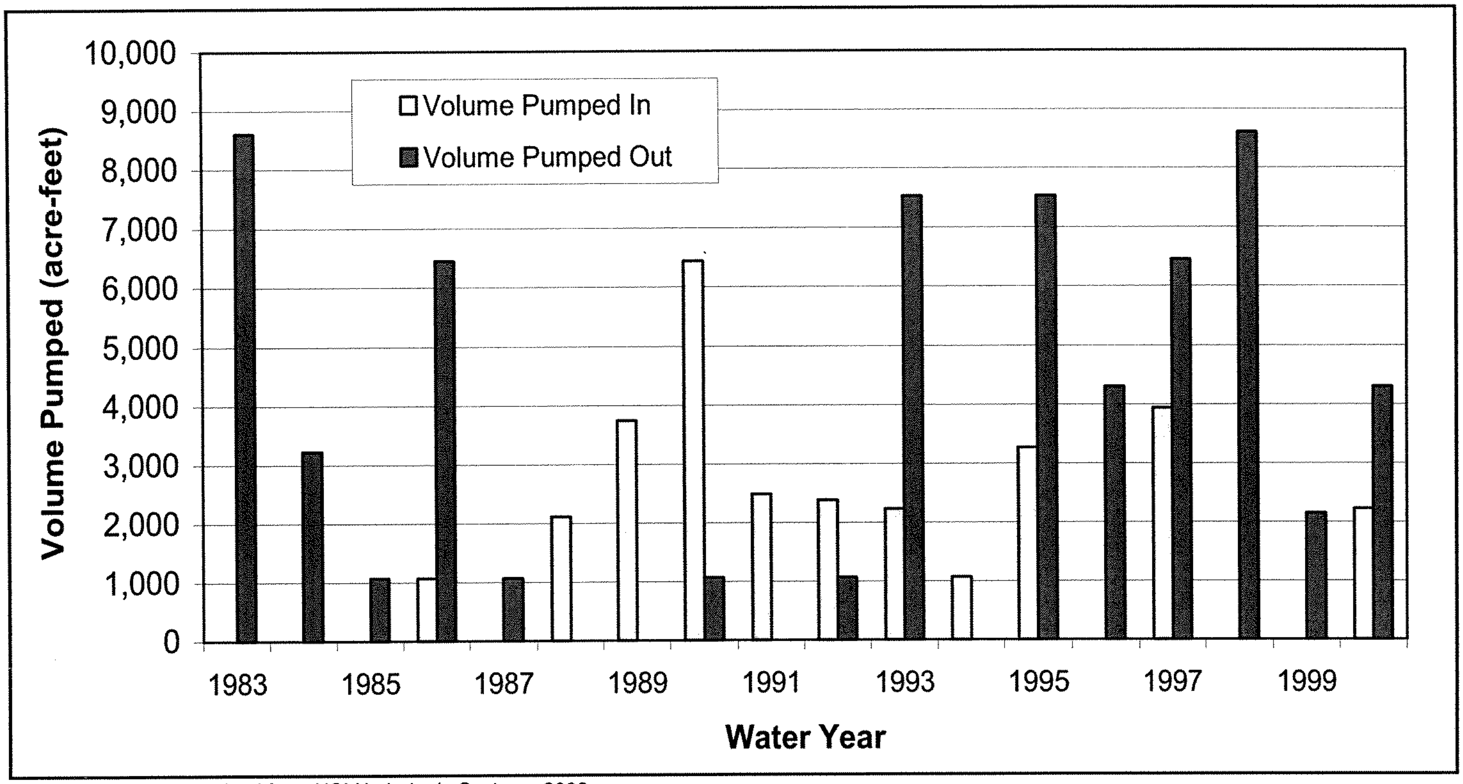
EXHIBIT 4.8-11



Source: HSI Hydrologic Systems, 2002d.

Final Lake Contaminant Concentration Estimates - Metals

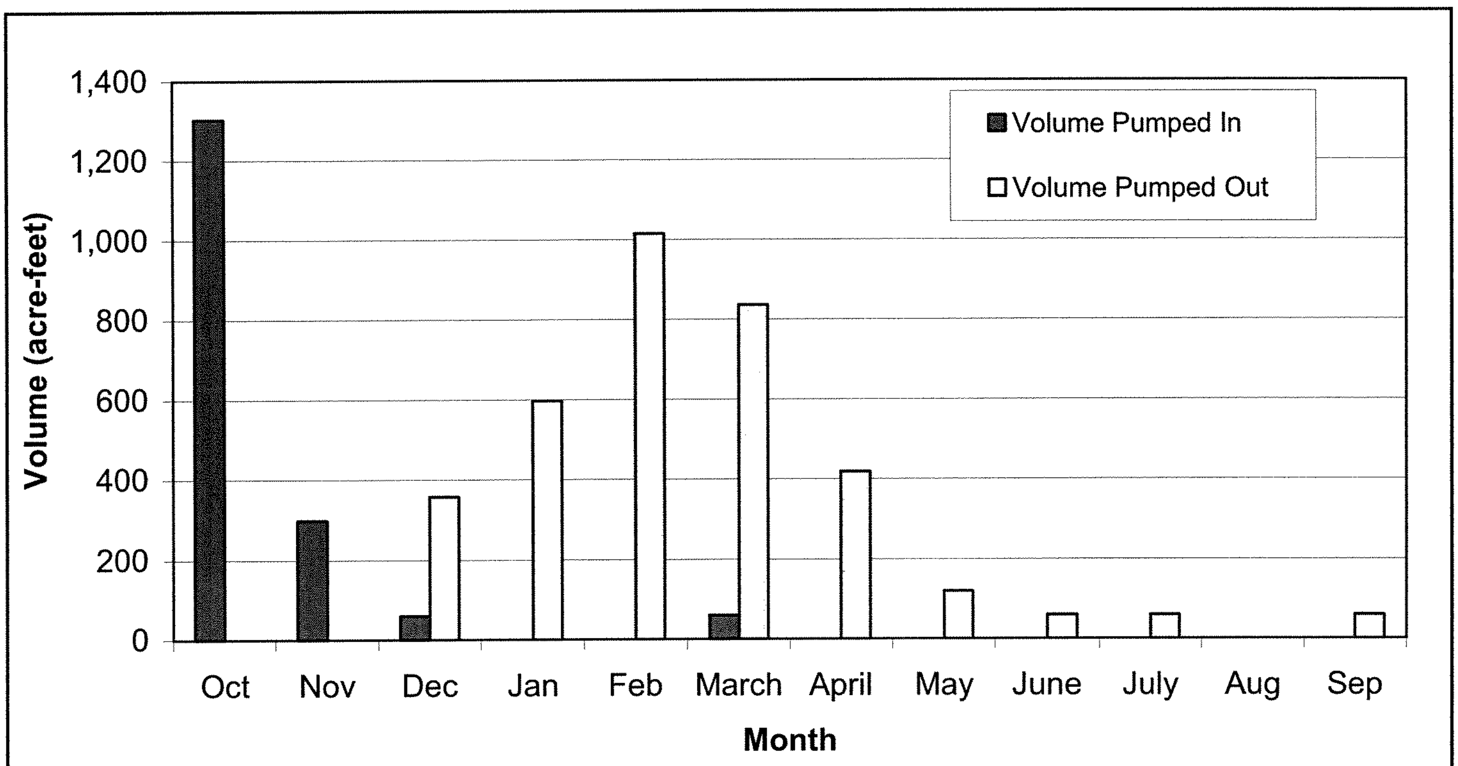
EXHIBIT 4.8-12



Source: Raw data received from HSI Hydrologic Systems 2002

Annual Water Volume Pumped into and out of the Delta under the Proposed Project Based on Past Water Year Data

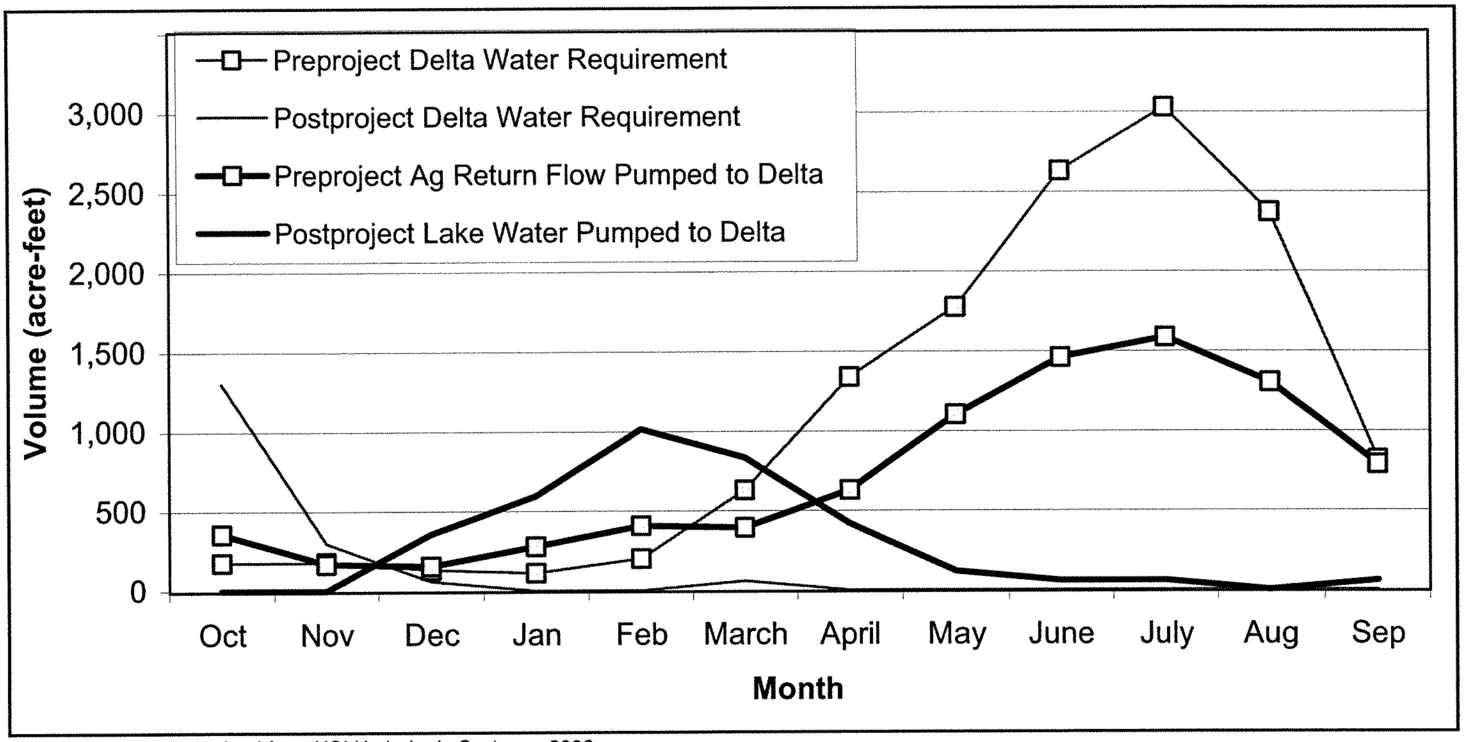
EXHIBIT 4.8-13



Source: Raw data received from HSI Hydrologic Systems 2002

Postproject Mean Monthly Water Volume Pumped into and out of the Delta under the Proposed Project Based on Past Water Year Data

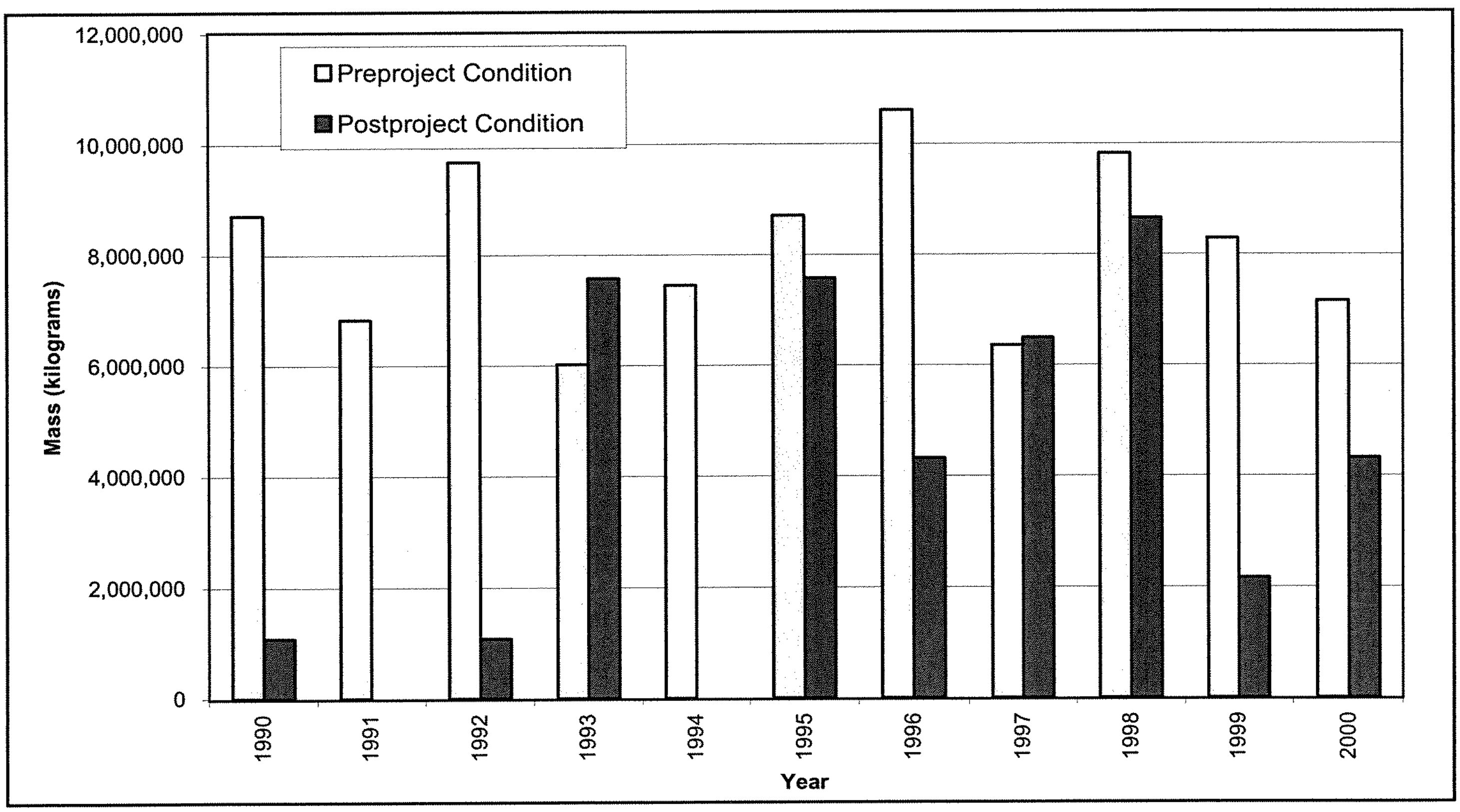
EXHIBIT 4.8-14



Source: Raw data received from HSI Hydrologic Systems, 2002.

Comparison of Historic Water Volume Pumped into and out of the Delta with the Projected Pumping Requirement of the River Islands Lake

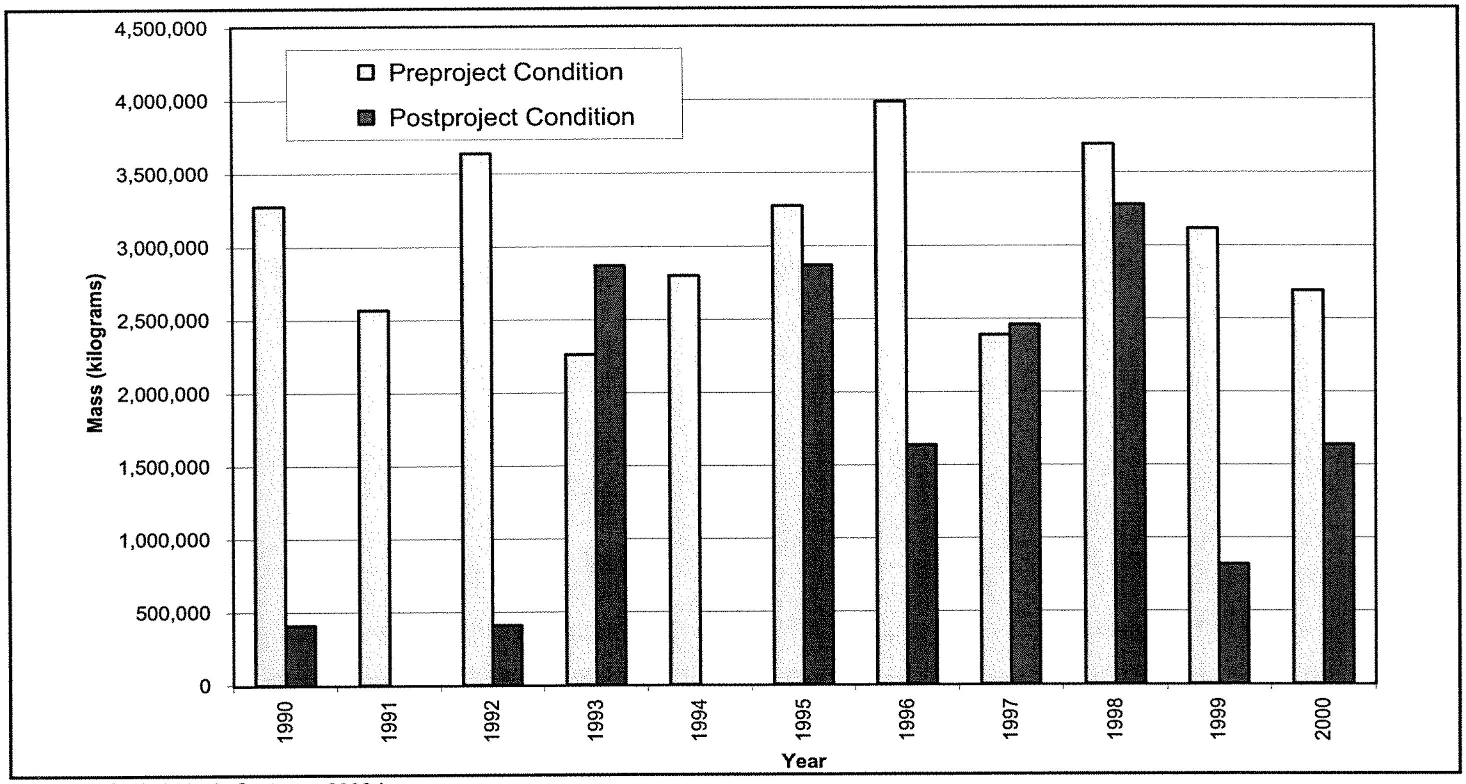
EXHIBIT 4.8-15



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands - Lake for Water Years 1990-2000 - Total Dissolved Solids

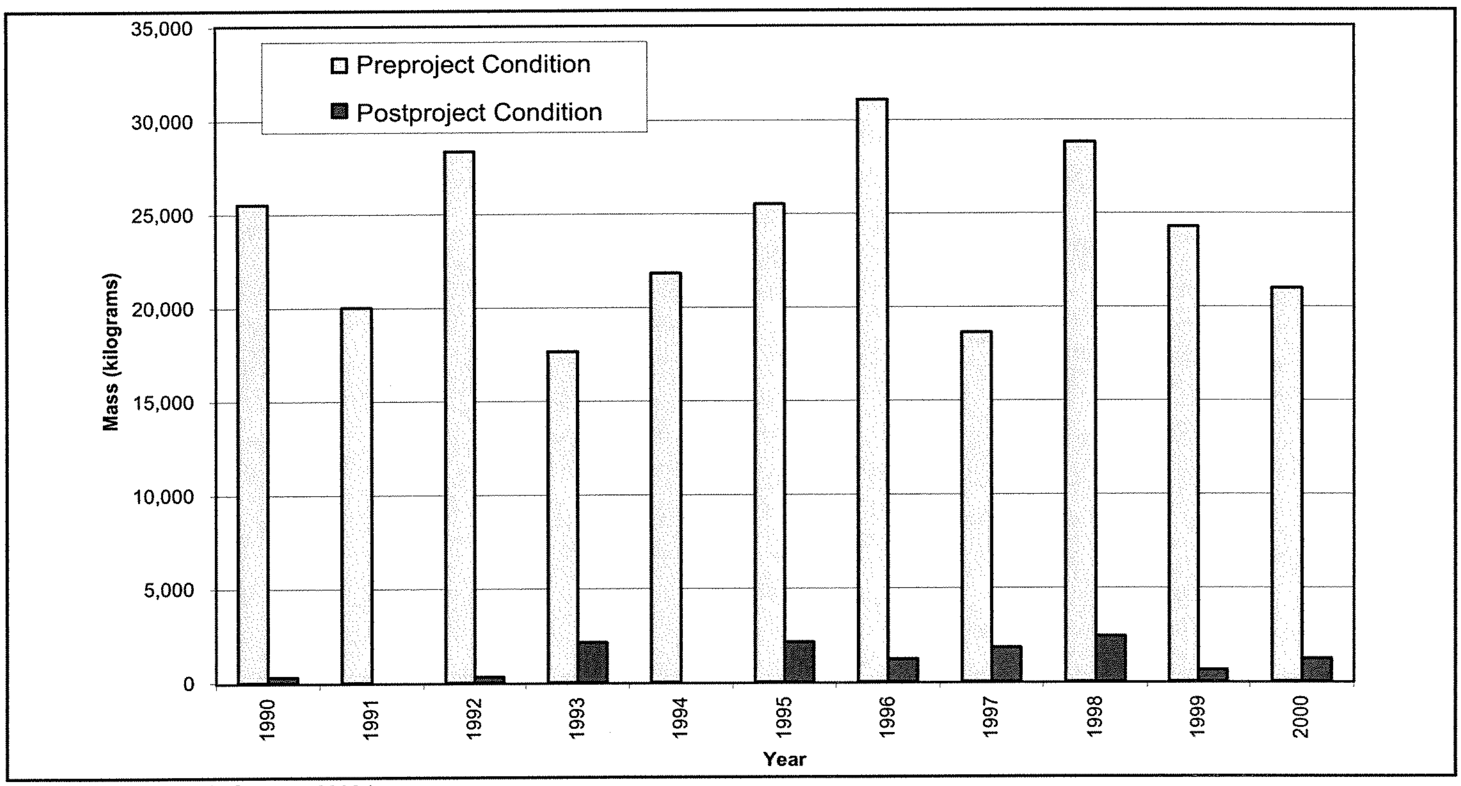
EXHIBIT 4.8-16



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Hardness

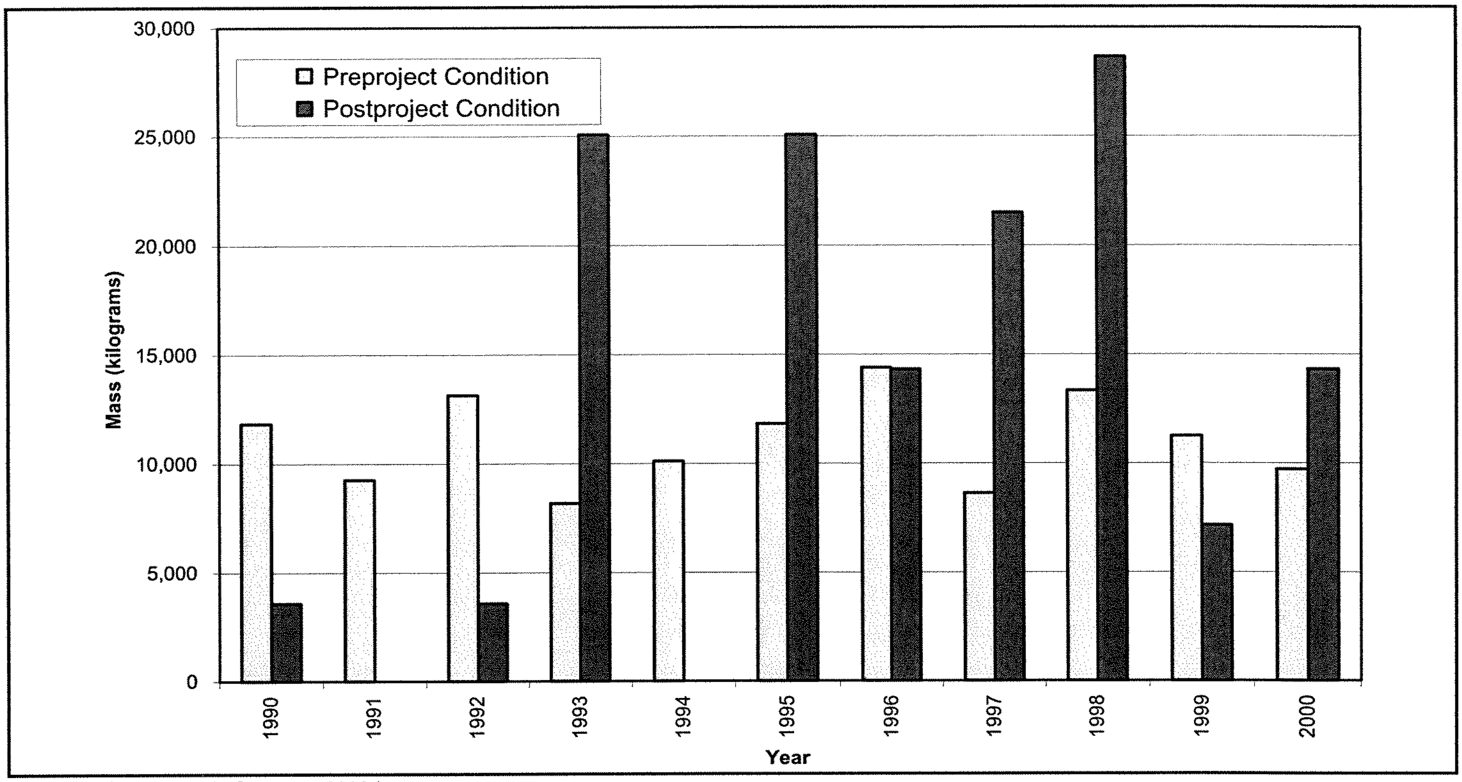
EXHIBIT 4.8-17



Source: HSI Hydrologic Systems 2002d

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Ammonia

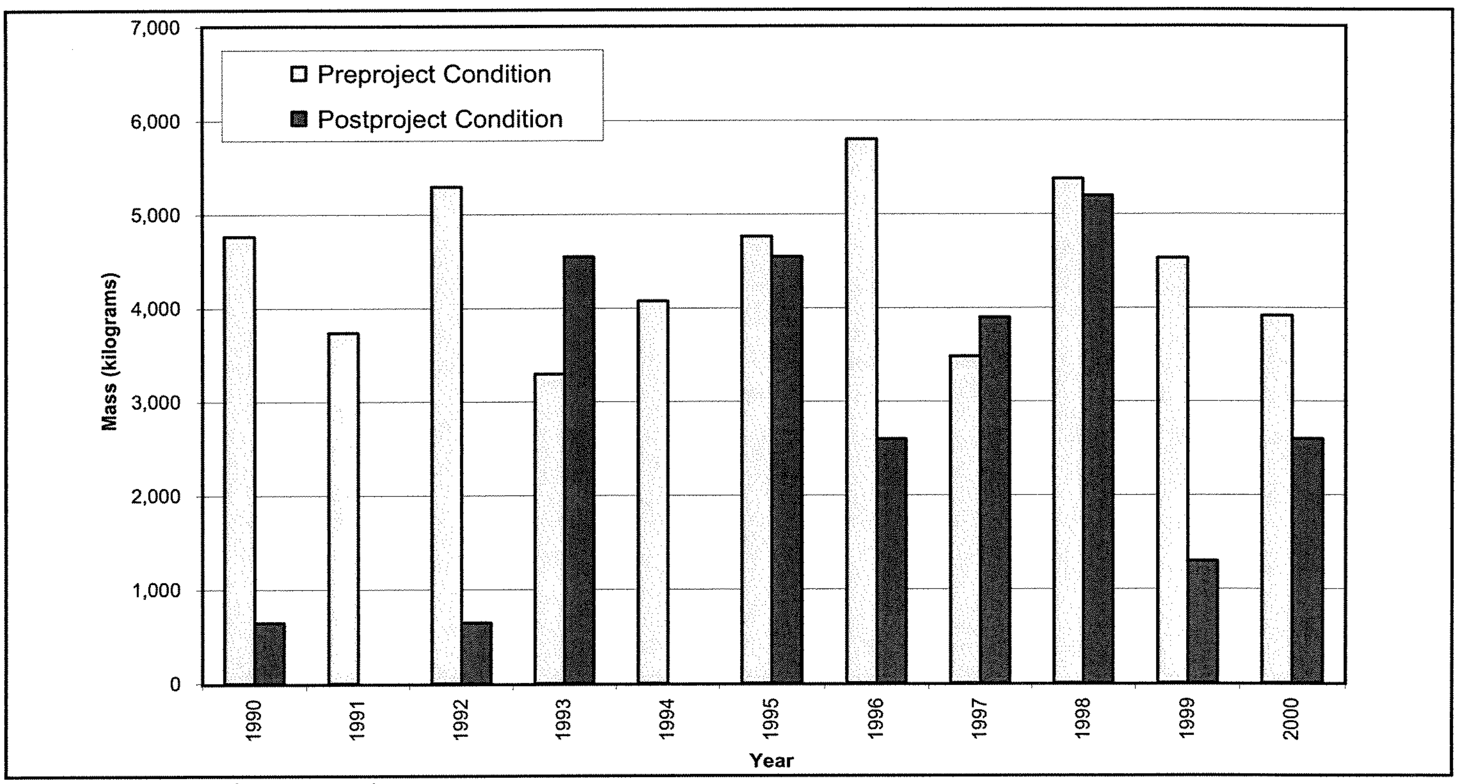
EXHIBIT 4.8-18



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Nitrate

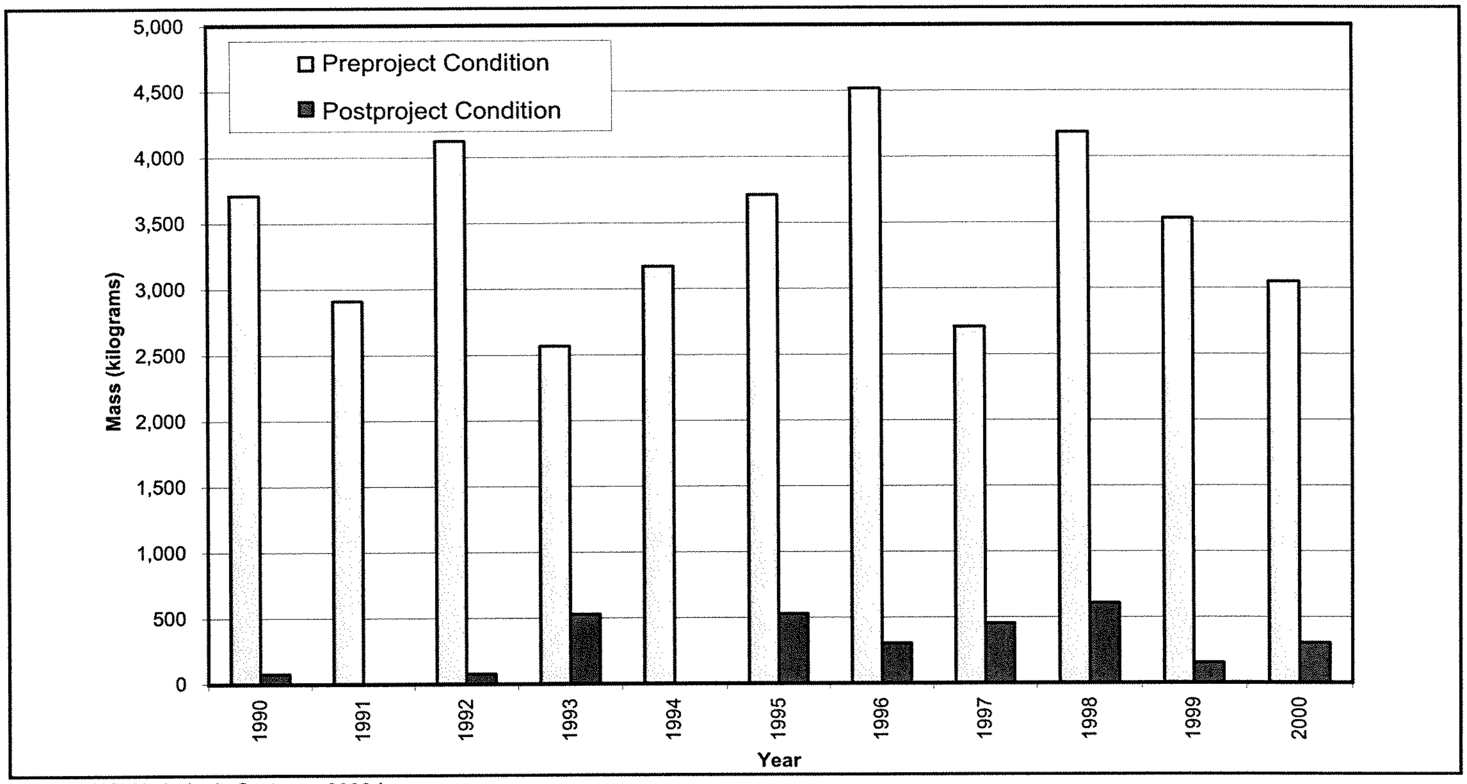
EXHIBIT 4.8-19



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Phosphorus

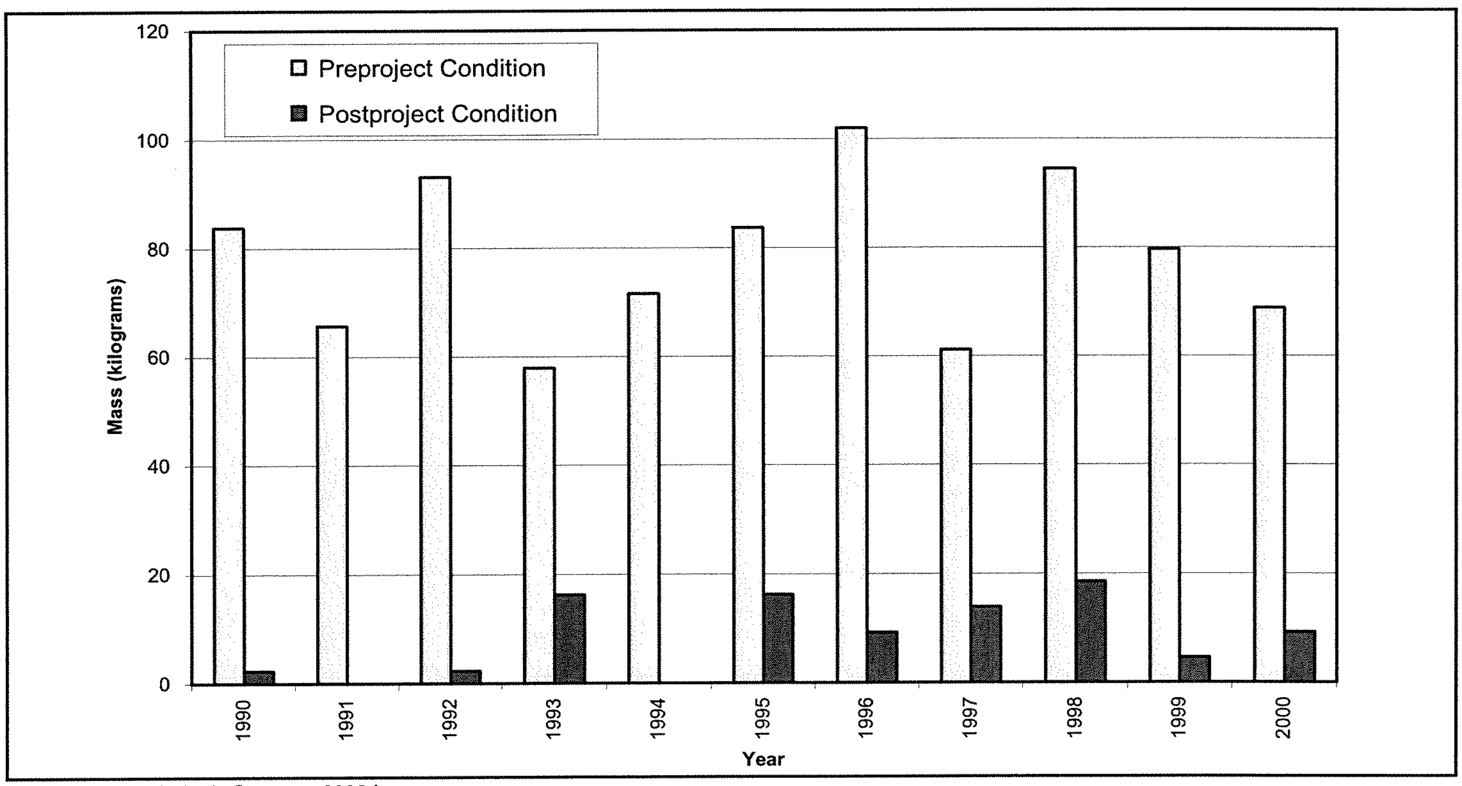
EXHIBIT 4.8-20



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Dissolved Phosphorus

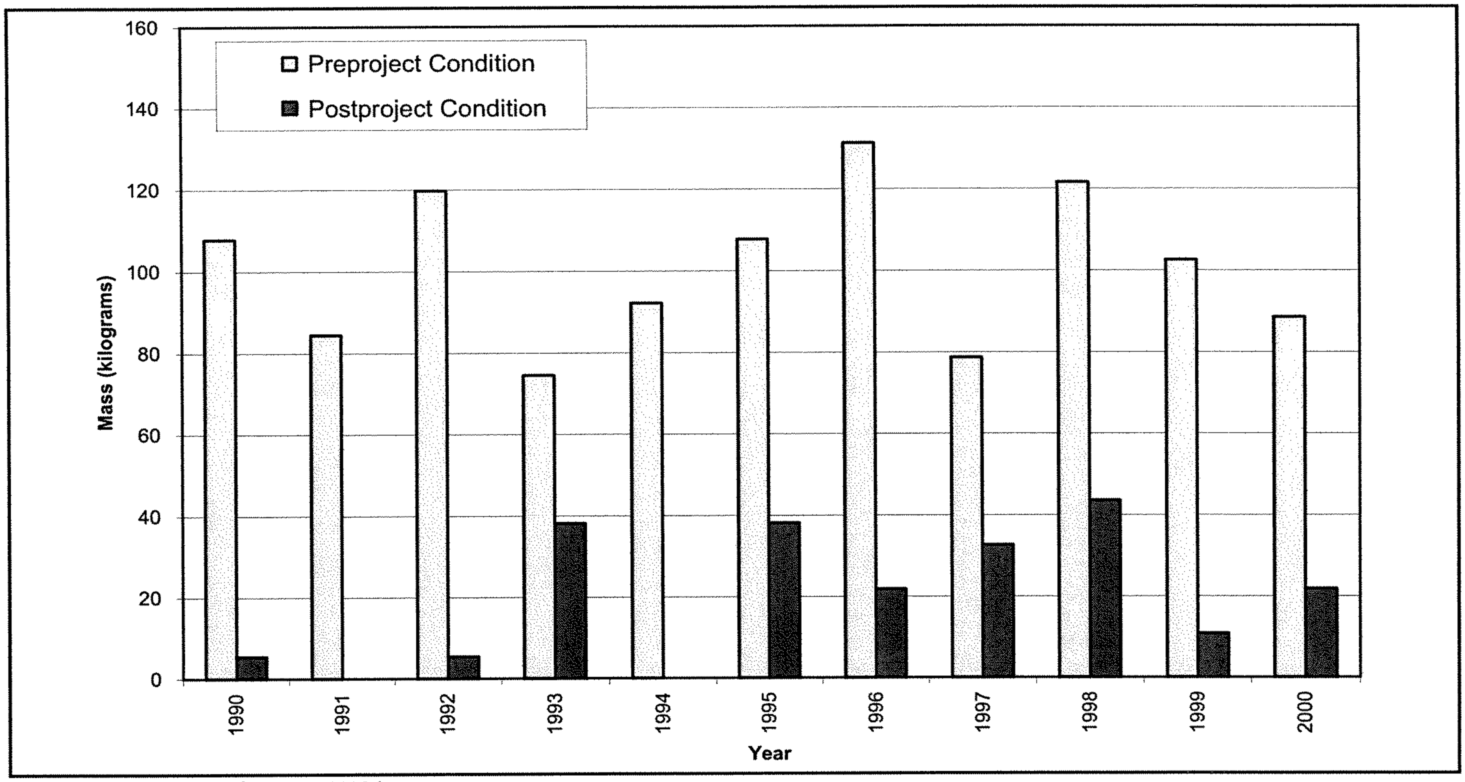
EXHIBIT 4.8-21



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Dissolved Arsenic

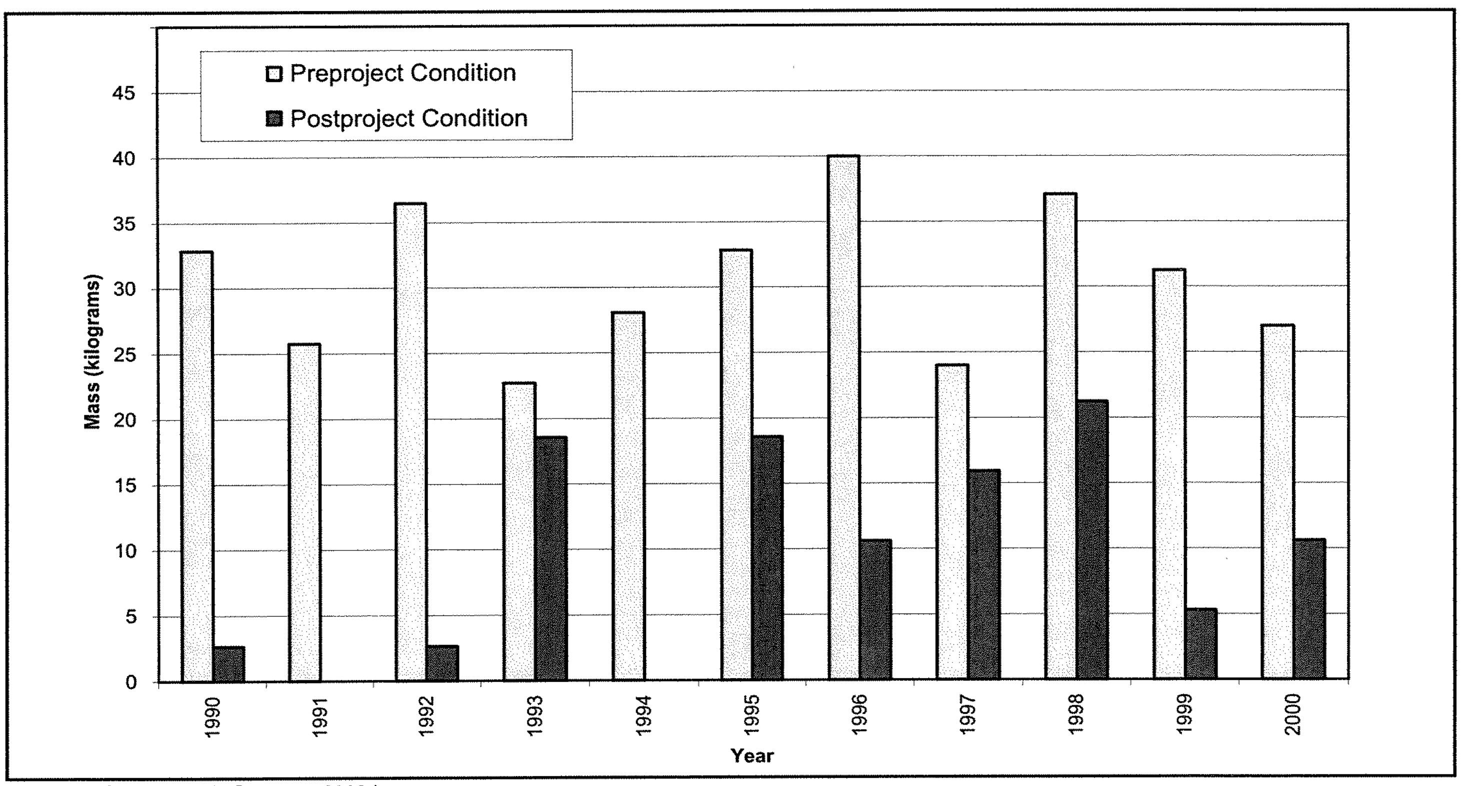
EXHIBIT 4.8-22



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Total Arsenic

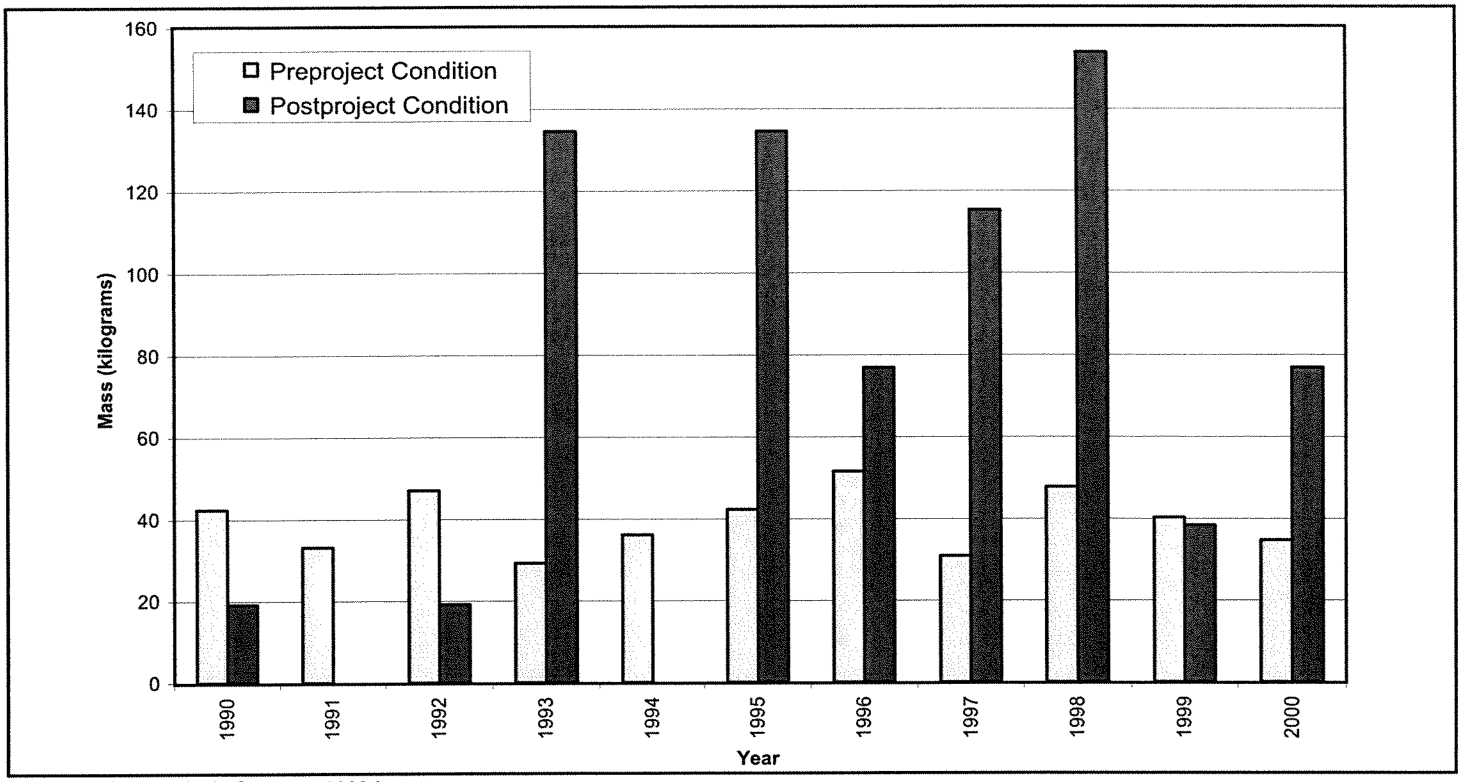
EXHIBIT 4.8-23



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Dissolved Copper

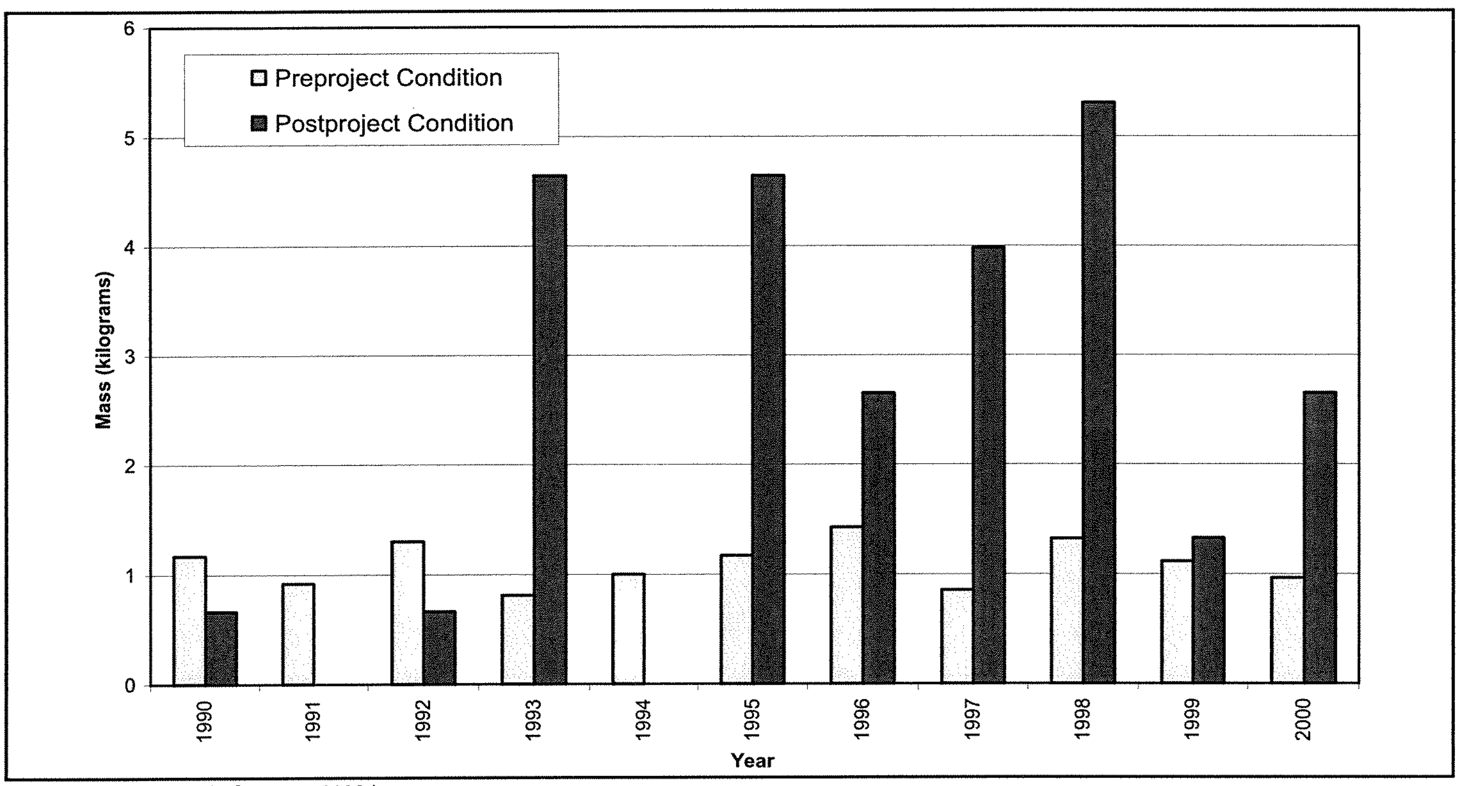
EXHIBIT 4.8-24



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Total Copper

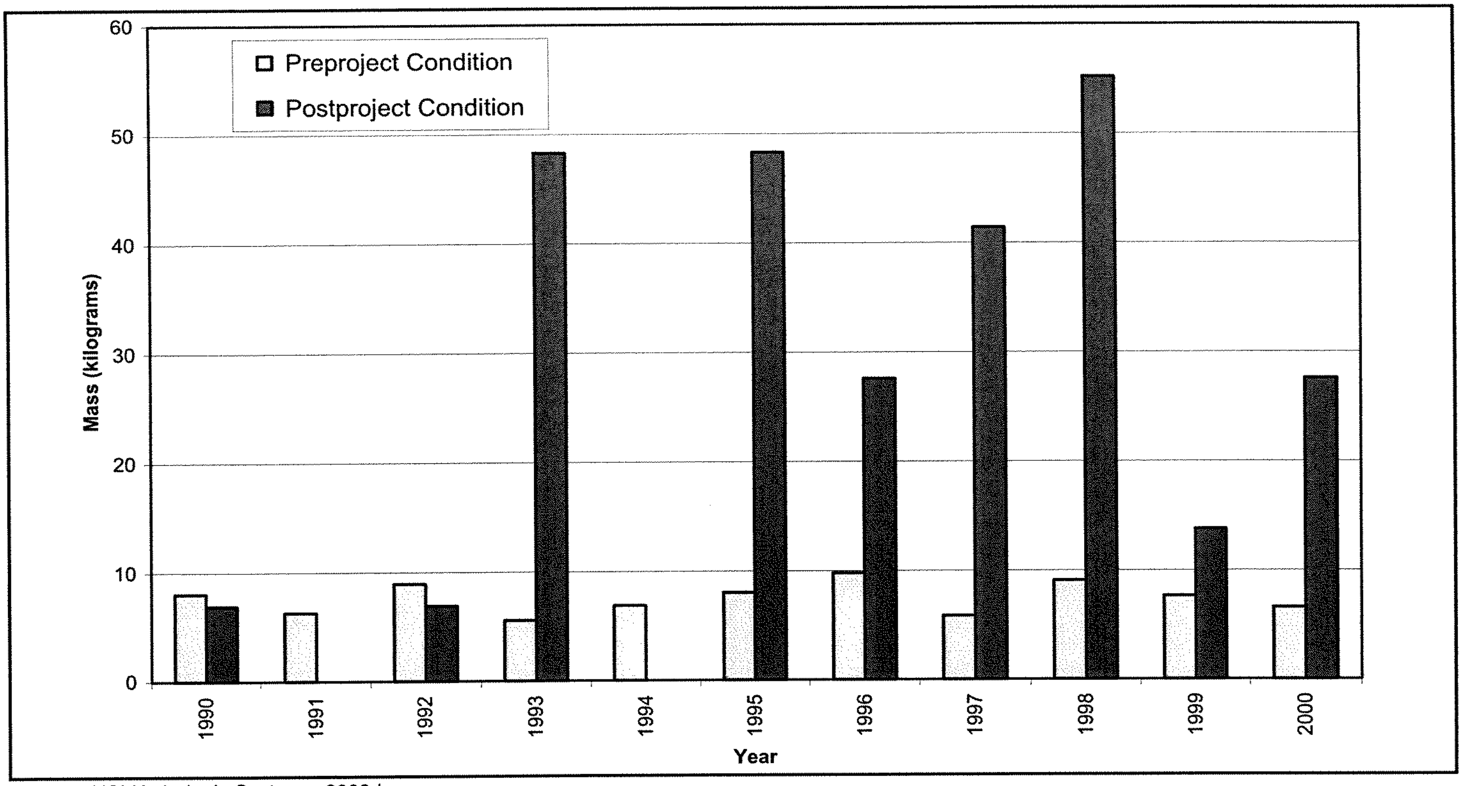
EXHIBIT 4.8-25



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Dissolved Lead

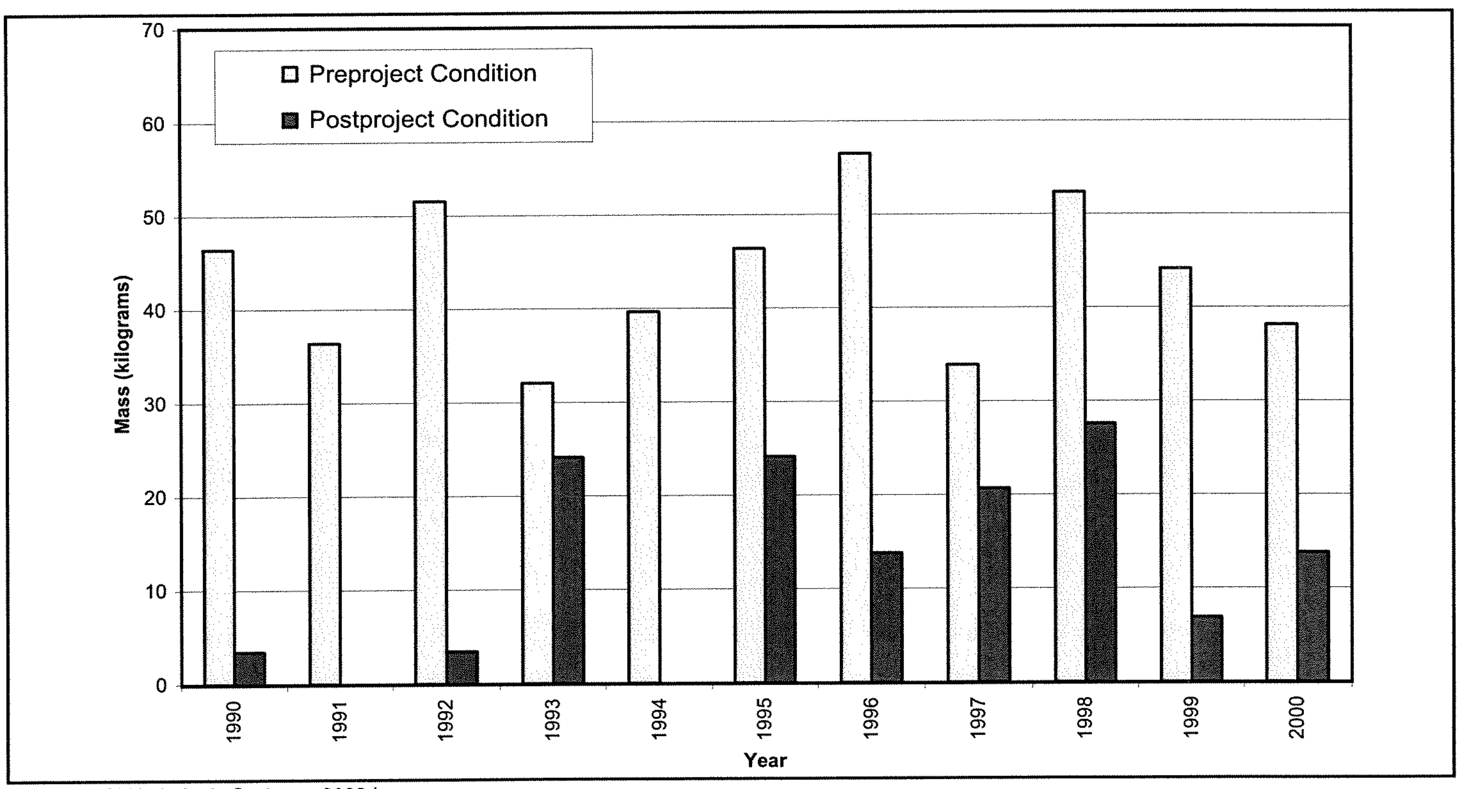
EXHIBIT 4.8-26



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Total Lead

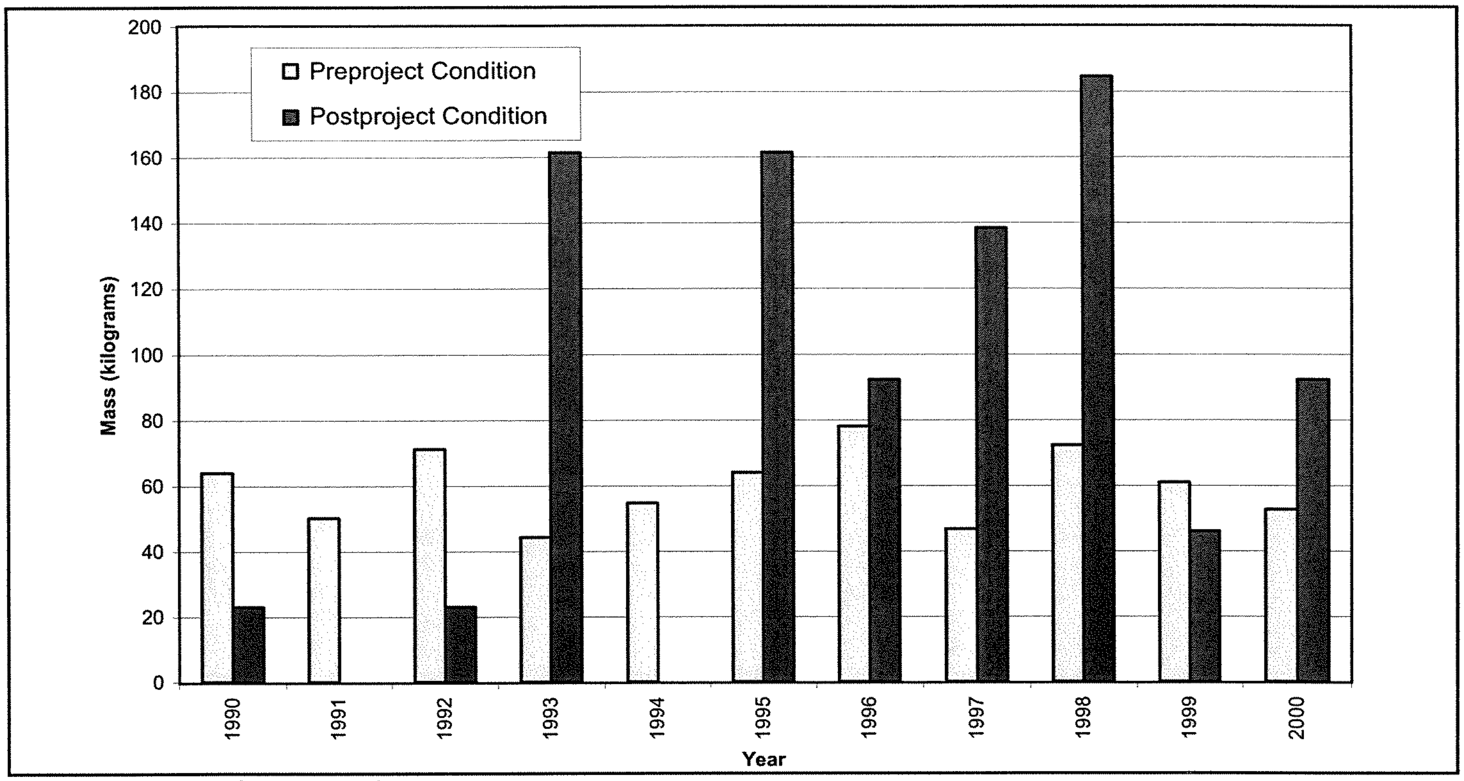
EXHIBIT 4.8-27



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Dissolved Nickel

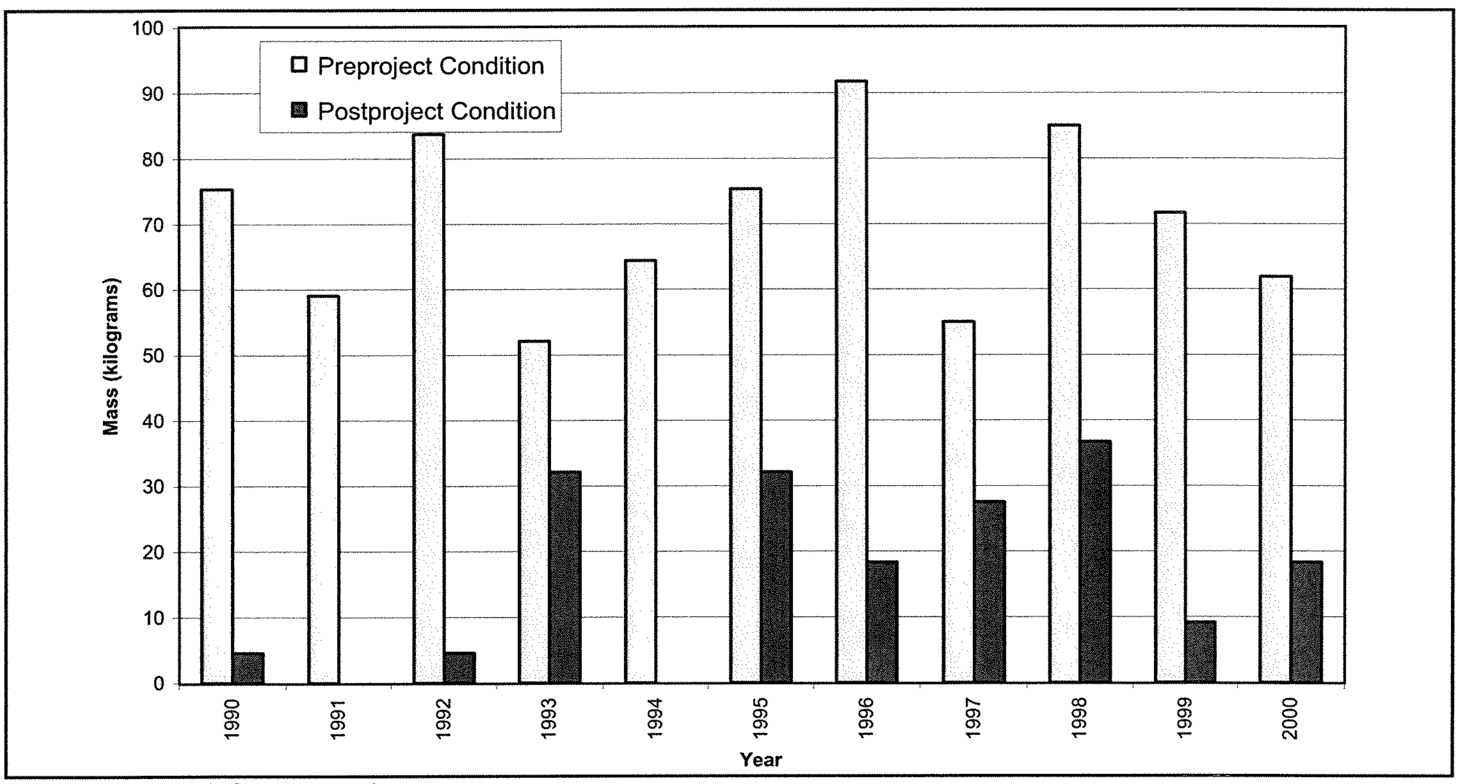
EXHIBIT 4.8-28



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Total Nickel

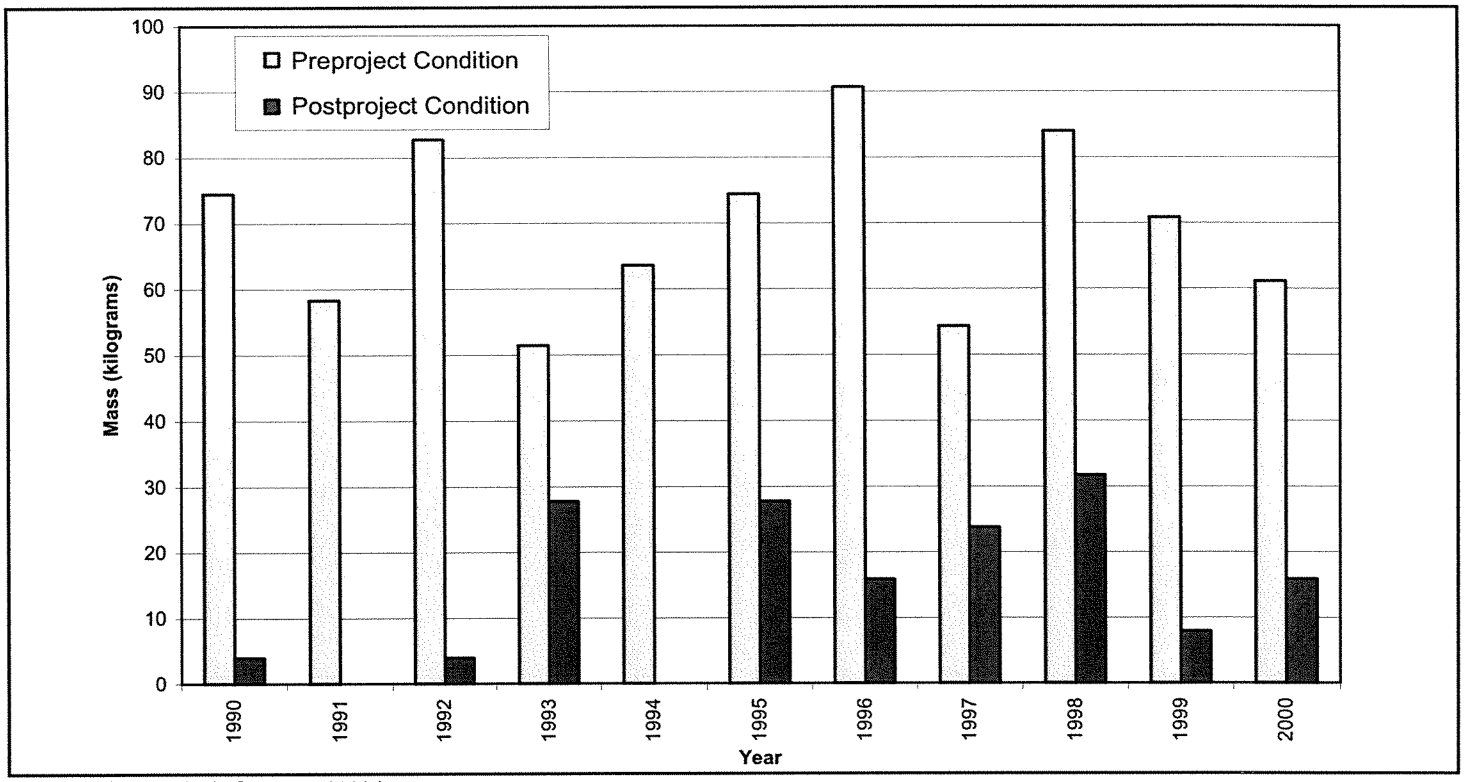
EXHIBIT 4.8-29



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Dissolved Selenium

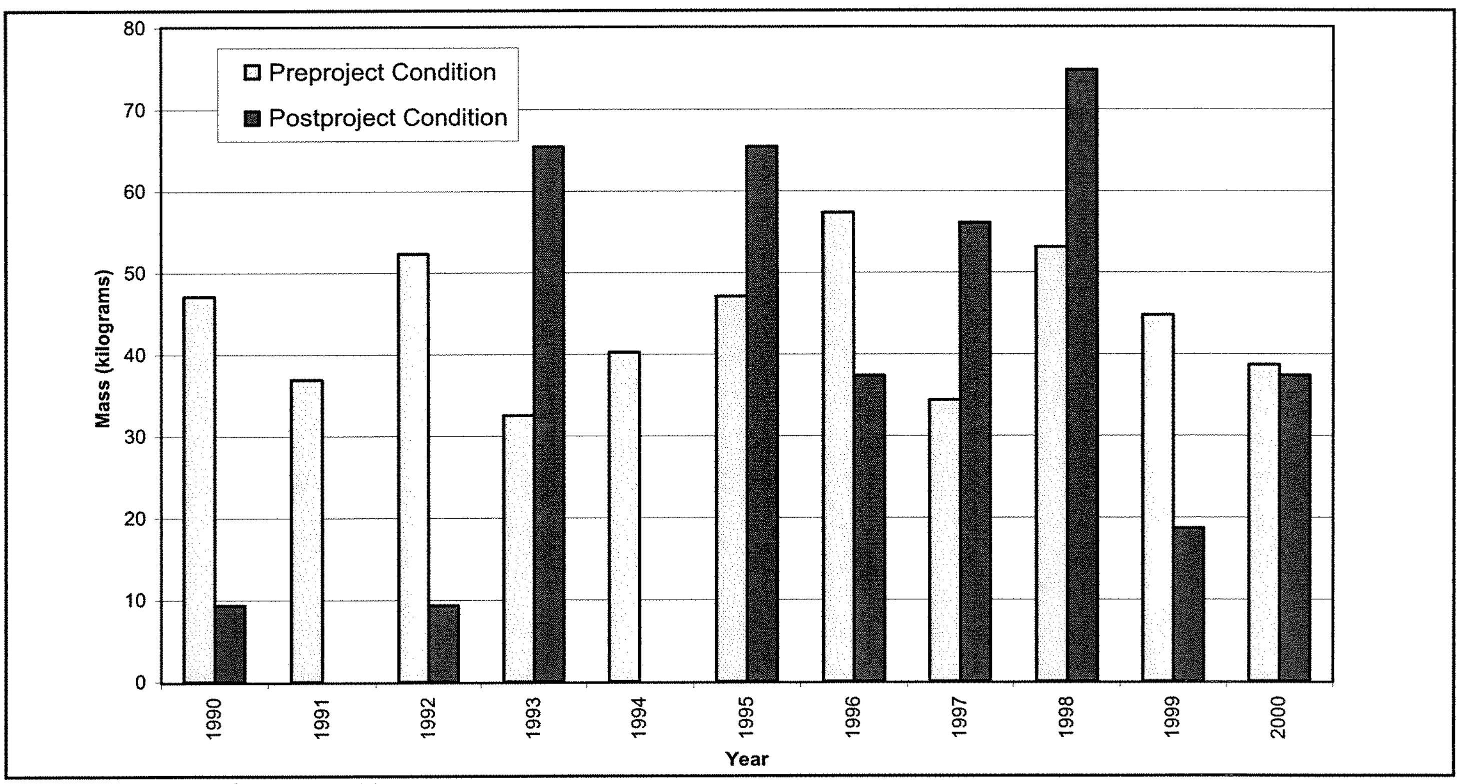
EXHIBIT 4.8-30



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Total Selenium

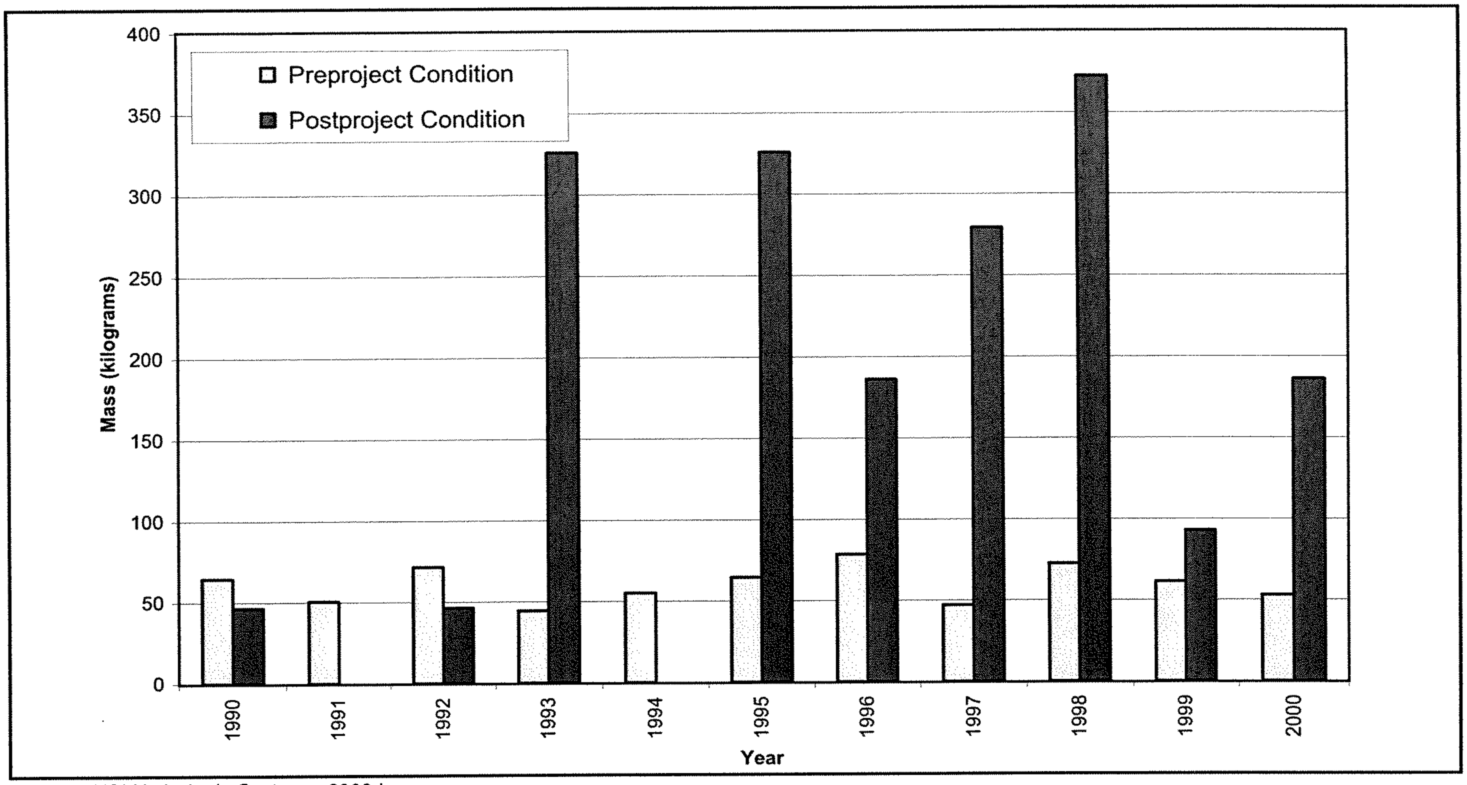
EXHIBIT 4.8-31



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Dissolved Zinc

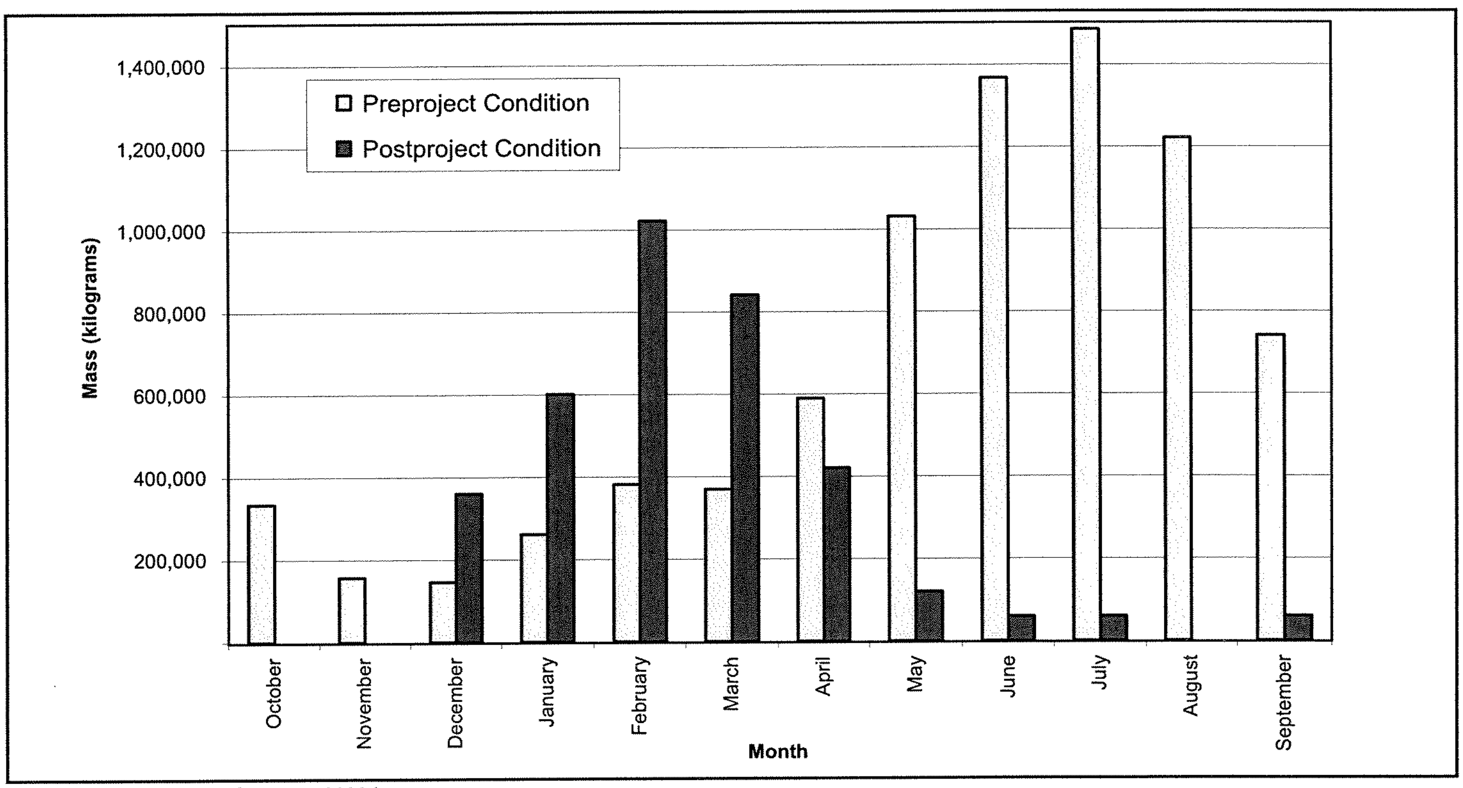
EXHIBIT 4.8-32



Source: HSI Hydrologic Systems, 2002d.

Comparison of Existing Stewart Tract Contaminant Discharge to the Delta with the Simulated Loading from the River Islands Lake for Water Years 1990-2000 - Total Zinc

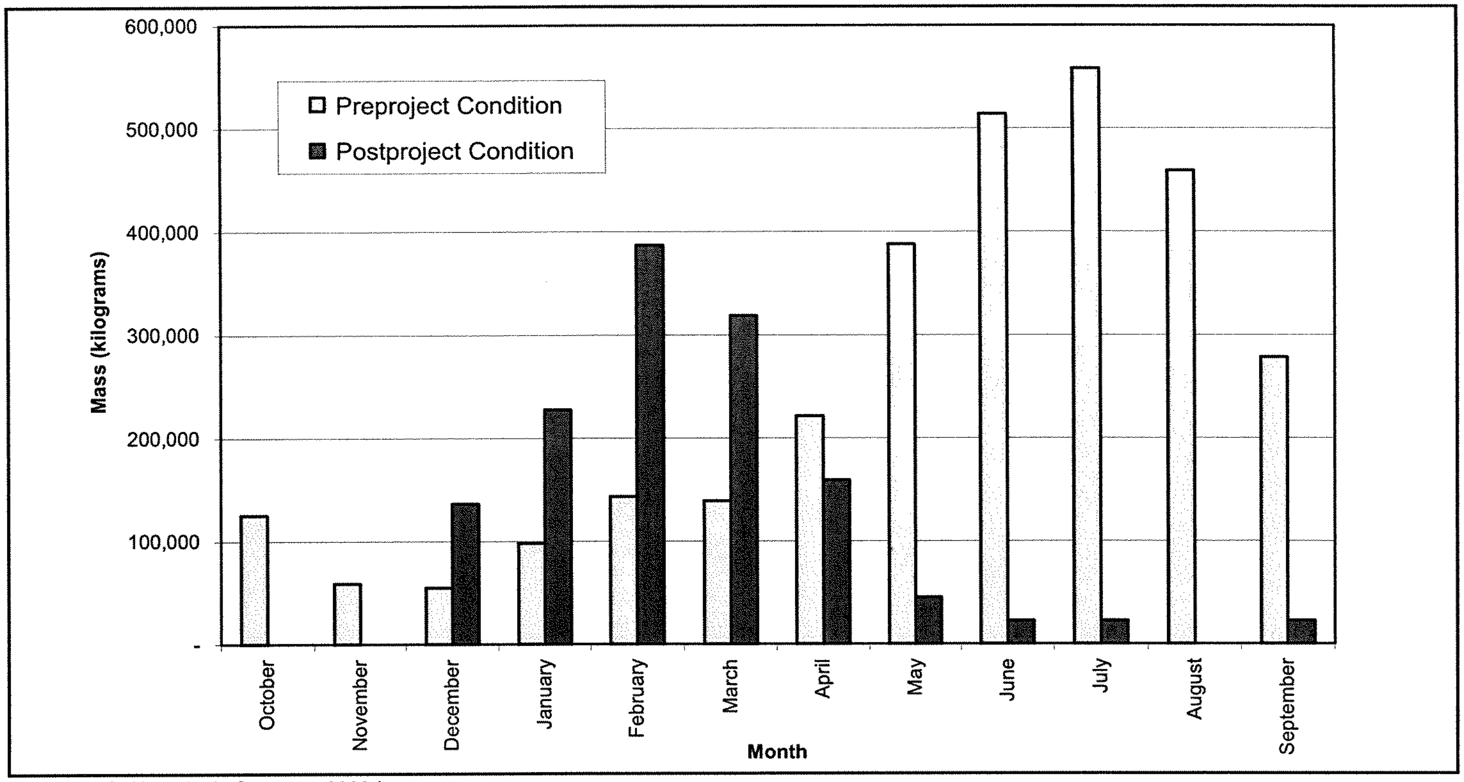
EXHIBIT 4.8-33



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Total Dissolved Solids

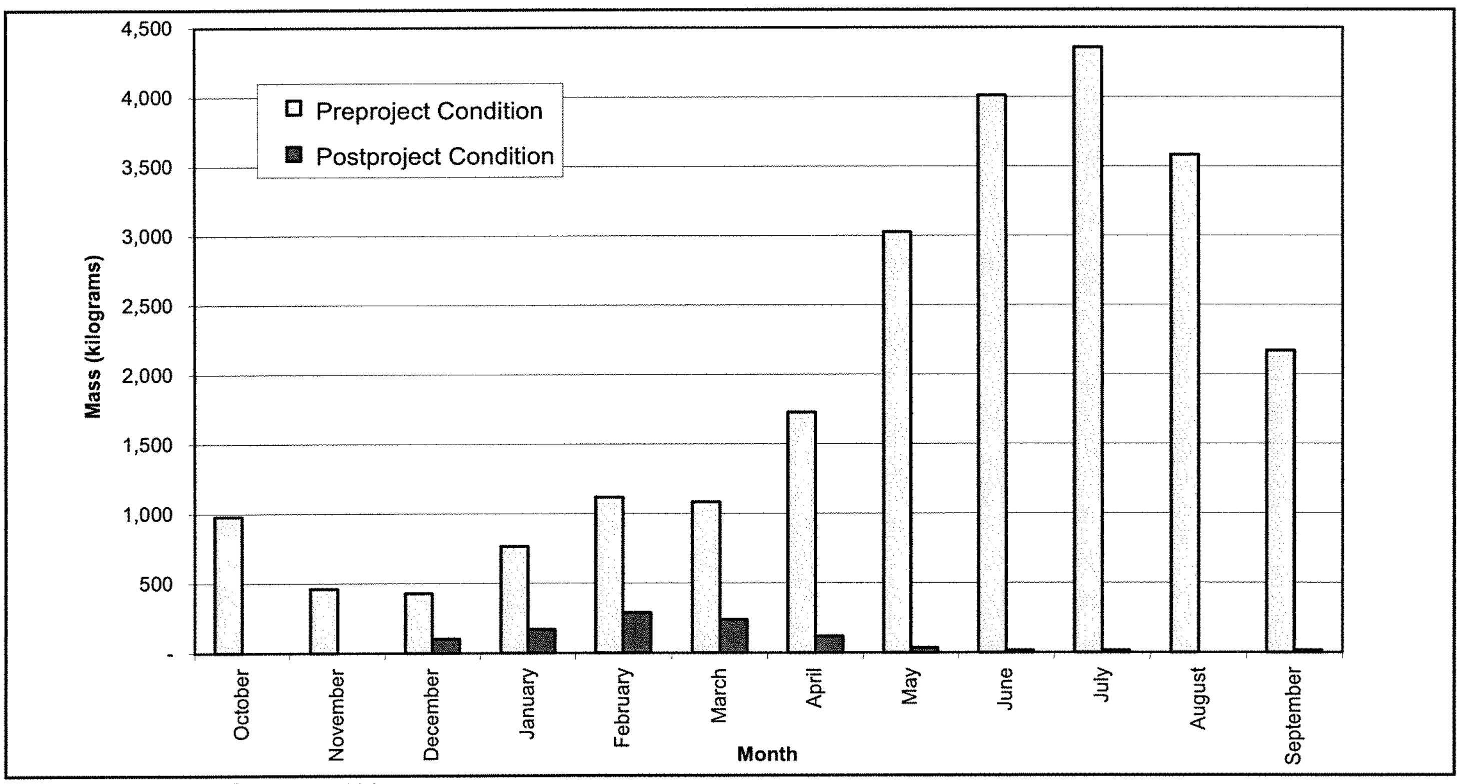
EXHIBIT 4.8-34



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Hardness

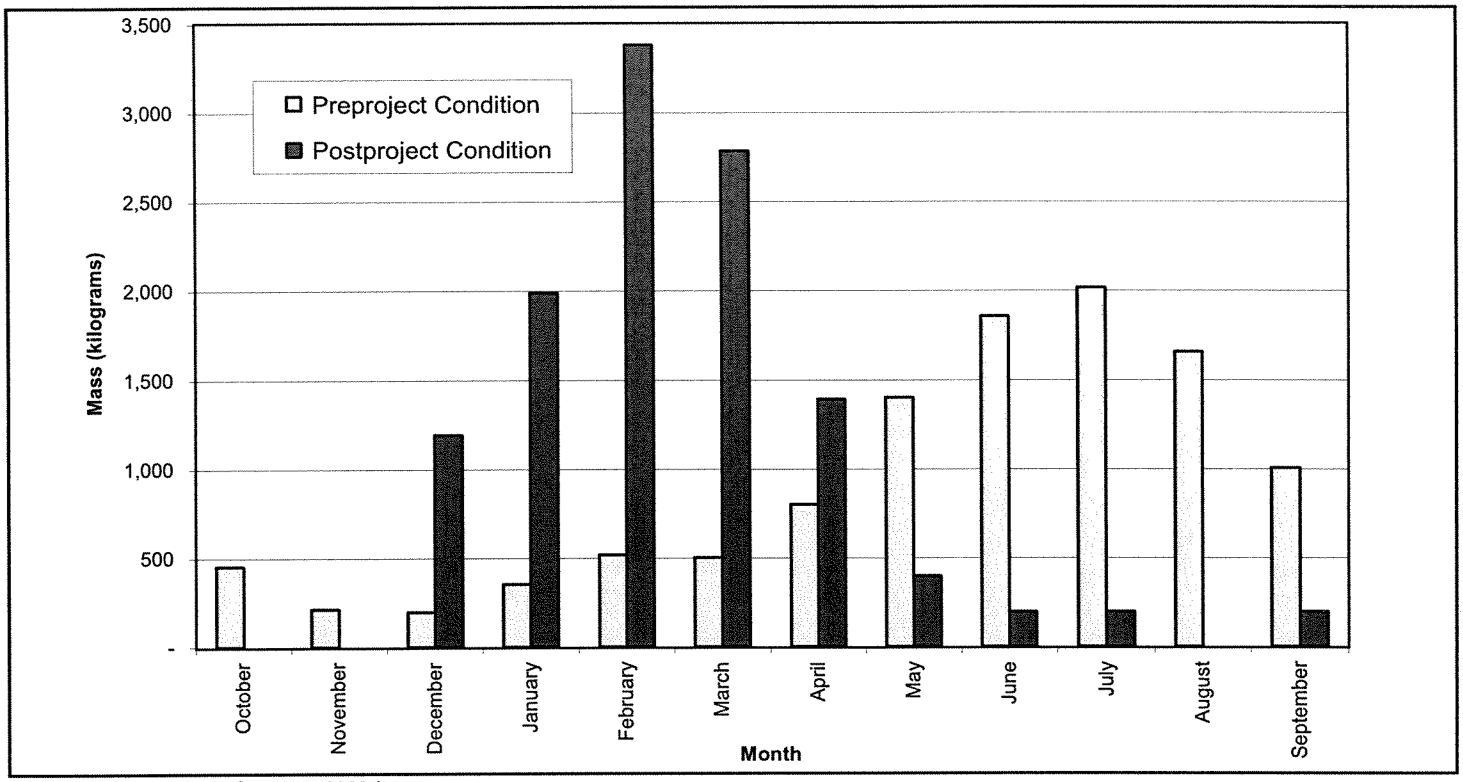
EXHIBIT 4.8-35



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Ammonia

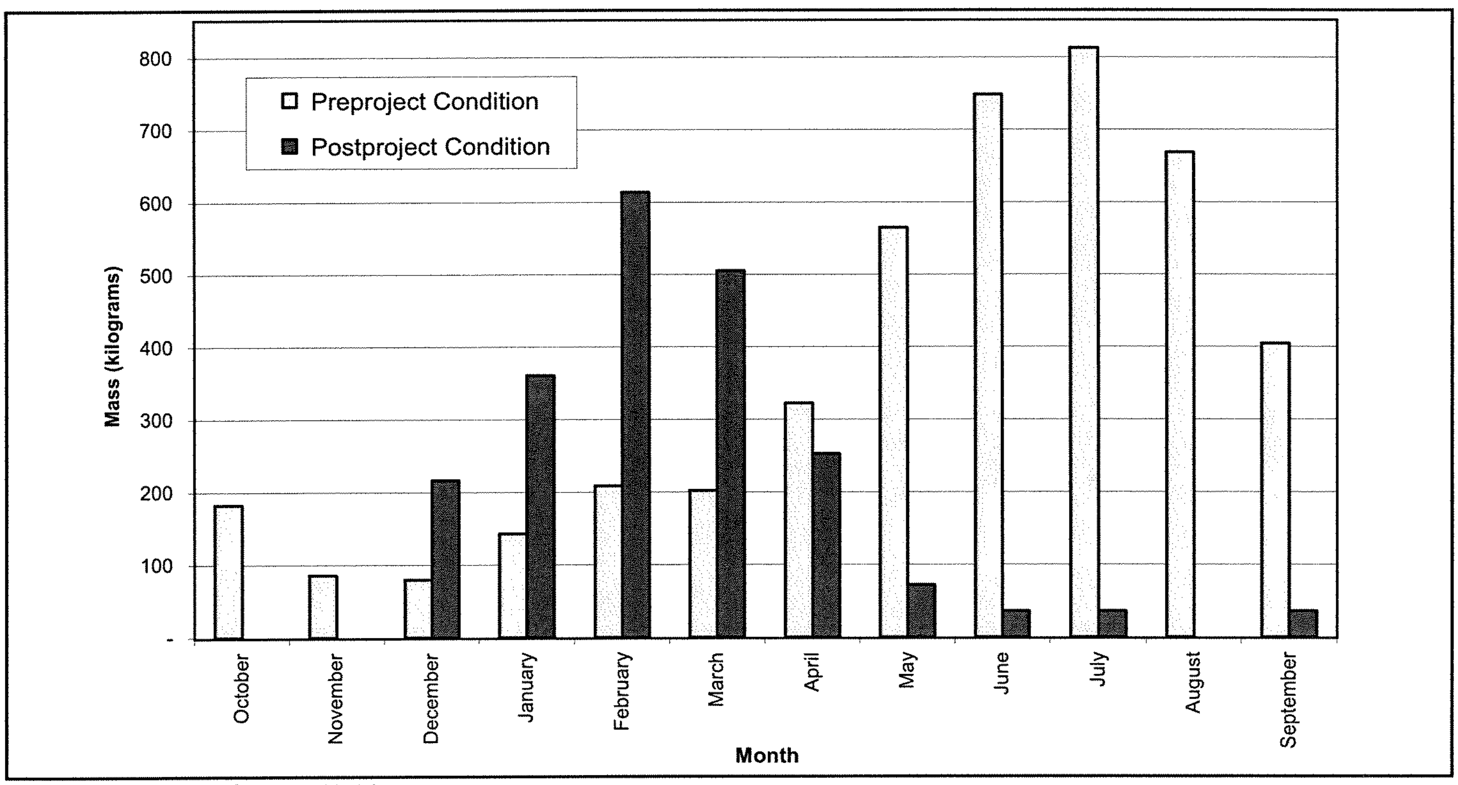
EXHIBIT 4.8-36



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Nitrate

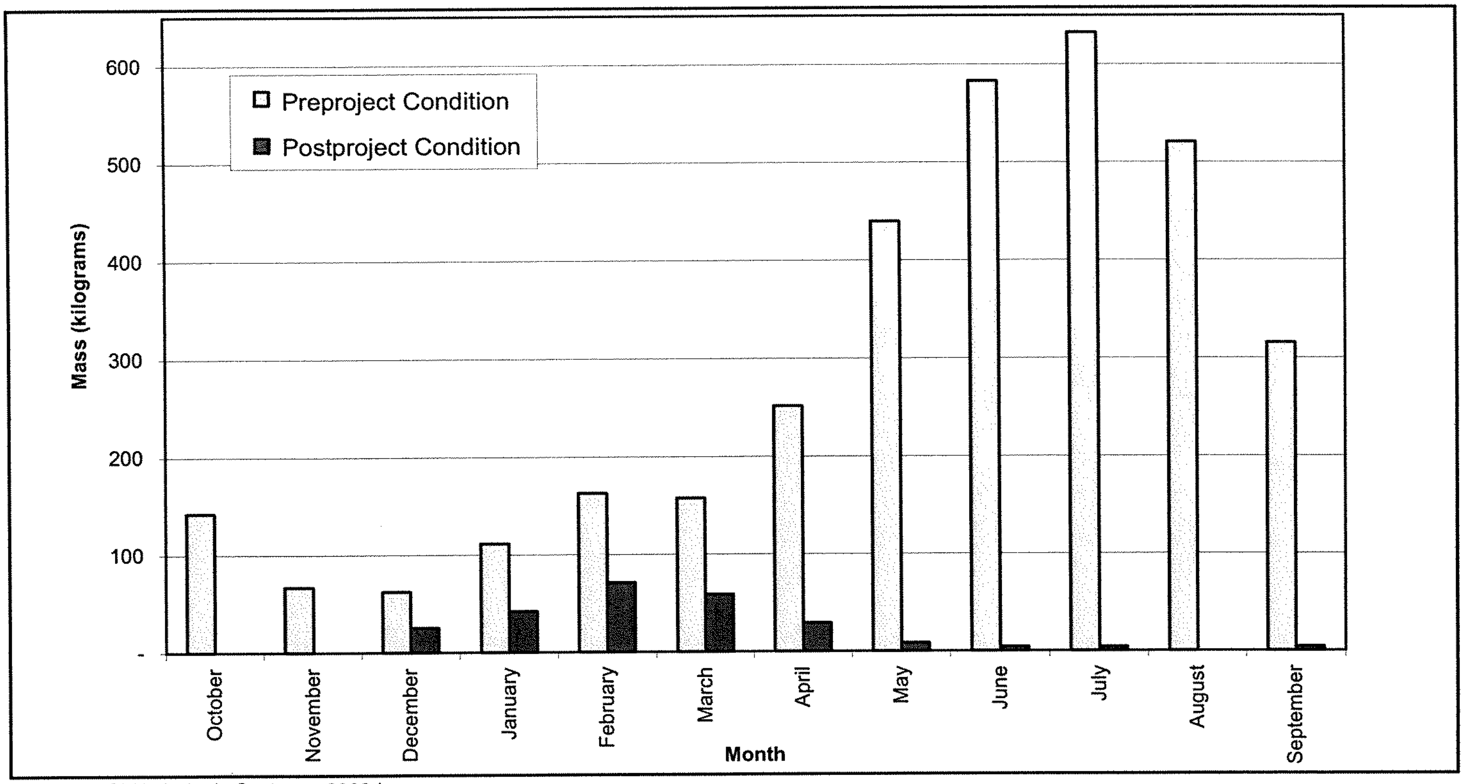
EXHIBIT 4.8-37



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Phosphorous

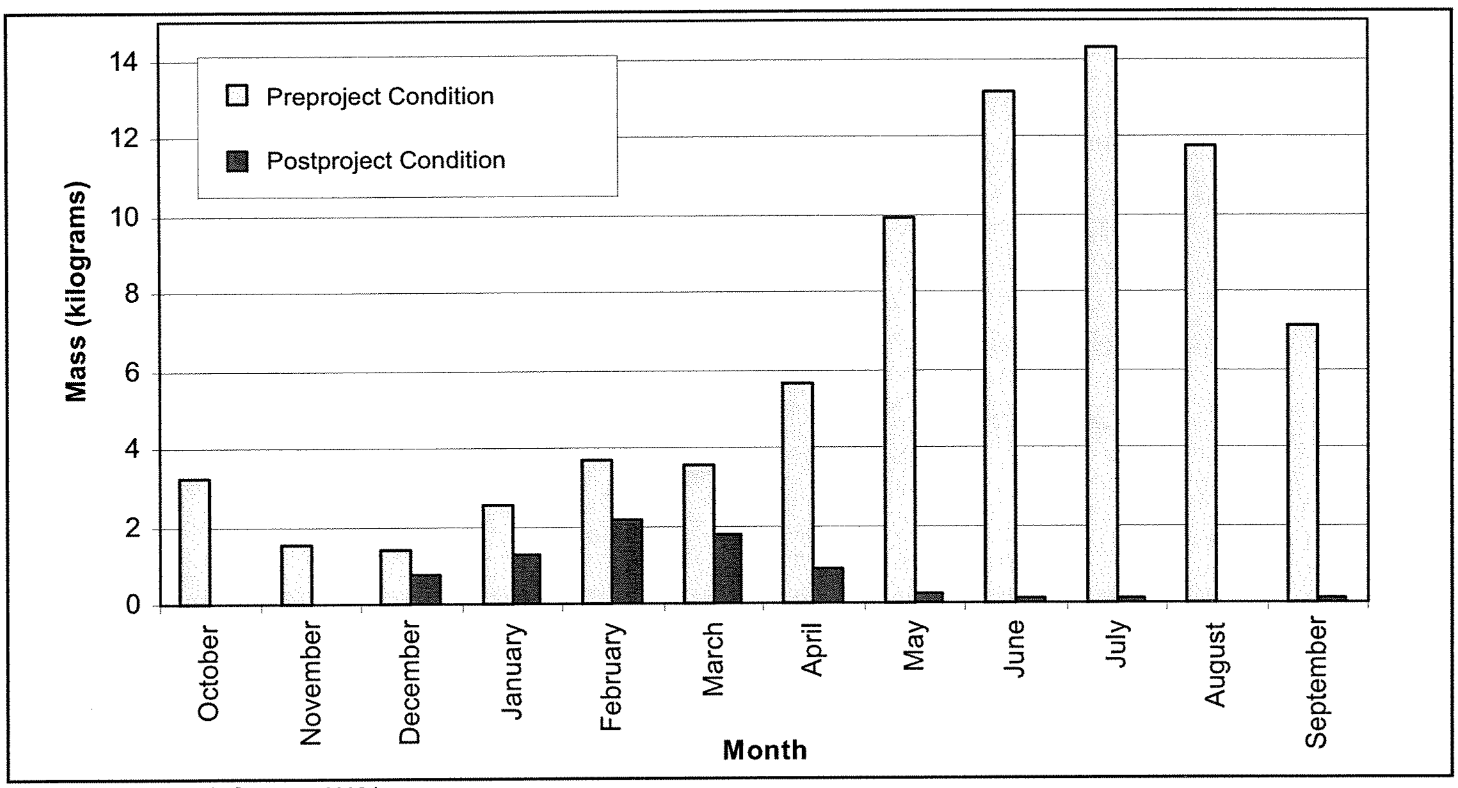
EXHIBIT 4.8-38



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Dissolved Phosphorous

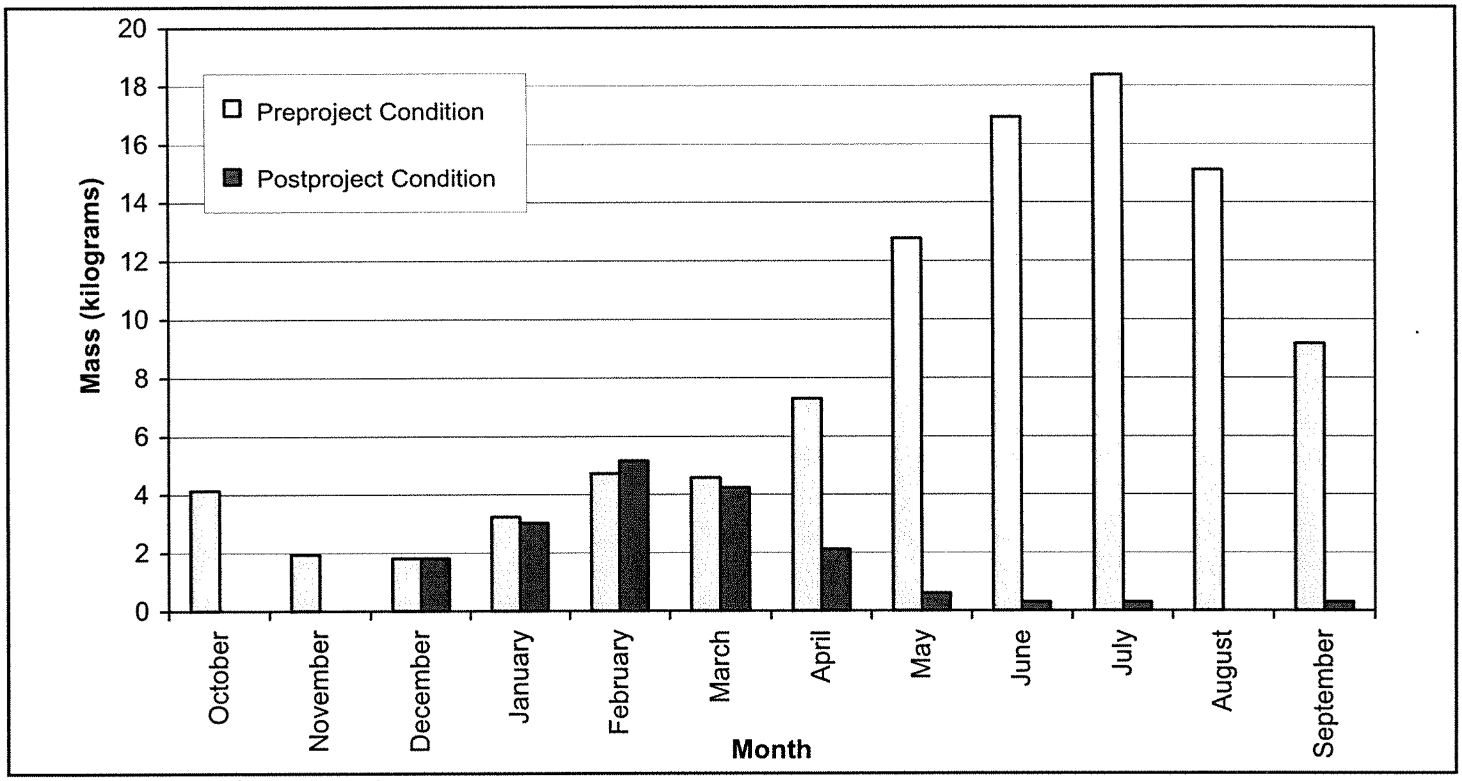
EXHIBIT 4.8-39



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Dissolved Arsenic

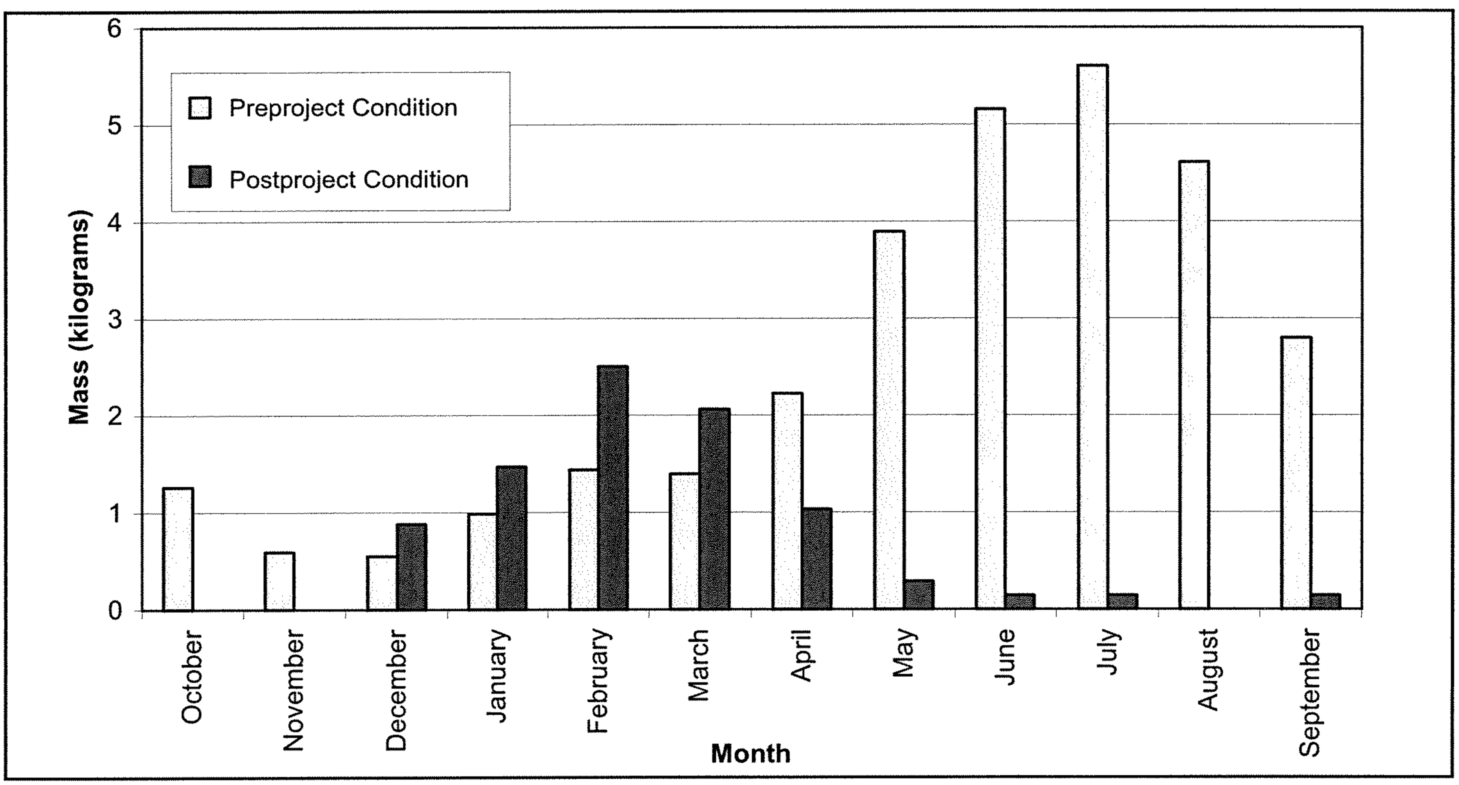
EXHIBIT 4.8-40



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Total Arsenic

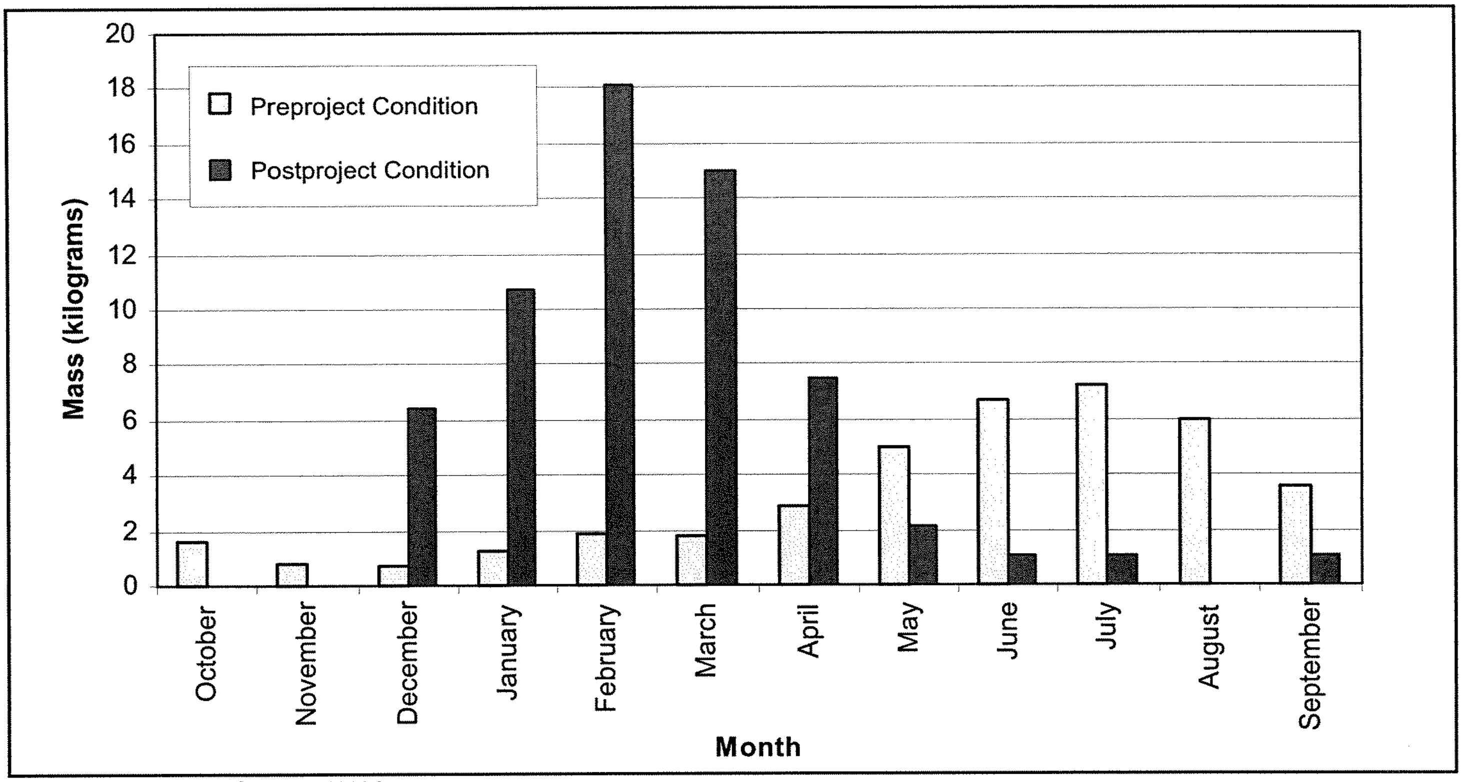
EXHIBIT 4.8-41



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Dissolved Copper

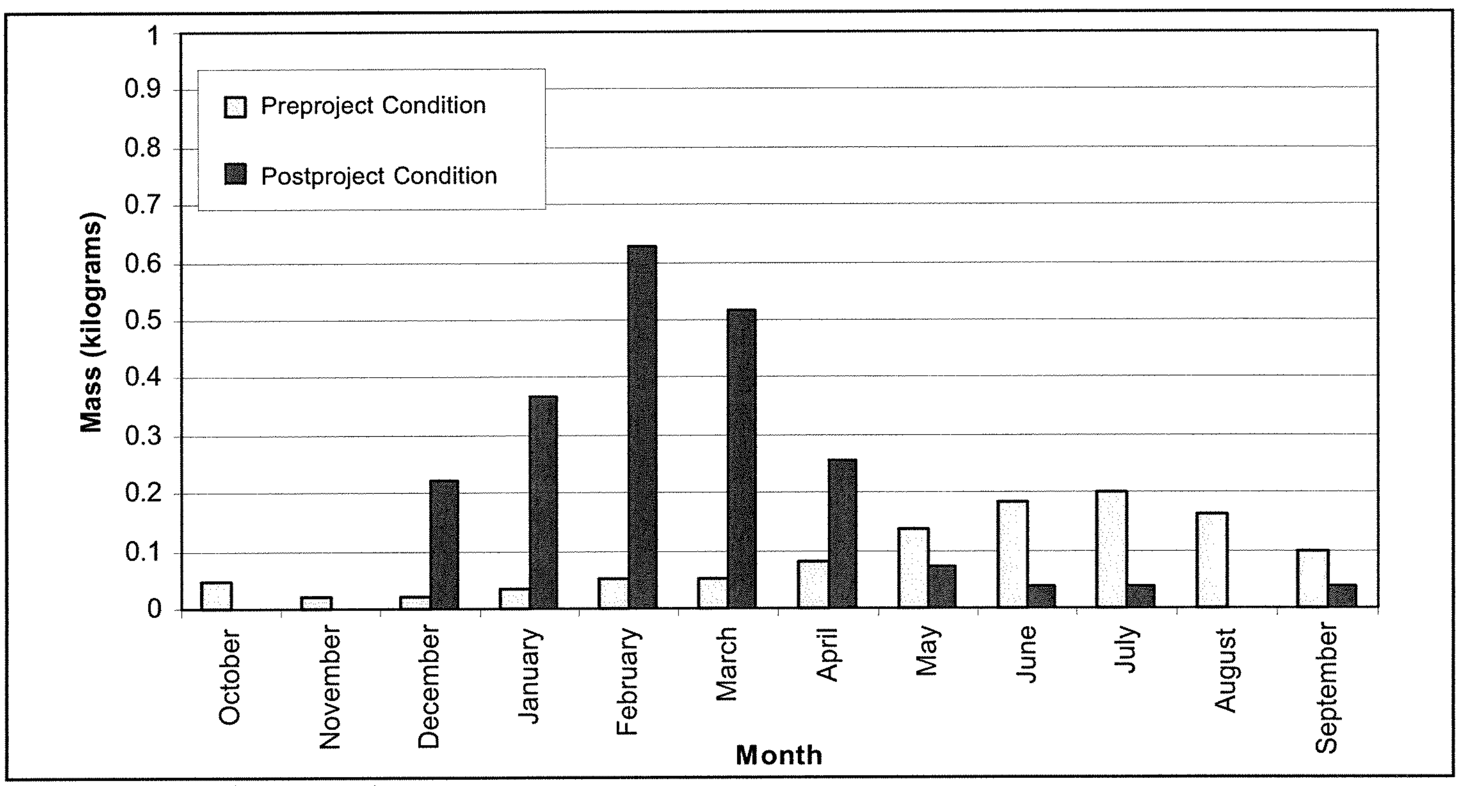
EXHIBIT 4.8-42



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Total Copper

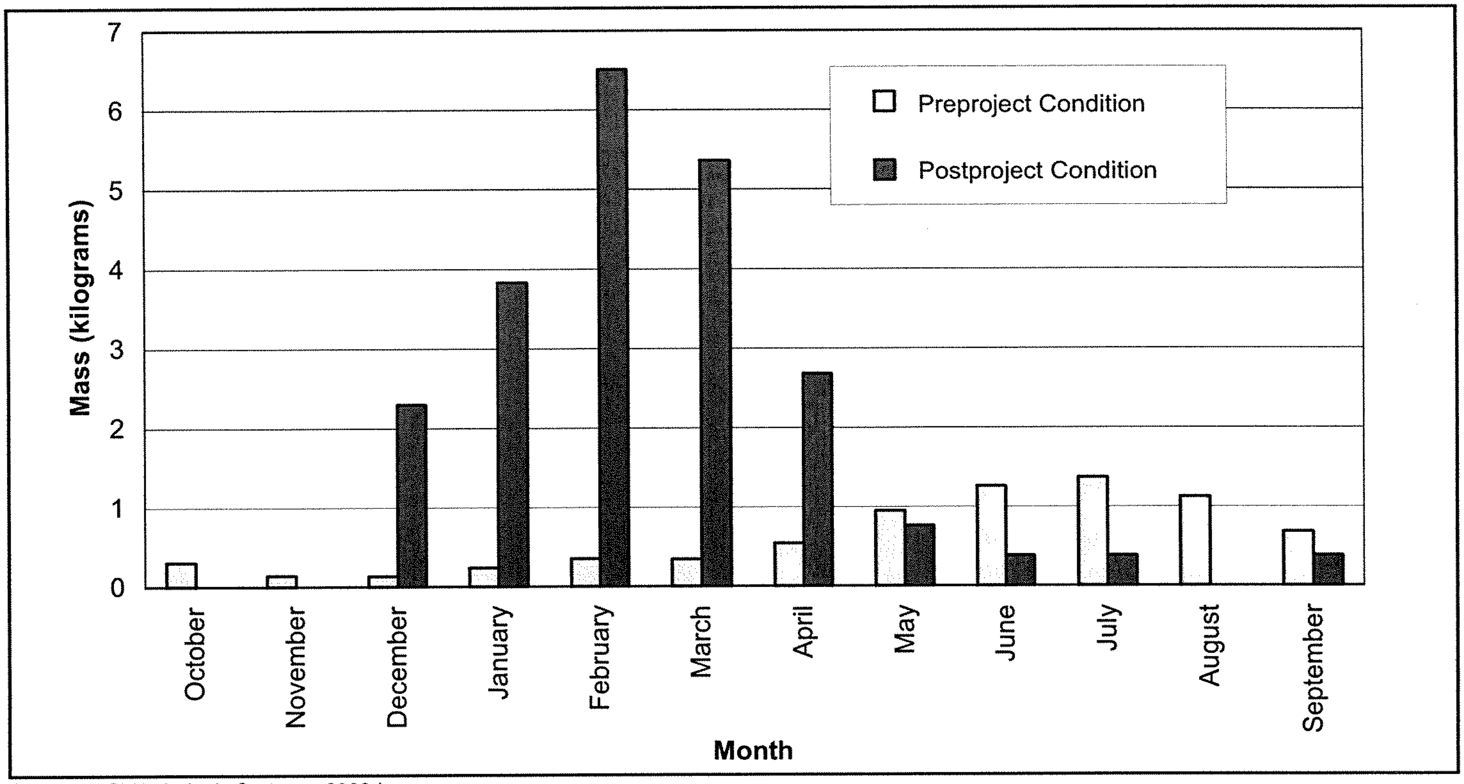
EXHIBIT 4.8-43



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Dissolved Lead

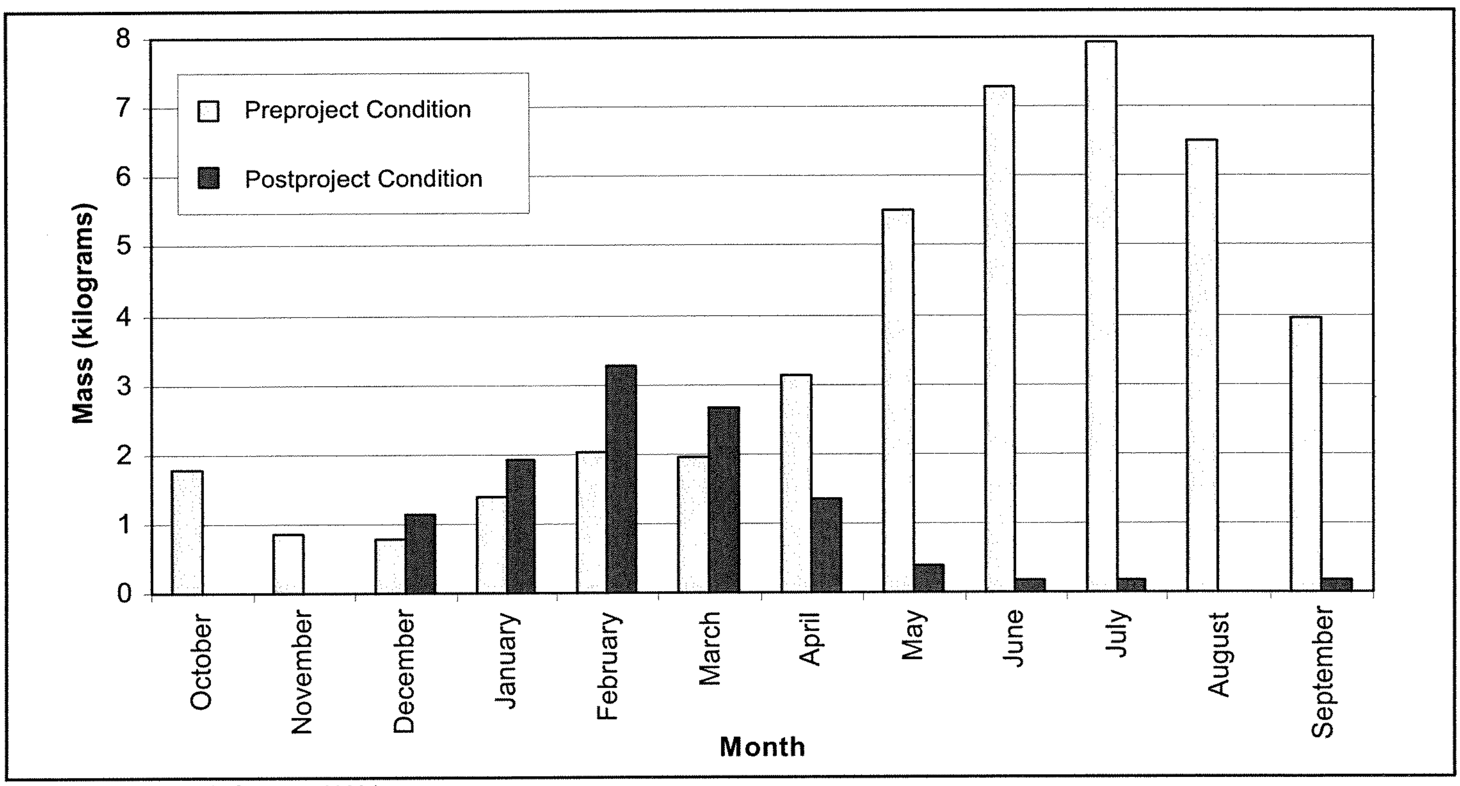
EXHIBIT 4.8-44



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Total Lead

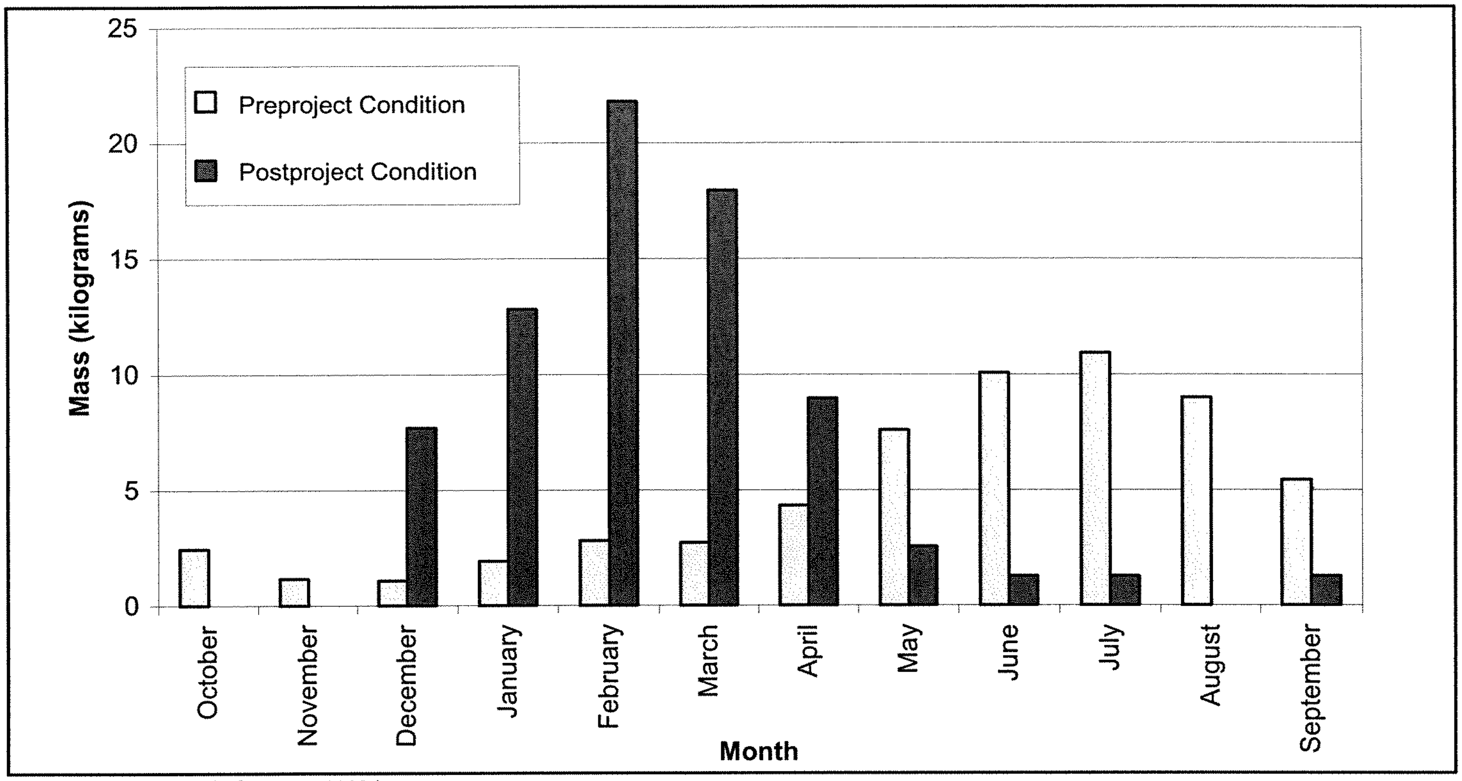
EXHIBIT 4.8-45



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Dissolved Nickel

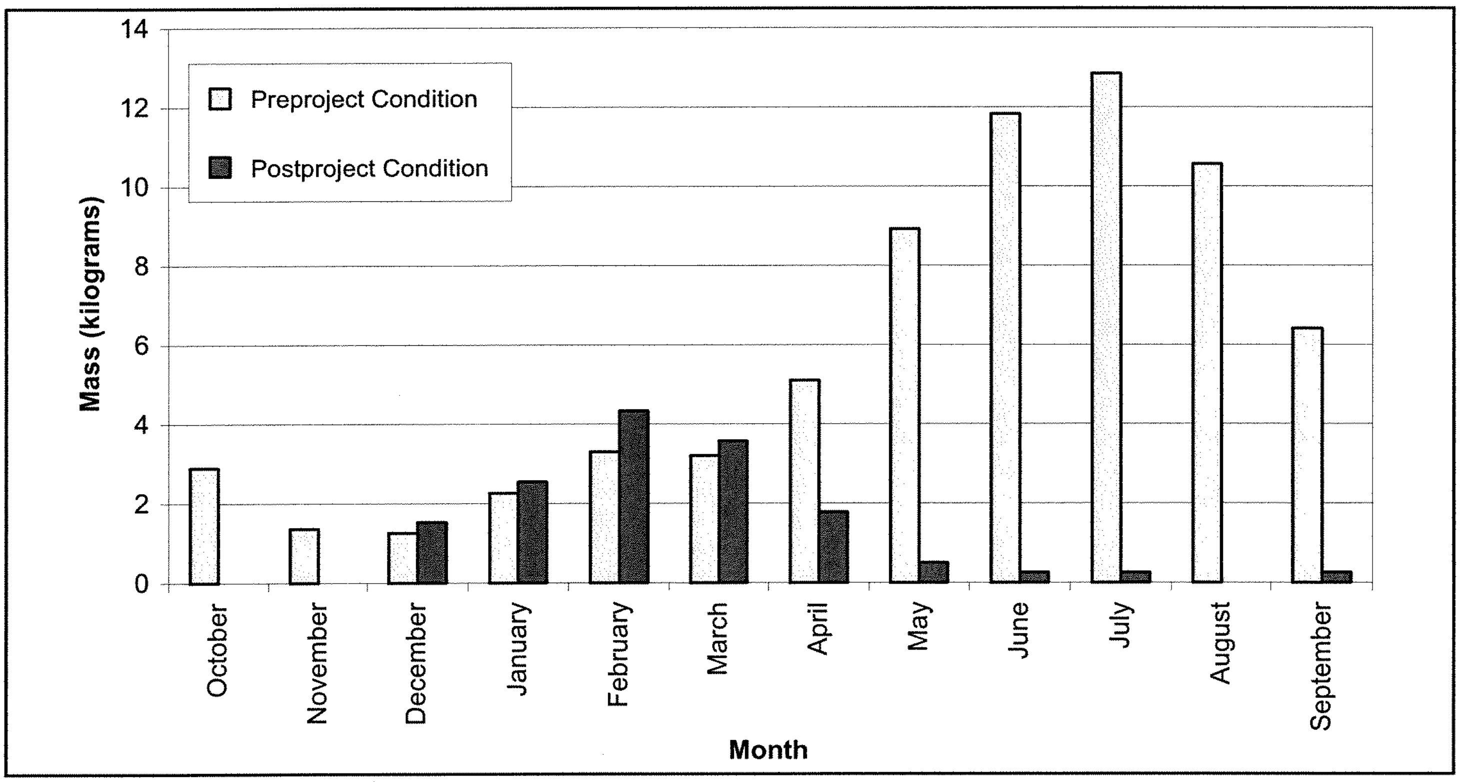
EXHIBIT 4.8-46



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Total Nickel

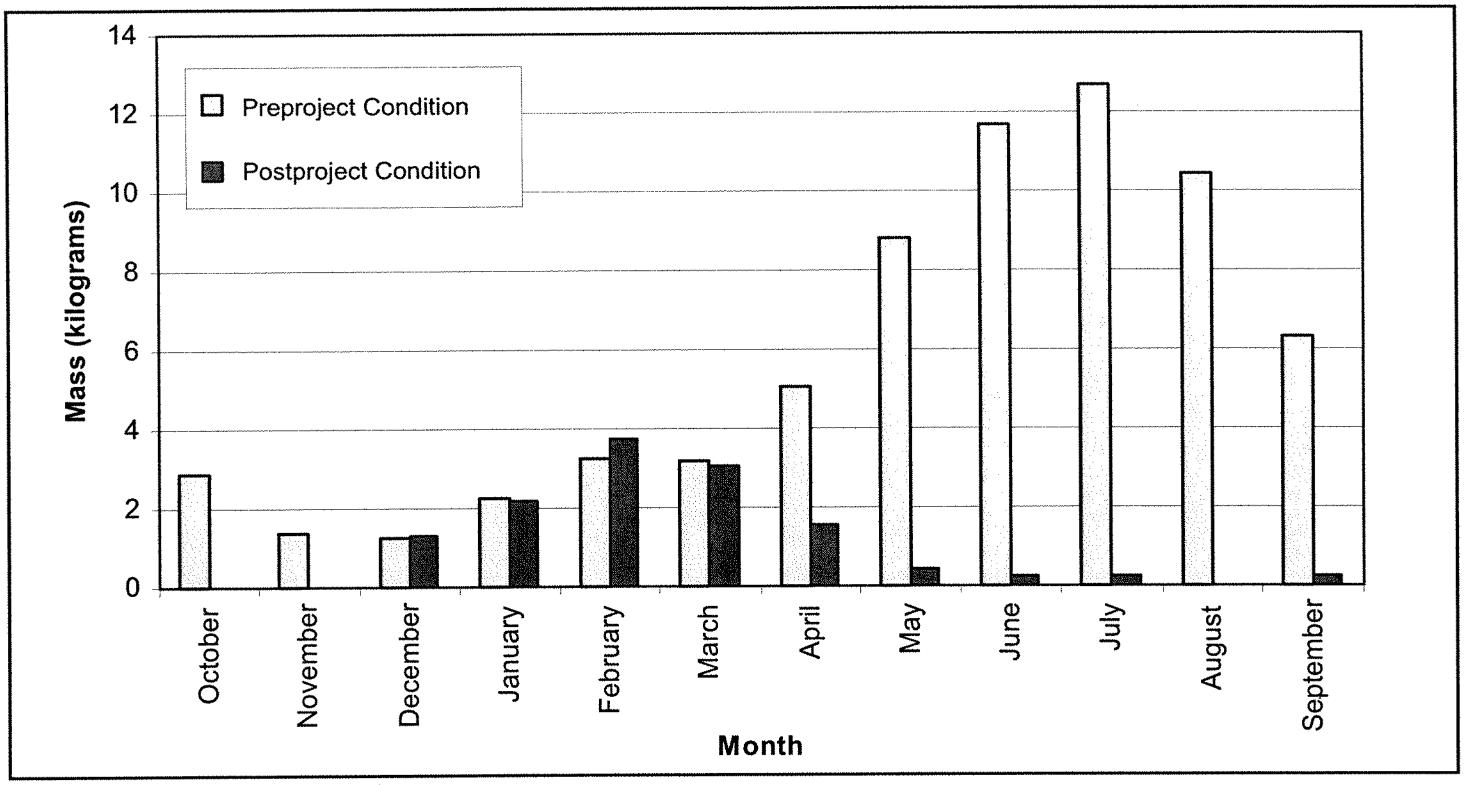
EXHIBIT 4.8-47



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Dissolved Selenium

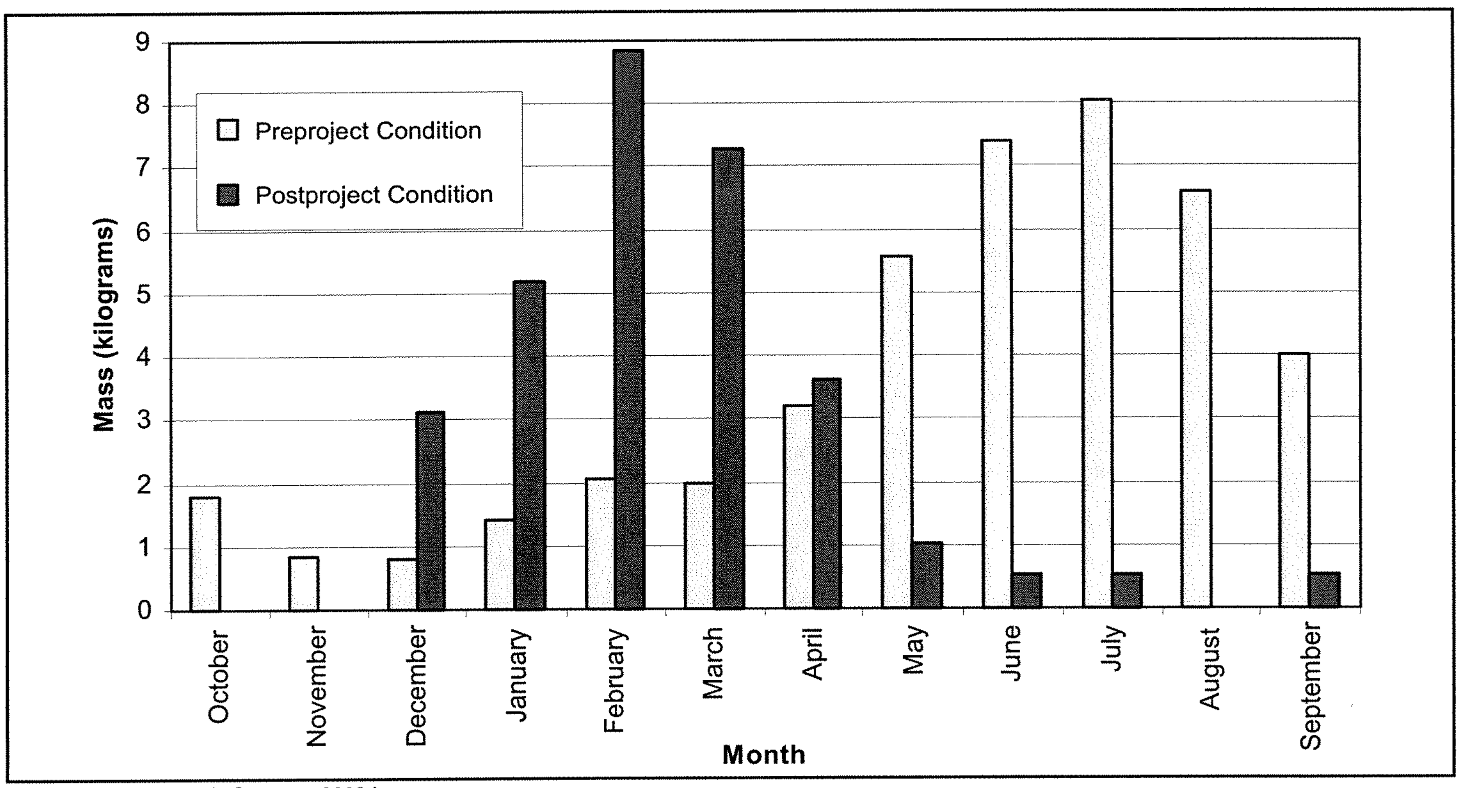
EXHIBIT 4.8-48



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Total Selenium

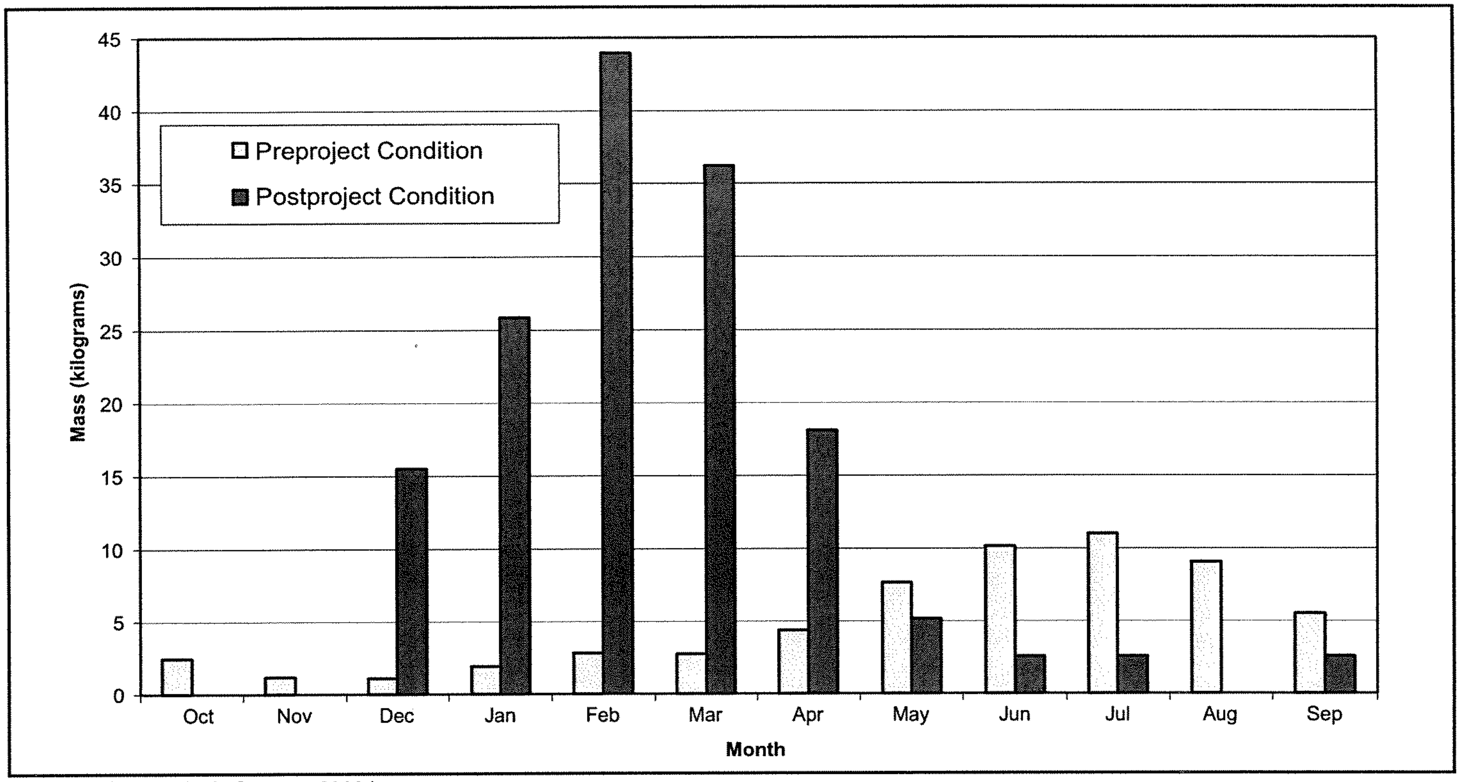
EXHIBIT 4.8-49



Source: HSI Hydrologic Systems, 2002d.

Comparison of the Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Dissolved Zinc

EXHIBIT 4.8-50



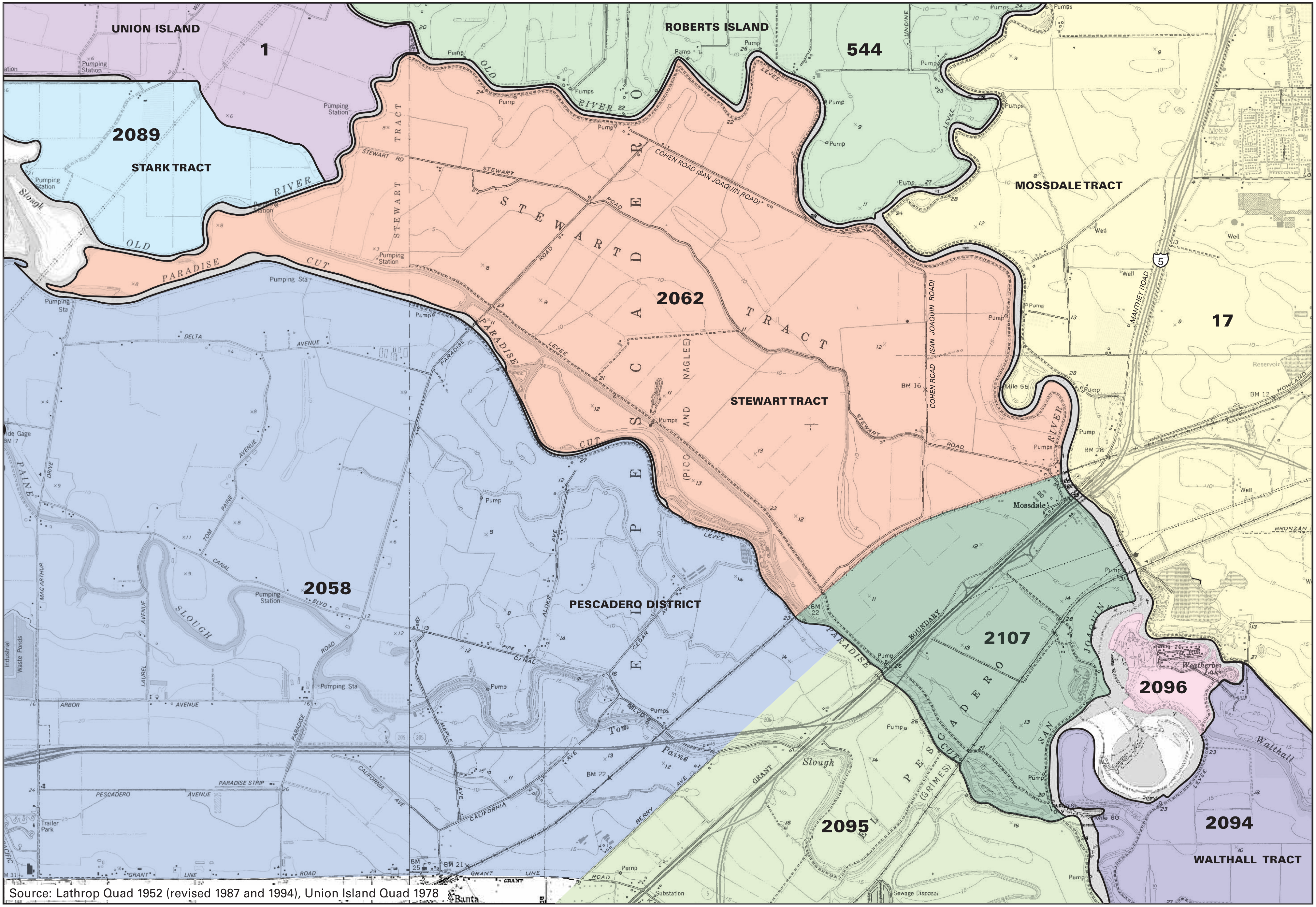
Source: HSI Hydrologic Systems 2002d

Comparison of Mean Monthly Mass Loading to the Delta for the Preproject and Postproject Conditions - Total Zinc

EXHIBIT 4.8-51

River Islands at Lathrop
CITY OF LATHROP
JN 1T013.01 9/02

EDAW



Reclamation District Boundaries

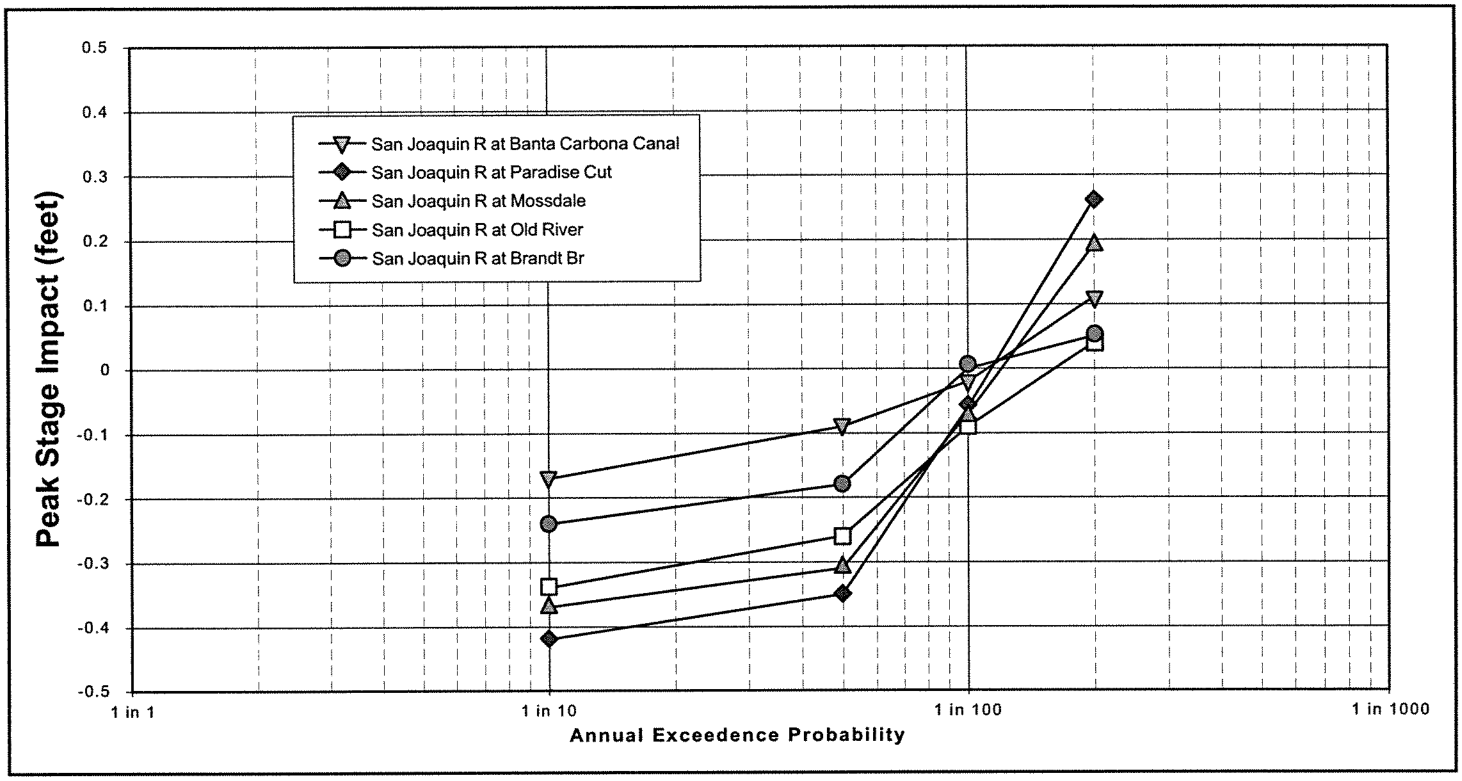
EXHIBIT 4.8-52

River Islands at Lathrop
CITY OF LATHROP
JN 1T013.01 9/02

0 1000 2000 4000 FEET

NORTH

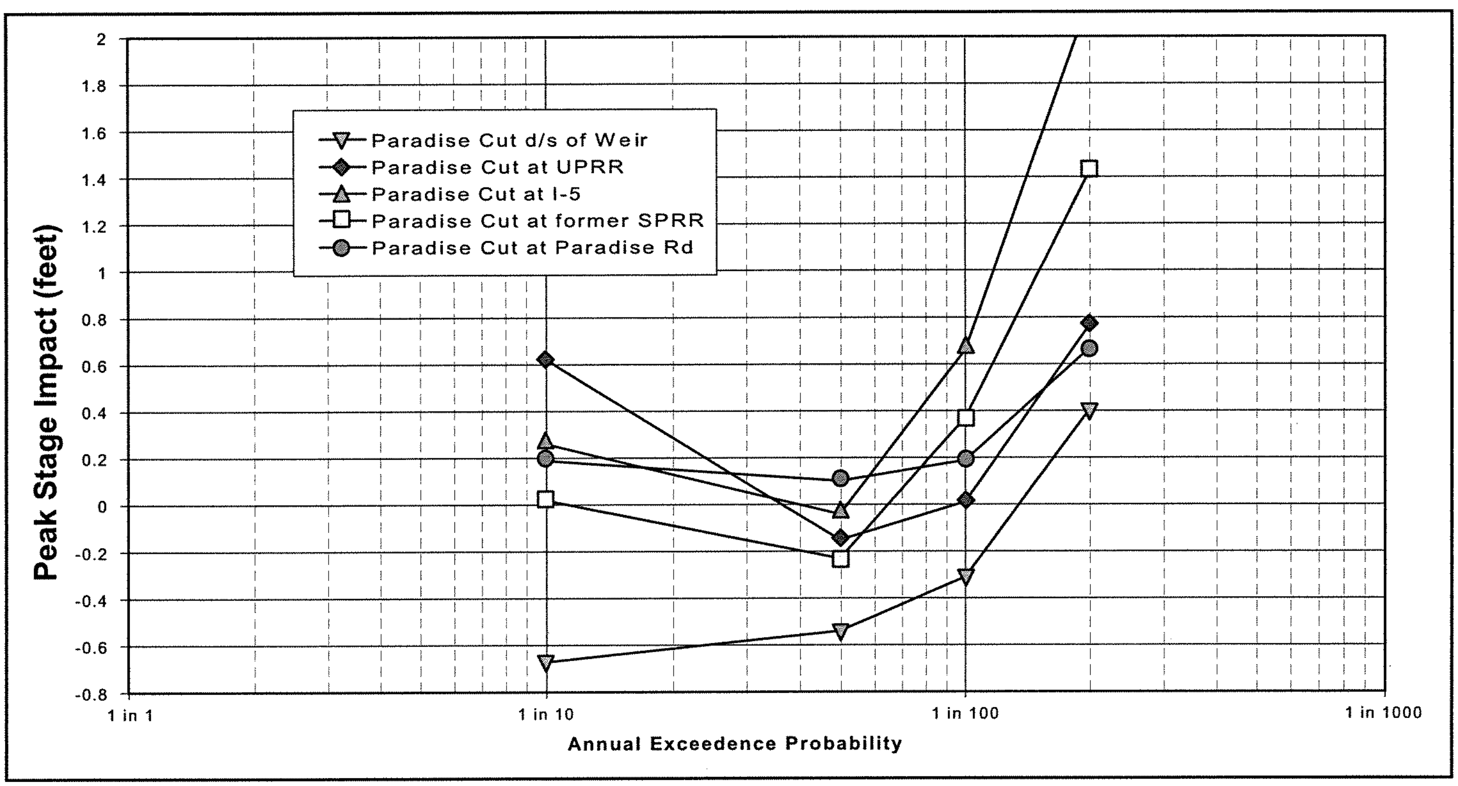
EDAW



Source: MBK Engineers 2002

Hydraulic Impact Frequency Curves - San Joaquin River

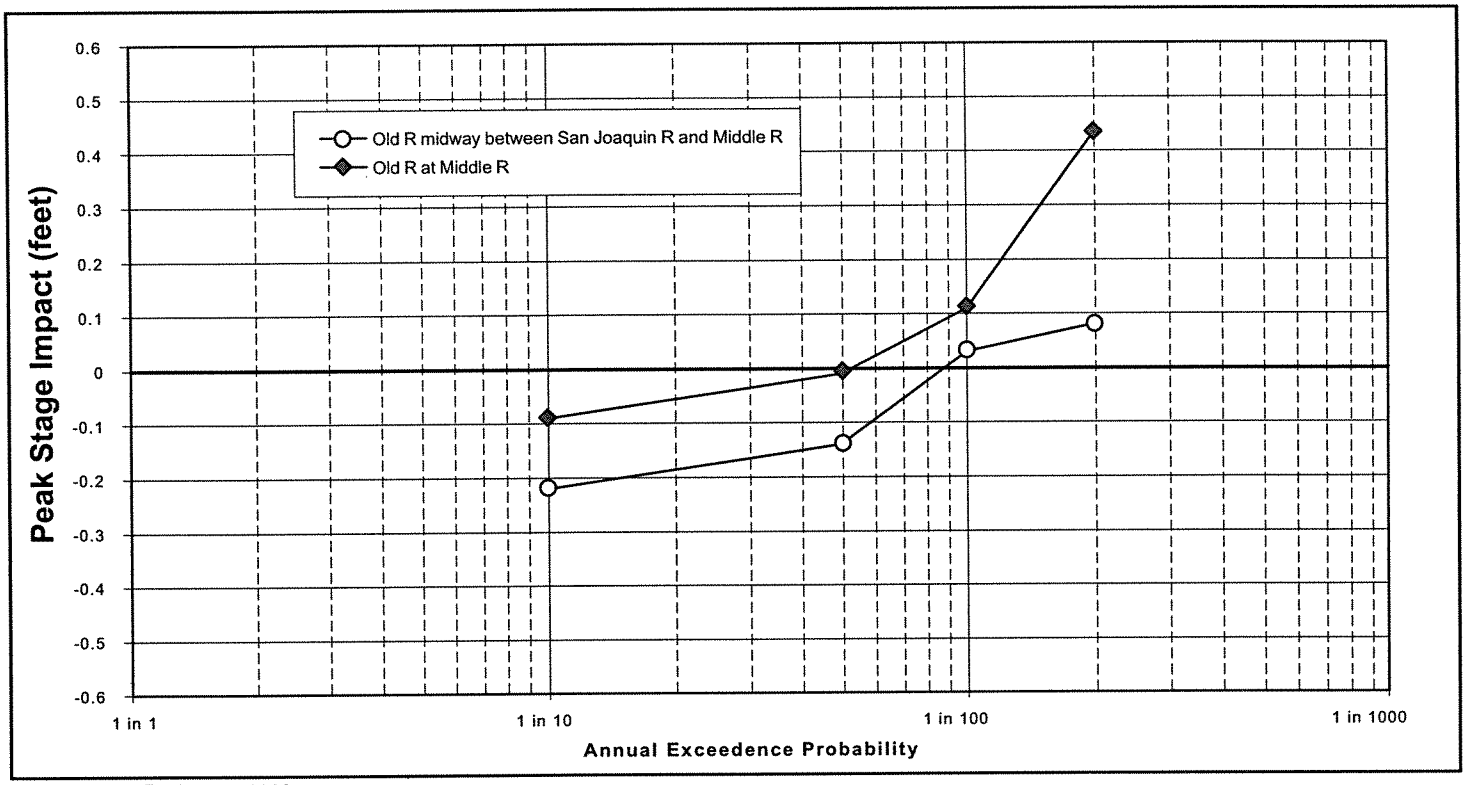
EXHIBIT 4.8-53



Source: MBK Engineers 2002

Hydraulic Impact Frequency Curves - Paradise Cut

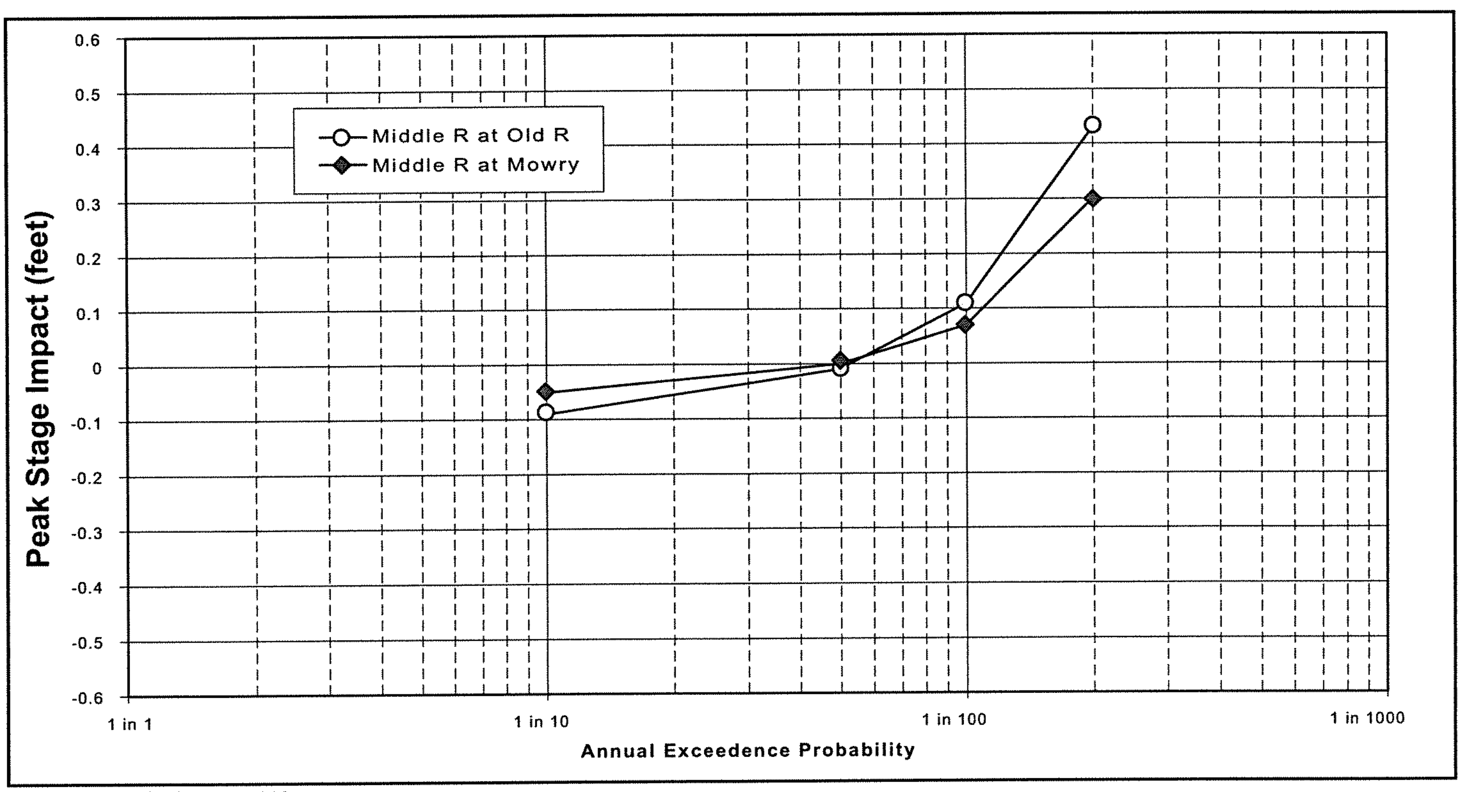
EXHIBIT 4.8-54



Source: MBK Engineers, 2002.

Hydraulic Impact Frequency Curves - Old River along Stewart Tract

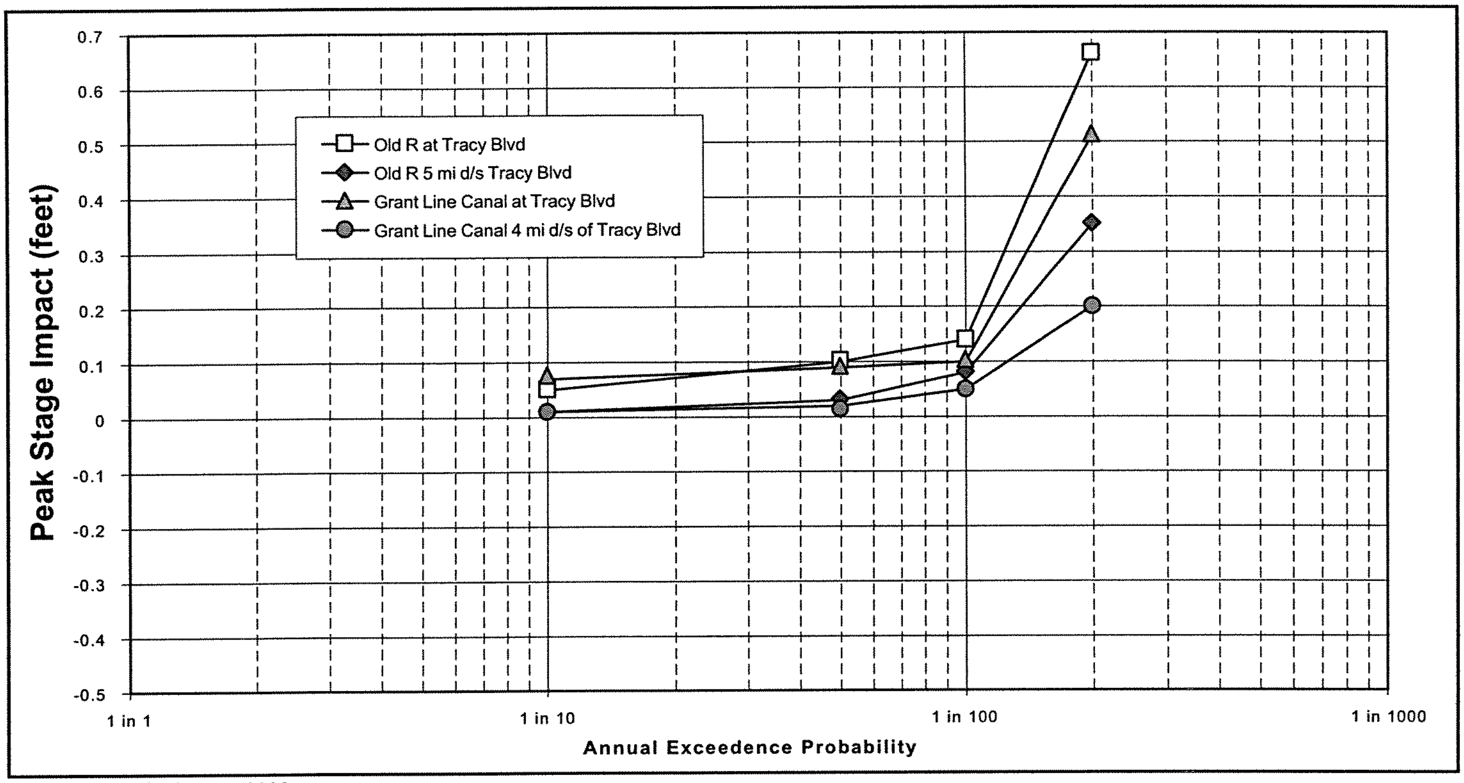
EXHIBIT 4.8-55



Source: MBK Engineers, 2002.

Hydraulic Impact Frequency Curves - Middle River

EXHIBIT 4.8-56



Source: MBK Engineers, 2002.

Hydraulic Impact Frequency Curves -
Old River and Grant Line Canal along Fabian Tract

EXHIBIT 4.8-57

River Islands at Lathrop
CITY OF LATHROP
JN 1T013.01 8/02

EDAW

4.9 HAZARDOUS MATERIALS AND PUBLIC HEALTH

4.9 Hazardous Materials and Public Health

This section evaluates the potential hazards, hazardous material, and public health impacts of the River Islands project. It is based on review of the Phase I Environmental Site Assessments (ESAs) prepared for Stewart Tract by The Denali Group dated February 2001 and by GeoResearch dated 1994 and on EDAW's review of the U.S. Environmental Protection Agency's (EPA's) Envirofacts website databases. Sufficient detail is provided in this section to analyze issues related to hazardous materials and public health at a project level of detail for both Phase 1 and Phase 2 of the proposed project.

4.9.1 Regulatory Background

The Lathrop General Plan does not specifically address the potential for existing hazardous materials in the plan area but includes policies to regulate the extent and location of land uses that may generate hazardous materials and other public health impacts. The WLSP and associated EIR take a similar approach, guiding land use decisions to avoid potential conflicts related to generation of hazardous materials and public health concerns.

Several agencies regulate the transportation and use of hazardous materials to minimize potential risks to public health and safety. These agencies include the California Environmental Protection Agency (Cal-EPA) and the Office of Emergency Services. The California Highway Patrol and California Department of Transportation (Caltrans) enforce regulations for hazardous materials transport. In Cal-EPA, the Department of Toxic Substances Control (DTSC) has primary regulatory authority for hazardous materials regulation enforcement. State hazardous waste regulations are contained primarily in Title 22 of the California Code of Regulations (CCR). Individual Regional Water Quality Control Boards (RWQCBs) are the lead agencies responsible for identifying, monitoring, and cleaning up leaking underground storage tanks. The San Joaquin County Environmental Health Department (SJCEHD) would regulate the cleanup of contaminated properties in its jurisdiction in coordination with Cal-EPA.

The project proposes to use recycled water (tertiary treated effluent) to irrigate proposed golf courses, parks, school grounds, and other public landscaping. Wastewater recycling in California is regulated under CCR Title 22, Division 4. The intent of these regulations is to ensure the protection of public health associated with the use of recycled water. The regulations establish acceptable levels of constituents in recycled water for a range of uses and prescribe means of assurance of reliability in the production of recycled water. Use of recycled water for nonpotable uses is common throughout the state. The California Department of Health Services (DHS) has jurisdiction over the distribution of recycled water and the enforcement of Title 22 regulations. RWQCBs are responsible for issuing waste discharge requirements (including discharge prohibitions, monitoring, and reporting programs). They also are responsible for user reuse requirements associated with implementation of wastewater reclamation projects.

4.9.2 Existing Conditions

The proposed project site covers approximately 4,905 acres in the City of Lathrop. The RID Area, where the proposed mixed-use residential/commercial development would be located, covers approximately

4,110 acres. The remainder of the project site would be used for open space, flood management, agriculture, habitat restoration, recreation, and similar uses. Because these remaining areas would not be occupied and proposed uses would be the same, or similar to, existing uses, these areas are not discussed further in this section.

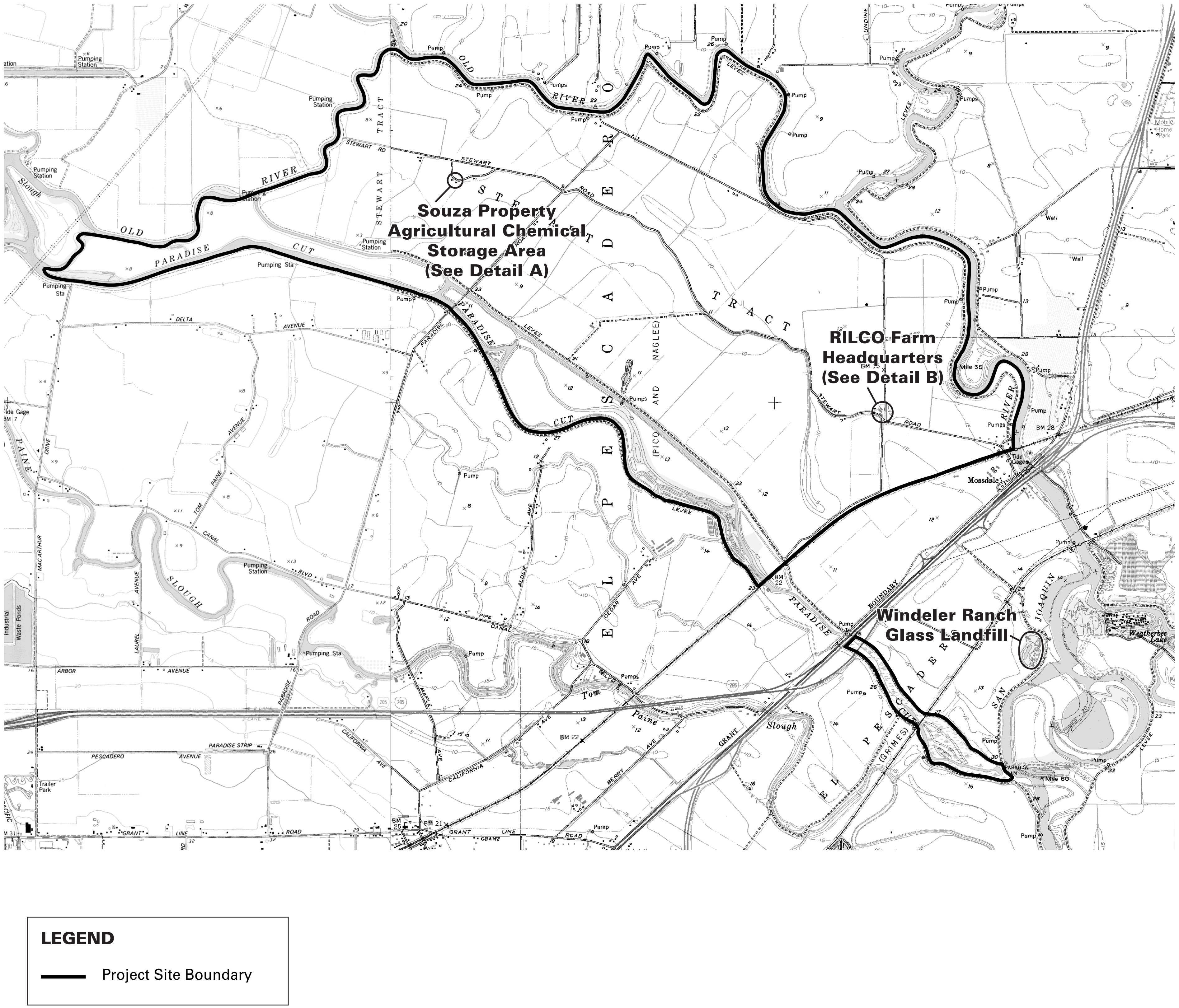
Currently, the RID Area is owned by Califia, LLC/Cambay Group, Utley, and Souza and is used primarily for agricultural and farming operations. Crops cultivated in the RID Area include melons, alfalfa, walnuts, and safflower. Numerous dwellings, barns, storage buildings, equipment and maintenance buildings, and other structures associated with existing farming operations are located on the RID Area.

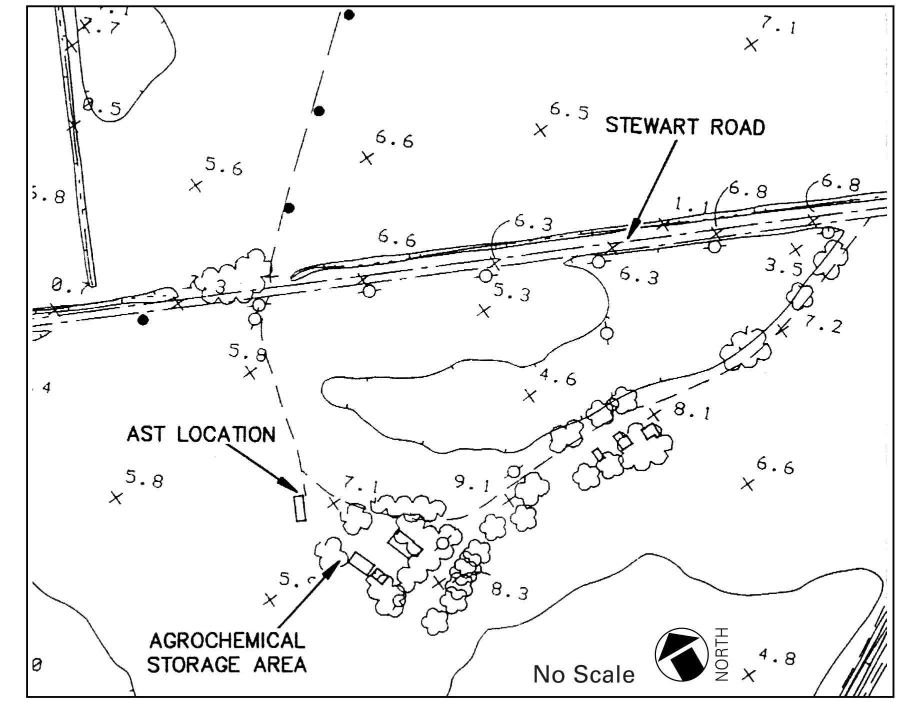
A Phase I ESA was prepared by The Denali Group in February 2001. The Phase I ESA was prepared to update a previous Phase I ESA prepared by GeoResearch in August 1994. The purpose of the Phase I ESAs was to document recognized environmental concerns (RECs) in the portion of Stewart Tract addressed in the WLSP related to current and historical uses of the area and to evaluate the potential for a release of hazardous materials from onsite or offsite sources that could significantly affect environmental conditions at the project site. Both ESAs evaluated the RID Area in its entirety, as well as other portions of Stewart Tract, the PCC Area, and a portion of the PCIP Area.

The results of the Phase I ESAs indicate that past activities associated with farming operations at the former RILCO farm headquarters and the Souza property agricultural chemical storage area could have potentially created a REC at the project site (Exhibit 4.9-1). Several other areas that were evaluated in the Phase I ESA, such as an abandoned airstrip and the Dell'Osso farm headquarters, did not qualify as RECs based on available evidence. Evidence at the RILCO farm headquarters and the Souza chemical storage area indicates the potential for soil and/or groundwater contamination (e.g., stained soil, stressed vegetation). The soil and/or groundwater contamination areas are associated with the location of former underground storage tanks (USTs), existing aboveground storage tanks (ASTs), agricultural/chemical handling and storage areas, and waste disposal areas. Potential hazardous constituents associated with current and past farming operations include petroleum hydrocarbons, fertilizers, herbicides and pesticides. The extent of soil and groundwater contamination could not be determined at the time of The Denali Group report. However, groundwater monitoring data collected during the preparation of the Lake Feasibility Study: Phase I-A Initial Surface and Groundwater Quality Investigation, prepared by Gary M. Litton (Litton 1999), indicated that pesticides and chlorinated herbicides were not present in groundwater at the site.

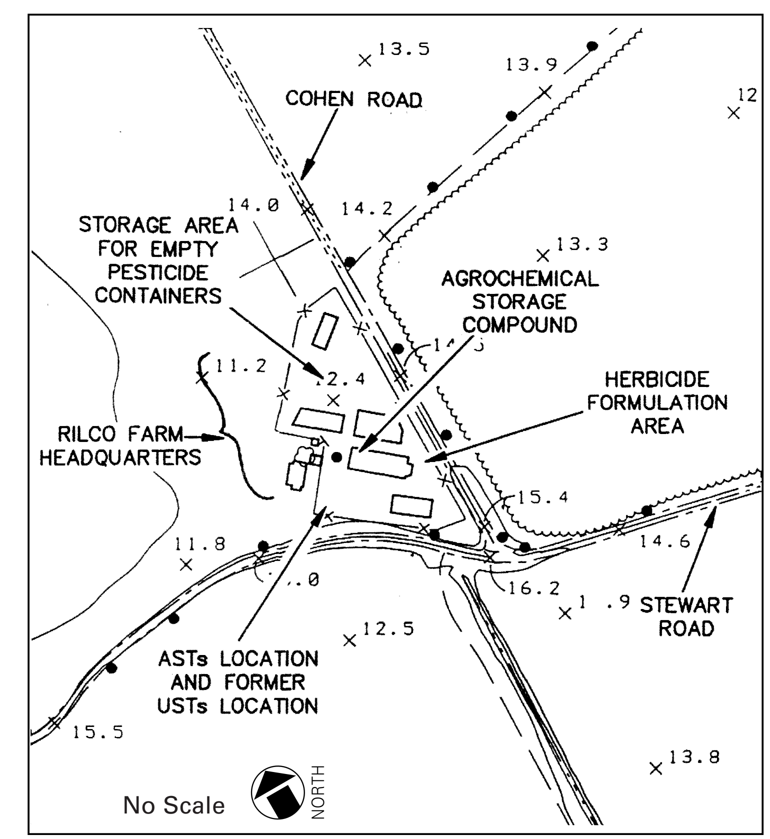
Reconnaissance visits to the project site conducted during preparation of the Phase I ESAs revealed the presence of several buildings that were constructed before 1979. These structures could contain asbestos (e.g., roof tiles, insulation) and lead (e.g., paints, sealants).

The Phase I ESAs identified the Windeler Ranch Glass landfill, located at 640 Mossdale Road, as a former landfill facility (Exhibit 4.9-1). This facility is located near the project site, east of the I-5/I-205/SR 120 interchange. Review of agency databases and conversations with staff members of the SJCEHD indicated that the facility was officially closed and capped in the mid-1990s. Subsequent inspections of the site revealed that no indications of site leakage have been detected.





Detail A



Detail B

Source: GeoResearch 1994; Base Map Source: Lathrop Quad 1952 (revised 1987 and 1994), Union Island Quad 1978.

Potential Hazardous Materials Sites

EXHIBIT 4.9-1

River Islands at Lathrop
CITY OF LATHROP
G 1T013.01 10/02

0 1000 2000 4000 FEET NORTH

EDAW

EDAW searched the EPA's Envirofacts website and the State Water Resources Control Board's (SWRCB's) Geotrack website to confirm and update information presented in the Phase I ESA (2001). The Envirofacts website presents information from several regulatory agencies' databases, including those for the EPA, DTSC, and Office of Emergency Services. According to these websites, the project site was not listed in any of the regulatory databases (U.S. Environmental Protection Agency 2002).

4.9.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

The following reports document potential hazardous conditions at the project site and were reviewed for this analysis:

- West Lathrop Specific Plan (1996), prepared by PBR for the City of Lathrop;
- Phase I Environmental Site Assessment for the Stewart Tract Property (1994), prepared by GeoResearch; and
- Phase I Environmental Site Assessment for the Stewart Tract Property (2001), prepared by The Denali Group.

In addition to reviewing the above reports, EDAW searched the EPA's Envirofacts website (as described above) to confirm information presented in the Phase I ESA (2001) and to identify any new hazardous material sites in the project area. Project activities were evaluated against the hazardous materials information gathered from the above documents to determine whether any risks to public health and safety or other conflicts would occur.

A project-level analysis of hazardous materials and public health was conducted for both Phase 1 and Phase 2 rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. The less specifically defined Phase 2 elements do not preclude a project-level analysis of hazardous material and public health issues, because sufficient data are available in the Phase I ESAs (GeoResearch 1994, The Denali Group 2001) to support a project-level analysis for each project phase and because potential exposure mechanisms and risk factors during project construction and operation would be the same for both Phase 1 and Phase 2 of development.

PRIOR WLSP EIR ANALYSIS

The WLSP EIR did not specifically analyze potential impacts associated with hazards and hazardous materials in the project area but addressed some of these issues in various sections throughout the document. Since the WLSP EIR was completed, the 2001 Phase I ESA was prepared, providing more detailed information on potential hazardous materials at the project site. Because this new information is available, a new and independent analysis of hazardous materials and public health is included in this SEIR.

THRESHOLDS OF SIGNIFICANCE

The River Islands project would cause a significant impact related to hazards, hazardous materials, and public health if it would

- create a public health hazard through the use, production, generation, release, or disposal of materials that pose a hazard to human, animal, or plant populations;
- expose construction workers to hazardous materials that would create health risks during construction; or
- create a health or potential health hazard.

IMPACT ANALYSIS

Impact
4.9-a

Hazardous Materials and Public Health - Hazardous Materials. *During all phases, the project would involve the storage, use, and transport of hazardous materials at the project site during construction activities. In addition, because the project proposes commercial uses, it is likely that some facilities (e.g., dry cleaners and gas stations) could use hazardous materials during operation. However, use of hazardous materials at the site would be in compliance with local, state, and federal regulations. Therefore, impacts related to creation of significant hazards to the public through routine transport, storage, use, disposal, and risk of upset would not occur. Therefore, this impact is considered* ***less than significant****.*

Development of the project site with residential and commercial uses during each project phase would involve the storage, use, and transport of hazardous materials (e.g., asphalt, fuel, lubricants, paint) during construction activities. In addition, commercial uses associated with each phase could include facilities such as gas stations and dry cleaners that could use and routinely transport hazardous material on and off the project site. Transportation of hazardous materials on area roadways is regulated by the California Highway Patrol and Caltrans, whereas use of these materials is regulated by the DTSC, as outlined in Title 22 of the CCR. The project applicant, builders, contractors, business owners, and others would be required to use, store, and transport hazardous materials in compliance with local, state, and federal regulations during project construction and operation. Facilities that would use hazardous materials on-site after the project is constructed would be required to obtain permits and comply with appropriate regulatory agency standards designed to avoid hazardous waste releases. Because the project would implement and comply with existing hazardous material regulations, impacts related to creation of significant hazards to the public through routine transport, use, disposal, and risk of upset would not occur with project development. Therefore, this impact is considered less than significant.

Impact
4.9-b

Hazardous Materials and Public Health - Exposure of Construction Workers, Residents, and Others to Hazardous Materials. *Past agricultural and farming operations in the RID Area could have resulted in contamination of soil and/or groundwater in some locations. Demolition, excavation, and construction activities in the RID Area could result in the exposure of construction workers to hazardous materials, including asbestos,* *petroleum hydrocarbons, pesticides, herbicides, and fertilizers. In addition, if contaminated sites in the RID Area are not cleaned before occupation or use of the site, then residents and others could be exposed to hazardous materials. This impact is considered* ***significant***.

Development of the River Islands project would involve site grading, excavation for utilities, dewatering of open trenches, backfilling, demolition of existing facilities, and construction of new residences and commercial facilities. No evidence of hazardous material contamination has been reported in the PCC and PCIP Areas. However, the Phase I ESA (The Denali Group 2001) identified several locations in the RID Area where past soil and/or groundwater contamination has occurred in relation to past and current agricultural and farming activities. These locations are in both Phase 1 and Phase 2 of the proposed project. Hazardous constituents of concern include petroleum hydrocarbons, pesticides, herbicides, and fertilizers. Excavation and construction activities at or near areas of potential soil and/or groundwater contamination could potentially expose construction workers to hazardous materials. If areas identified as potentially having contaminated soil and/or groundwater are not cleaned, future residents and others could come into contact with and be exposed to hazardous materials. In addition, several on-site structures could potentially contain asbestos-containing building materials and lead-containing materials (e.g., paint sealants, pipe solder), which could become friable or mobile during demolition activities and come into contact with construction workers. Exposure of construction workers, residents, and others to hazardous materials on the project site would be considered a significant impact.

Impact
4.9-c

Hazardous Materials and Public Health - Potential Public Health Impacts Associated with Recycled Water. *The proposed project includes the use of recycled water to irrigate nonresidential landscaping in the project site. The recycled water would comply with state requirements for unrestricted use. Because recycled water would comply with state health requirements and because irrigation of residential (private) landscaping is not proposed, conflicts related to public health are not anticipated. This impact is considered* ***less than significant***.

The proposed project includes plans to use recycled water from the City of Lathrop's Wastewater Recycling Plant #1 (WRP #1) (and WRP #3, if it is constructed) to irrigate golf courses, school grounds, parks, commercial development, and other public landscaping. Use of recycled water for irrigation of residential landscaping is not proposed. If wastewater recycling facilities do not operate properly, the public could come into contact with contaminated water, resulting in a public health hazard. However, recycled water treated at the City WRP(s) would comply with Title 22 of the CCR requirements for unrestricted use (i.e., disinfected tertiary treatment). Because the recycled water used at the project site would comply with Title 22 health requirements and because irrigation of residential landscaping is not proposed (allowing for better control of public contact), potential public health impacts are considered less than significant.

4.9.4 Mitigation Measures

No mitigation measures are necessary for the following less-than-significant impacts.

4.9-a Hazardous Materials

4.9-c Potential Public Health Impacts Associated with Recycled Water

The following mitigation measure is provided for this section's only significant impact.

4.9-b **Hazardous Materials and Public Health - Exposure of Construction Workers, Residents, and Others to Hazardous Materials**. Before demolition of any structures associated with past and current farming operations (e.g., buildings, ASTs, USTs), the project applicant shall investigate the extent to which soil and/or groundwater has been contaminated from these operations. This investigation would include, as necessary, analysis of soil and/or groundwater samples taken at or near the potential contamination sites. If the results indicate that contamination exists at levels above regulatory action standards, then the SJCEHD shall be notified and the site shall be remediated in accordance with recommendations made by SJCEHD; RWQCB; DTSC; or other appropriate federal, state, or local regulatory agencies. The agencies involved would be dependent on the type and extent of contamination.

- If evidence of previously undiscovered soil or groundwater contamination (e.g., stained soil, odorous groundwater) is encountered during excavation and dewatering activities, the SJCEHD shall be notified. Any contaminated areas shall be remediated in accordance with recommendations made by SJCEHD; RWQCB; DTSC; or other appropriate federal, state, or local regulatory agencies.

- Before demolition of any on-site buildings, the project applicant shall have a qualified consultant investigate whether any of these buildings contain asbestos-containing materials and lead that could become friable or mobile during demolition activities. If found, the asbestos-containing materials and lead shall be removed by an accredited inspector in accordance with EPA and California Occupational Safety and Health Administration (Cal/OSHA) standards. In addition, all activities (construction or demolition) in the vicinity of these materials shall comply with Cal/OSHA asbestos and lead worker construction standards. The asbestos-containing materials and lead shall be properly disposed of at an appropriate off-site disposal facility.

4.9.5 Residual Significant Impacts

There would be no residual significant impacts associated with hazardous materials and public health after implementation of the mitigation measures recommended in this section.

4.10 PUBLIC SERVICES

4.10 PUBLIC SERVICES

This section provides an overview of existing public services for the City of Lathrop, including fire protection, police services, public schools, and solid waste management. Impacts are evaluated related to increased demand for public services associated with the proposed project and actions needed to provide the services that could potentially lead to physical environmental effects. Sufficient detail is provided in this section to analyze issues related to public services at a project level of detail for both Phase 1 and Phase 2 of the proposed project. Other public services/utilities, such as water and wastewater treatment, stormwater management, electricity, and natural gas services, are addressed in section 4.11, "Public Utilities."

4.10.1 REGULATORY BACKGROUND

CITY OF LATHROP GENERAL PLAN

The City of Lathrop General Plan (General Plan) includes several policies specifically related to the public services addressed in this chapter (fire, police, public schools, solid waste management). The following policies under the "Safety Goals and Policies" section of the General Plan apply to the proposed project:

> **Policy 1:** The City will continue to give high priority to the support of police protection, and to fire suppression and prevention and life safety functions of the Fire Department. Ultimate expansion of the City's fire service is to include additional stations affording adequate response within a maximum of 3-4 minutes to all parts of the urban area.

> **Policy 2:** The City will work to maintain a fire flow standard of 3,000 gpm [gallons per minute] for all commercial and industrial areas, and 1,500 gpm for residential areas, to assure capability to suppress urban fires. In strategic areas, the City should provide above ground water storage with capacities sufficient to supply the City for required durations.

> **Policy 3:** The City will maintain a street system which is capable of providing access to any fires that may develop within the urban area, and which is capable of providing for the adequate evacuation of residents in the event of an emergency condition of magnitude.

One General Plan policy in the "Seismic Goals and Policies" section applies to fire protection:

> **Policy 3:** The present building height limit of 50 feet shall be maintained, with a maximum of four stories. This policy shall stay in force until such time that high rise construction is desired and capability for evacuation and fire fighting in upper stories is possible through the availability of appropriate equipment.

One General Plan policy in the "Air Quality and Solid Waste Management Policies" section applies to solid waste management:

> **Policy 7:** Environmental assessments for development projects proposed consistent with the General Plan shall provide all of the information required under the "Waste Plan Format for Development Projects" that is employed by the San Joaquin County Department of Public Works.

The General Plan defers to the WLSP for determining needs for schools and other public and semi-public facilities in the portion of Stewart Tract encompassing the proposed project.

WEST LATHROP SPECIFIC PLAN

The West Lathrop Specific Plan (WLSP) contains objectives designed to achieve goals outlined in the General Plan. The following WLSP objectives address public services and are applicable to the proposed project:

> **Objective 2C:** Provide community services that meet the varied needs of West Lathrop households.

This objective addresses the provision of parks, outdoor gathering places, civic and cultural facilities, and schools. The land use plan in the WLSP includes four combined elementary school/park sites on Stewart Tract. It was assumed in the WLSP that grade 9–12 students on Stewart Tract would be bussed to a high school in Tracy.

> **Objective 7A:** Ensure the life safety of residents and visitors in West Lathrop at all times, providing adequate emergency services, fire and police response times.

As described for this objective, two fire stations would be constructed on Stewart Tract, primarily to serve the amusement parks included in the WLSP. A police substation would be included in one of the fire stations.

Additional guidance related to public services in the WLSP includes the need for schools to meet state site/building development standards and the construction of schools in phases paralleling proposed development phases.

The WLSP Environmental Impact Report (WLSP EIR) includes several public services-related mitigation measures, in addition to the WLSP objectives, policies, and guidelines, that would apply to the proposed project:

- collecting school impact fees or mitigation fees to fund school development;
- monitoring development to ensure compliance with the City's Integrated Solid Waste Management Plan;

- managing solid waste from ongoing agricultural operations using traditional approaches, such as using crop wastes to fertilize the soil;
- requiring mandatory pickup of waste from residential areas, along with containerized sorting of wastes for recycling and reuse;
- segregating construction wood waste and chipping or mulching this waste for use in landscaping or farming; and
- collecting and composting lawn clippings and other garden waste.

CALIFORNIA DEPARTMENT OF EDUCATION

The California Department of Education (CDE) School Facilities Planning Division (SFPD) has prepared a School Site Selection and Approval Guide that provides criteria for locating appropriate school sites in the State of California. The CDE's authority for approving proposed sites for schools is contained in Education Code §17251. The CDE's approval is a condition for school districts to receive state funds for the acquisition of sites under the state's School Facilities Program administered by the State Allocation Board. Districts using only local funds are still encouraged to seek the CDE's approval for the benefits that such outside review can provide.

School site and size recommendations were changed by the CDE in 2000 to reflect various changes in educational conditions, such as the lowering of class sizes and use of advanced technology. The expanded use of school buildings and grounds for community and agency joint use and concern for the safety of the students and staff members also influenced the modification of the CDE recommendations.

The CDE provides specific recommendations for school site size in the publication School Site Analysis and Development. This document suggests a ratio of 1:2 between buildings and grounds. CDE is aware that in a number of cases, primarily in urban settings, smaller sites cannot accommodate this ratio. In such cases, the SFPD may approve an amount of acreage less than the recommended gross site size and building-to-grounds ratio.

Certain health and safety requirements for school site selection are governed by state regulations and the policies of the SFPD relating to:

- proximity to airports, high-voltage power transmission lines, railroads, and major roadways;
- presence of toxic and hazardous substances;
- hazardous facilities and hazardous air emissions within a quarter mile;
- proximity to high-pressure natural gas lines, propane storage facilities, gasoline lines, pressurized sewer lines, or high-pressure water pipelines;
- noise;
- results of geological studies and soils analyses;

- traffic and school bus safety; and
- safety issues related to joint-use facilities.

4.10.2 Existing Conditions

Fire Protection Services

The project site is in the service area of the Lathrop-Manteca Fire Protection District (LMFPD). The following information on the LMFPD was obtained from the district's website (LMFPD 2002) and various telephone conversations with district staff members. The LMFPD was established in 1936 as the Manteca-Lathrop Rural County Fire Protection District; the district changed its name to the Lathrop-Manteca Fire Protection District in February 2002. References to documents prepared before 2002 use the name of the agency at the time the document was prepared (i.e., Manteca-Lathrop Rural County Fire Protection District).

The district service area covers more than 100 square miles in southern San Joaquin County and includes the City of Lathrop. The district surrounds, but does not include, the City of Manteca, which has its own fire protection services.

The LMFPD service area consists of a mixture of rural and urban areas, including more than 4,300 single-family dwellings, more than 5 million square feet of commercial use structures, and thousands of acres of agricultural lands. Since the City of Lathrop was incorporated in 1989, the LMFPD has accommodated all planned urban growth in the City, and the district plans to provide necessary service to new development in West Lathrop and/or elsewhere in its 100-square-mile jurisdiction.

The LMFPD currently employs 28 career personnel and 18 reserve firefighters. The districtwide fire suppression force is organized into three rotating 24-hour shifts with eight members of the force on duty for each shift. These shifts cover operations at three stations:

- Station 31 - Lathrop City - 800 East J Street, Lathrop
- Station 32 - Nile Garden - 22701 South Union Road, Manteca
- Station 33 - New Haven - 9121 East Lathrop Road, Manteca

Each shift includes four members of the force at the main station (Station 31) and a minimum of two at each of the two satellite stations (Stations 32 and 33). The main station is equipped with a 65-foot Telesquirt triple combination pump, one reserve Type 1 fire engine, one 3,000-gallon water tender/pump, one light rescue truck, and one heavy rescue truck. A total of four additional pumpers are shared between the two satellite stations. Additional assistance can be summoned under mutual aid and automatic aid agreements with surrounding cities, San Joaquin County, and state firefighting agencies.

An important requirement in fire suppression is adequate fire flow, which is the amount of water, expressed in gallons per minute (gpm), available to control a given fire and the duration this flow is available. The total fire flow needed to extinguish a structural fire is based on a variety of factors, including building design, internal square footage, construction materials, dominant use, height, number of floors, and distance to adjacent buildings. Minimum requirements for available fire flow at a given building are dependant on standards set in the California Fire Code. Generally, fire flow requirements for the type of development associated with the proposed project is between 1,250 and 2,000 gpm (measured at 20 pounds per square inch) with a minimum 2-hour duration. However, fire flow requirements in the Employment Center and Town Center may be greater due to the increased building heights anticipated in this area.

The LMFPD responds to fires, medical emergencies, traffic accidents, river rescues, and a variety of other emergency situations. All of the LMFPD firefighting personnel are qualified as Emergency Medical Technicians. Ambulance service from the Manteca District Ambulance is also available at Station 31. All medical patients in the LMFPD service area are transported to one of six local hospitals, depending on proximity and available space (Monty, pers. comm., 2001).

Fire Station 31, which also serves as LMFPD's headquarters, currently provides first-response service to the project site. This station is approximately 2.5 miles from the closest edge of the project site by road and would have a response time of roughly 3–4 minutes to this area. Response times would exceed 4 minutes to reach the interior and more distant portions of the project site The first response time goal in the LMFPD is 3 minutes in urban areas and 6 minutes in rural areas (Manteca-Lathrop Rural County Fire Protection District 2000). The average first-response time for Station 31 is currently 3–5 minutes.

Under an agreement with the LMFPD, a fire station would be built to serve the Mossdale Landing project, north of the River Islands site (EDAW 2002). It would be placed in service when 170 homes are developed at Mossdale Landing or response times exceed 3–4 minutes, whichever comes first. Although several sites for this facility are being considered, any of the locations would provide faster response times to the River Islands site than the existing Station 31.

Police Services

Police services are provided to the City of Lathrop (and the project area) under contract with the San Joaquin County Sheriff's Department. Personnel from the department are assigned to the City of Lathrop for a minimum of 3 years. The police department is located at City Hall, 16775 Howland Road, approximately 2 miles by road to the project site. The department is currently out of space at its existing Lathrop City Hall facility and is in negotiations to move to a larger facility at 15597 7th Street, which is approximately 0.25 mile (by road) farther from the project site. Also, in accordance with the General Plan, a new Government Center, to include a new police station, would be developed west of Interstate 5 (I-5) in the City of Lathrop. The Government Center police station would either add to or replace the 7th Street station, depending on conditions when the Government Center is built.

Since the City of Lathrop was incorporated, police service has been expanded to include six patrol cars. The department is staffed 24 hours a day in a series of six shifts with one officer during the slowest times (3 a.m. to 8 a.m.) and two to four officers during periods of heavier calls for service. Minimum staffing levels are set at five officers per day. The existing 18-person staff in Lathrop includes 12 patrol deputies, one chief, one lieutenant, one detective, one community resource officer, and 1.5 Full-Time-Equivalent

(FTE) administrative personnel (City of Lathrop 2002). If needed, additional assistance can be summoned under a mutual aid agreement with other cities and the County.

Existing staffing levels are at 1.4 officers per thousand residents. The police chief has indicated a desire for 1.5 police officers per 1,000 residents and an additional 0.5 FTE of civilian support staff under existing conditions (Moffitt, pers. comm., 2001 and 2002). The current emergency response time in the core area of Lathrop is 2–4 minutes. However, the northern areas of the City and Stewart Tract have longer response times (Moffitt, pers. comm., 2001).

Animal Control is a division of the City's Police Department and is supported by the City's General Fund. This division is staffed by City employees, including one animal control administrator and one animal control officer, and is equipped with two animal collection vehicles. The City of Lathrop contracts with the City of Manteca for animal shelter services. Presently, Animal Control monitors the number of calls received at the department, and as demand increases, additional patrol units would be required. In 2001, the City of Lathrop Animal Control Division received 2,147 total calls for service. The general trend for total calls for service has been increasing, with total annual calls more than doubling since 1995, when 1,005 calls were received (Enneking, pers. comm., 2002).

PUBLIC SCHOOLS

City of Lathrop

The City of Lathrop, excluding Stewart Tract, is served by the Manteca Unified School District (MUSD). Lathrop Elementary School and Joseph Widmer Elementary School serve grades K–8 in the City. High school students from Lathrop are bussed to Sierra High School in Manteca.

River Islands Project Site

The proposed project site is located in two different school district boundaries: the Banta Elementary School District (BESD), which serves grades K-8, and the Tracy Unified School District (TUSD), which serves grades K-12. Because the BESD serves only grades K–8, high school students in the BESD area attend high school in the TUSD.

The BESD currently serves approximately 275 students, all at the Banta school. The student capacity in the district with its existing facilities is estimated at 302 students (Jack Schreder & Associates 2002), leaving capacity to accommodate roughly 27 additional K–8 students. The BESD's student population has remained relatively constant over the last 5-10 years because the district has seen little or no population growth.

The TUSD serves approximately 15,000 students (TUSD 2002). The student population continues to grow as new homes are constructed in the City of Tracy, with the most recent projections estimating 752 new students to be added in the 2000–2001 school year (TUSD 2002). There are three high schools in the TUSD, all located in the City of Tracy: Duncan-Russel High School, Merril F. West High School, and Tracy High School. The proposed project is within the Tracy High School attendance boundaries.

Duncan-Russel High School has a student capacity of 120 with projected enrollment of 125 students for the 2002–2003 school year, leaving no capacity for additional students. Merril F. West High School has a student capacity of 2,625, with the use of portable classrooms, and a projected enrollment of 2,628 for the 2002–2003 school year. Therefore, Merril F. West High School also has no capacity for additional students. Tracy High School has a student capacity of 2,113 with portables and a projected enrollment of 2,099 students for 2002–2003 school year (Ohm, pers. comm., 2002). Based on these capacity and enrollment numbers, it is estimated that the TUSD has capacity in existing facilities to accommodate approximately 14 additional high school students.

SOLID WASTE REMOVAL/DISPOSAL

The City of Lathrop currently provides residential solid waste curbside pickup and hauling services through a contract with Lathrop Sunrise Sanitation, an independent solid waste hauler. Waste is collected in a three-container system, allowing separation of garbage, recyclables, and yard waste. Recyclables are sent to Stockton Recycling, Inc. (a private company), and garden waste is composted. Delta Containers, an independent waste hauler associated with Lathrop Sunrise Sanitation, currently provides waste collection to commercial and industrial customers within the City of Lathrop. Both residential and commercial/industrial waste is hauled to the San Joaquin County Lovelace Transfer Station, approximately 1 mile northeast of the City, and then to the County's Class III Foothill Sanitary Landfill in Linden, approximately 35 miles northeast of the City. The landfill has approximately 44 million tons of capacity remaining and is expected to remain open until 2048 (Johnson, pers. comm., 2002).

4.10.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Impacts on fire and police services, animal control, public schools, and solid waste disposal that would result from the proposed project were identified by comparing existing service capacity and facilities against anticipated future demand associated with project implementation. Because temporary impacts could occur if public services are not provided concurrently with the project developments (residential, commercial) that create demand for these services, an evaluation of project phasing is included. In addition, a project-level analysis of public services was conducted for both Phase 1 and Phase 2, rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. Although in some specific instances Phase 2 project elements may not be as highly defined as those in Phase 1, sufficient information related to public services in Phase 2 is available to allow a project-level of analysis equitable with the analysis of Phase 1.

The proposed project includes plans for an interim fire station in Phase 1a, a permanent fire station (likely in the Employment Center) in Phase 1, and one or more additional stations to be brought into service during Phase 2. Potential impacts related to fire protection services are analyzed in light of these plans. The River Islands development plan, however, does not specifically include provisions for police stations. The proposed project includes plans for K–12 schools on the project site, through either a nontraditional or a traditional public school system, as discussed in Chapter 3, "Description of the

Proposed Project." Potential impacts on the local school system are analyzed in light of this project element. The evaluation of solid waste disposal assumes an expansion of existing solid waste services currently provided in Lathrop into the project area. The impact analysis focuses on anticipated solid waste generation from the proposed project compared to existing capacity in landfill facilities that would receive the waste.

PRIOR WLSP EIR ANALYSIS

The WLSP EIR analyzed a theme park/residential development on Stewart Tract that would have been constructed in four phases over a period of roughly 30 years. Phase 1 would have included a combined fire and police station and one joint use elementary school/park. Phase 2 would have included the development of an additional fire station and three joint use elementary school/parks. These facilities were considered sufficient to serve remaining development in project Phases 3 and 4. However, grade 9–12 students on Stewart Tract would be bussed to high schools in Tracy.

The WLSP EIR acknowledges that the development of the plan area would result in an increased demand for public services. However, the EIR does not identify significant impacts with respect to the increased demand for fire and police services because two additional fire stations and one additional police station were included in the development plans. Impacts associated with increased school demand were identified and mitigated through collection of school impact fees (or similar fees) to fund construction of new schools and dedication of land for school facilities. The WLSP EIR acknowledged that the theme park/resort character of the proposed project would generate large amounts of solid waste. Several mitigation measures were provided that focused on methods to reduce waste generated by theme park-related uses. Solid waste impacts associated with residential uses would be mitigated by requirements in the WLSP for pickup in compliance with the City's Integrated Solid Waste Management Plan, separation of recyclables, and hauling to the Lovelace Transfer Station and then to the Foothill Landfill.

The River Islands project differs from development analyzed in the WLSP EIR in several respects that are relevant to provision of public services. More permanent residences are included in River Islands, altering demands on fire, police, and school facilities, and levels of solid waste generation. River Islands does not include amusement parks and similar developments that place special demands on fire and police protection resources. The WLSP included specific plans for a police station, whereas the River Islands project does not. The proposed project includes a specific proposal for providing schools onsite. Due to these differences, an independent analysis of public services is included in this SEIR.

THRESHOLDS OF SIGNIFICANCE

The River Islands project would cause a significant impact on public services if it would:

- create a need for the development of new service facilities, the construction of which could result in significant environmental impacts;
- substantially impede existing service;
- generate solid waste beyond the capacity of existing landfills; or

- violate federal, state, or local statutes and regulations related to solid waste.

IMPACT ANALYSIS

Impact
4.10-a

<u>Public Services - Obstruction of Roadways during Construction.</u> *Implementation of the proposed project could obstruct roadways in the vicinity during construction, which could obstruct or slow emergency vehicles attempting to access the area. This impact is considered **significant**.*

The proposed project would include construction activities of varying levels over a 20-year period (2005–2025). While a majority of project construction activities would occur onsite, nearby roadways such as Manthey Road, Paradise Road, and Louise Avenue could be affected (see section 4.4, "Traffic"). Construction activities during Phase 2 could also affect segments of onsite roads developed during Phase 1, such as South River Islands Parkway and Golden Valley Parkway. Ongoing construction activities could result in temporary lane closures, increased truck traffic, and other roadway effects that could slow or stop emergency vehicles, temporarily increasing response times and impeding existing service. This impact is considered significant.

Impact
4.10-b

<u>Public Services - Increased Demand for Fire Protection Facilities and Services.</u> *Development of the proposed project would result in an increase in demand for fire protection facilities and services. If planned fire stations are not constructed, existing fire protection facilities could not adequately serve the project site. This impact is considered **significant**.*

The estimated resident population for the proposed project would be 2,560 after buildout of Phase 1a, 12,412 after buildout of Phase 1, and 31,680 after full project buildout. According to the Manteca-Lathrop Fire Protection District Master Plan (Manteca-Lathrop Rural County Fire Protection District 2000), a 1.2:1,000 firefighter-to-resident ratio must be maintained. Therefore, to maintain an appropriate level of service, a minimum of three firefighters would need to be added to the LMFPD during Phase 1a, an additional 12 firefighters (for a total of 15) would need to be added to accommodate Phase 1, and an additional 23 firefighters (for a total of 38) would need to be added to accommodate full project buildout.

Associated with the increased need for firefighters, new stations and equipment would also be required. During initial project development, the existing fire stations in the City of Lathrop, and in particular Fire Station 31, which currently provides first response to the project site, could not maintain the LMFPD goal of a 3- to 4-minute response time for all portions of Phase 1a. Therefore, as described previously, an interim fire station is planned in the Phase 1a development area. A permanent fire station is planned to be placed into service during Phase 1 and is expected to be located in the Employment Center. One or more additional fire stations would be placed into service during Phase 2. These stations are expected to provide sufficient fire protection service to the project site (Monty, pers. comm., 2002). However, specific details regarding the schedule and location for these facilities have not been established. If these stations are not constructed, existing LMFPD fire protection facilities could not provide adequate service to the project.

As required in the General Plan, buildings in the plan area (including the project site) cannot exceed 50 feet in height, or four stories, until appropriate firefighting equipment is available. If any buildings proposed in the Employment Center or Town Center exceed this height limit, the LMFPD would need to obtain aerial ("hook and ladder") trucks and other specialized equipment to allow fire suppression and emergency response in the upper stories.

The need for increased fire protection service and facilities created by the proposed project and the construction of these facilities is considered a significant impact.

Impact
4.10-c

Public Services - Increased Demand for Water-Related Emergency Services and Facilities. *Because of the heavy integration of water features into the design of the proposed project, demand for water-related emergency services and facilities would increase as a result of project implementation. The LMFPD would require new equipment to address this demand. This impact is considered* ***significant****.*

Project implementation would result in numerous homes, docks, bridges, and other facilities being constructed on or adjacent to the San Joaquin River, Old River, Paradise Cut, and the internal project lake. With increased people and structures near, or in contact with these water bodies there would be an expected increase in demand for water-related emergency services. These typically would include river search and rescue efforts, responses to boating accidents, and similar activities. However, with homes and other structures constructed adjacent to these water bodies, and increased wildland fuels (vegetation) along the river edges associated with riparian habitat restoration, there may also be the need for fire suppression/emergency response efforts to approach these areas from the adjacent water surface. The LMFPD does not currently possess sufficient equipment and facilities to address these types of water-related emergency situations.

The need for increased water-related emergency services and facilities created by the proposed project is considered a significant impact.

Impact
4.10-d

Public Services - Increased Demand for Fire Flow. *The proposed project would include the development of residential, commercial, school, and other uses that would require adequate available water flow for fire suppression. Lack of adequate fire flow would substantially impede the ability of the LMFPD to provide effective fire suppression service at the project site and would be considered a* ***significant*** *impact.*

The LMFPD maintains oversight authority to ensure that adequate fire flow is available in the district's service area. Methods to calculate minimum fire flow are included in the California Fire Code. Various factors influence the determination of minimum fire flow, including the density of structures, height, the number of stories, square footage, building materials, and structural design. For most of the structures associated with the proposed project, the minimum fire flow requirement would be between 1,250 gpm and 2,000 gpm (measured at 20 pounds per square inch) for a duration of at least 2 hours. Fire flow requirements may be substantially greater in the Employment Center and Town Center where multiple-story buildings could be constructed. Lack of adequate fire flow would impede the ability of the LMFPD to provide effective fire suppression service at the project site and would be considered a significant impact.

Impact
4.10-e

<u>Public Services - Increased Demand for Police Protection Facilities and Services.</u> *The development of the proposed project would increase the demand for police protection facilities and services and result in the need for additional staff members and equipment to maintain an adequate level of service. This impact is considered **significant**.*

The estimated resident population for the proposed project would be 2,560 after buildout of Phase 1a, 12,412 after buildout of Phase 1, and 31,680 after full project buildout. Using the existing ratio of 1.4:1,000 officers to residents in the City of Lathrop, to maintain a similar level of service, a minimum of four officers would need to be added to the Lathrop police force during Phase 1a, an additional 13 officers (for a total of 17) would need to be added to accommodate Phase 1, and an additional 27 police officers (for a total of 44) would need to be added to accommodate full project buildout. Additional administrative staff members would also be required to support the additional patrol officers.

The existing Lathrop City Hall police station is currently at capacity (Moffitt, pers. comm., 2001). The Police Department has indicated that accommodating the four new officers needed for Phase 1a, as well as any additional new officers associated with later phases, would require additional facility space. As described previously, the Police Department is currently in negotiations to move to a larger facility on 7th Street, which would allow some growth in the force until such time as a new Government Center is developed west of I-5. The 7th Street facility is estimated to be able to accommodate the four additional patrol officers associated with Phase 1a, officers required to support other new development in the City of Lathrop during this period (e.g., Mossdale Landing), and some number of additional officers, until such time as the Government Center is developed (Moffitt, pers. comm., 2001 and 2002). It is difficult to ascertain at this time the exact number of officers the 7th Street facility may support since a majority of the demand on facility space would be from administrative and support staff members, and the space needs for these staff members (as well as patrol officers) have not been fully planned for the 7th Street facility. However, at some point during Phase 1 of River Islands development, the Government Center, or some other facility or facilities, would be required to accommodate the additional patrol officers and associated administrative staff members required to provide service to the proposed project. The Government Center would be located either north of the Mossdale Village area, within the River Islands project site, or in another area west of I-5 planned for development. The impacts of developing the Government Center would be included in the overall California Environmental Quality Act (CEQA) analysis for the relevant site. Potential impacts would include farmland conversion and noise.

Although initially the project site would be served by police officers associated with the planned 7th Street facility, which is 2.25 miles from the closest edge of the project site, police emergency response times would be expected to remain within the 3- to 4-minute goal of the General Plan. Because police emergency response primarily originates from squad cars on patrol beats, rather than from the police station, the location of the station relative to the project site is not particularly relevant. Therefore, whether officers are associated with the existing City Hall station, the planned 7th Street facility, or the proposed Government Center west of I-5, emergency police response times would remain within desired goals as long as sufficient patrol officers are available.

Funding for police facilities and services comes out of the City of Lathrop General Fund. The City also incurs startup costs associated with the hiring and training of new officers, equipping each new officer, and providing patrol vehicles (one vehicle serves two officers). These startup and equipment costs are typically paid by project applicants as a standard City requirement included in the development agreements for new development.

Impact
4.10-f

Public Services - Increased Demand for Animal Control Facilities and Services. *Increases in human populations as a result of project development would result in a corresponding increase in demand for animal control facilities and services. New facilities and staff members would be required to maintain the existing level of service in the City. This impact is considered* ***significant****.*

Increased population associated with the proposed project would result in a corresponding increase in demand for animal control services, including retrieval of stray or abandoned animals; animal shelter operation; cruelty investigations; and responses to barking dog complaints, dog bites, and leash law violations. Because of the proposed project's riverine surroundings, requests for service related to wildlife conflicts also would be anticipated. The existing City of Lathrop Animal Control Division facilities and staff are not sufficient to maintain the existing level of service to current City residents while responding to increased demand associated with the proposed project. It can be anticipated that if the existing staffing level of two animal control officers is maintained, response times for service requests would increase, and noncritical services (e.g., responses to barking dog complaints) may no longer be provided. Because existing services could be substantially affected, this impact is considered significant.

Impact
4.10-g

Public Services - Increased Demand for Public School Facilities and Services. *Implementation of the proposed project would increase demand for elementary schools (K–8) within the BESD and for high schools in the TUSD. Although the project includes a proposal for onsite schools, proposed facilities may not be sufficient to meet demand during Phase 1a and Phase 1. In addition, a schedule and funding mechanism for construction of these schools has not been confirmed. Therefore, this impact is considered* ***significant****.*

As discussed in Chapter 3, "Description of the Proposed Project," the River Islands school system is proposed to accommodate an estimated 5,600 K–8 students and 1,350 grade 9–12 students at full project buildout. These student population numbers were based on estimates provided by the BESD and the TUSD to the project applicant during early phases of River Islands design. The BESD would provide K–8 service to the proposed project, and the TUSD would serve grade 9–12 students.

Table 4.10-1 shows student population estimates per project phase based on the number of dwelling units proposed in each phase and student generation rates recently provided by the BESD (Draa, pers. comm., 2002) and the TUSD (Ohm, pers. comm., 2002). To plan for the proposed project, BESD would be using the same K–5 and grade 6–8 student generation rates developed by the TUSD. For single-family dwelling units, the generation rates are 0.4277 student per household for K–5 and 0.1650 student per household for grade 6–8, or 0.5927 student per household for combined K–8. For multifamily dwelling units (e.g., apartment, townhouse), the generation rates are 0.1862 K–5 student per household and 0.0747 grade 6–8 student, or 0.2609 student per household for K–8 combined. The TUSD uses a student generation rate for grades 9–12 of 0.179 student per single-family dwelling unit and 0.043 student per multifamily dwelling unit. It is assumed that active adult housing would generate only a negligible number of K–12 students or no K–12 students because they would be located in an age-restricted development. Based on these calculations, at full buildout (2025) the proposed project would generate 4,800 K–8 students (800 fewer than the early estimates) and 1,497 grade 9–12 students (147 more than the early estimates).

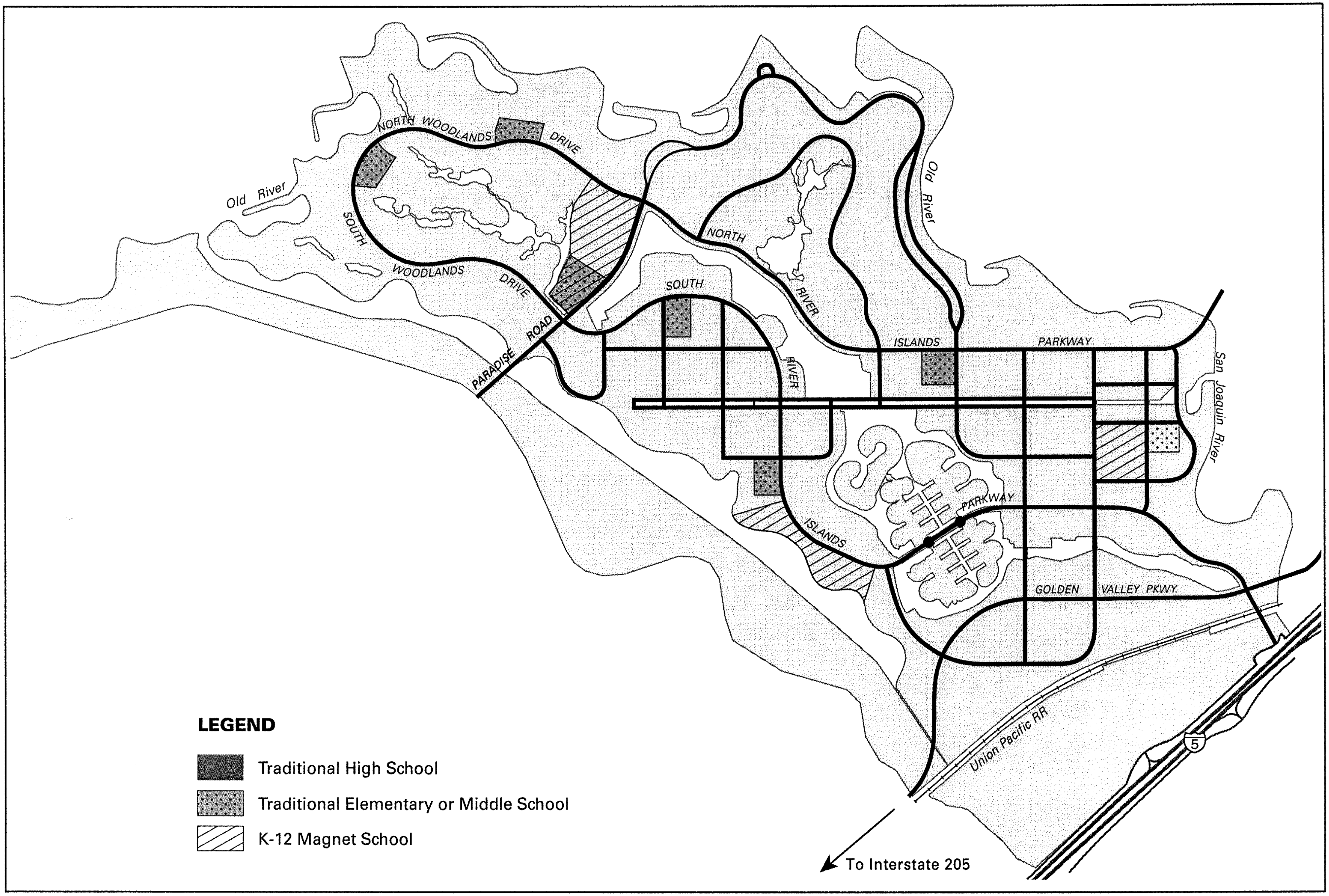
Table 4.10-1
Phasing of River Islands Development and Student Generation

	Phase 1a (2007)			Phase 1 (2015)			Phase 2 (2025)		
	Number of Dwelling Units	K-8	9-12	Number of Units	K-8	9-12	Number of Units	K-8	9–12
Residential Development									
Single family [1]	800	474	143	3,231	1,915	578	7,971	4,724	1,427
Active adult [2]	--	--	--	--	--	--	1,400	0	0
Apartments [3]	--	--	--	600	157	26	1,200	313	52
Townhouses [3]	--	--	--	229	59	10	429	112	18
Total	800	474	143	4,060	2,131	614	11,000	5,149	1,497
School Capacity									
Town Center school	--	--	--	--	1,700	500	--	1,700	500
Paradise Cut school	--	--	--	--	--	--	--	1,700	500
Olympic school	--	--	--	--	--	--	--	1,700	500
Total capacity	--	--	--	--	1,700	500	--	5,100	1,500
Students vs. capacity		(474)	(143)		(431)	(114)		49	3

1 Based on 0.5927 K–8 and 0.179 grade 9–12 students per single-family dwelling unit.
2 Active adult units were assumed to generate a negligible number of K–12 students.
3 Based on 0.2609 K–8 and 0.043 grade 9–12 students per multifamily dwelling unit.

Sources: Draa and Ohm, pers. comms., 2002

Under the proposed nontraditional school model (Exhibit 4.10-1), three schools/campuses would be built on the project site, each capable of accommodating 2,000–2,400 combined K–12 students. For the purposes of this analysis, it was assumed that each school would serve 2,200 students: 1,700 in grades K–8 and 500 in grades 9–12. Under these conditions, at full project buildout, there would be a deficit in school capacity of 49 students relative to anticipated K–8 demand (Table 4.10-1). However, this demand could be easily met by designing one or more schools closer to the full 2,400-student capacity. There would be sufficient capacity for grade 9–12 demand with a surplus capacity for three students. If each school were constructed to near full capacity (2,400 students), there would also be sufficient capacity to meet the early student generation estimates of 5,600 K–8 students and 1,350 grade 9–12 students.



Source: Data provided by The SWA Group 2002

Proposed Magnet and Traditional School Sites

EXHIBIT 4.10-1

River Islands at Lathrop
CITY OF LATHROP
JN 1T013.01 10/02

0 1500 3000 FEET

NORTH

EDAW

Under the nontraditional school model (Exhibit 4.10-1), the first school (the Town Center school) would be built during Phase 1 (2007–2015). The remaining two schools (the Paradise Cut school and the Olympic School) would be built during Phase 2 (2015–2025). Although temporary school facilities would likely be constructed as part of Phase 1a, there are no confirmed plans for schools to be built during this phase (2005–2007), when up to 800 single-family dwelling units would be constructed on the project site. It is expected that these 800 units would generate 474 K–8 students and 143 grade 9–12 students (Table 4.10-1). The BESD currently has capacity to accommodate an estimated 27 additional K–8 students. The TRUSD currently has capacity for an estimated 14 additional high school students. Because plans for onsite schools associated with Phase 1a are at a more conceptual level of development than for the later project phases, it is assumed that demand for school facilities would exceed availability, as shown in Table 4.10-1, and that new services and facilities would be required. These new services and facilities would be provided offsite by the BESD and TUSD, and/or temporary school facilities would be provided on the project site.

At completion of Phase 1 of the proposed project, the estimated student population would be 2,131 K–8 students and 614 grade 9–12 students. The Town Center school is the only school planned for construction during this project phase. Assuming the school can accommodate 1,700 K–8 students and 500 grade 9–12 students, demand would exceed capacity by 431 K–8 students and 114 grade 9–12 students (Table 4.10-1). If the Town Center school were built to maximum capacity (2,400 students), it still could not serve the student population estimated for Phase 1 (2,745 students). Therefore, there would be a need to develop school services and facilities beyond those, or more rapidly than those, described for the proposed project.

As stated in the schools discussion in Chapter 3, "Description of the Proposed Project," the project applicant, the BESD, and the TUSD are aware of the challenges associated with implementing the nontraditional school system. Therefore, a traditional system with seven to eight grade K–8 schools, each with an approximately 750-student capacity (or six K–6 schools and two grade 6–8 schools with similar overall student capacity), and a single high school would be constructed. This school approach is sufficient to meet student demand at full project buildout. Also, this system would be sufficient to accommodate students during Phase 1a and Phase 1 since each K–8 school (or K–6 and grade 6–8 school) would be built as needed to meet demand. Temporary high school facilities would be associated with the K–8 schools until a sufficient grade 9–12 population has developed to support the high school.

Whether the nontraditional or traditional school model were adopted, a set schedule and funding mechanism for construction of the schools has not been established. If the proposed onsite schools are not constructed, the students generated by the proposed project would need to be accommodated offsite at BESD and TUSD facilities. Given the volume of students that would be generated by the proposed project, this would substantially overcrowd schools in these districts.

Because the proposed project would create substantial demand for new school services and facilities and could potentially impede existing services and facilities, this impact is considered significant.

Impact
4.10-h

<u>Public Services - Increased Generation of Solid Waste.</u> *The proposed project would substantially increase solid waste generation. However, Foothill Sanitary Landfill, which would receive solid waste from the project, has ample long-term available capacity. Therefore, this impact is considered* ***less than significant****.*

The California Integrated Waste Management Board (CIWMB) provides an average per capita solid waste disposal rate for San Joaquin County of 0.36 ton per resident per year (CIWMB 2002a). The estimated total population for the proposed project is 31,680 residents; therefore, solid waste generation for project residents would be expected to be approximately 11,405 tons per year.

In addition, it is estimated that approximately 16,750 workers would be employed on the project site. A variety of businesses and industries would be developed as part of the proposed project, as would normally occur in a large mixed use development. Business waste disposal rates calculated by the CIWMB for businesses likely to occur at the project site range from 0.3 ton per employee per year for general merchandise stores, to 3.1 tons per employee per year for restaurants (CIWMB 2002b). However, the vast majority of employees at the project site would be located in the Employment Center, working in jobs within waste generation categories such as finance/insurance/real estate/legal (0.3 ton per employee per year), manufacturing electronic equipment (0.5 ton per employee per year), other professional services (1.2 tons per employee per year), communications (1.5 tons per employee per year), and business services (1.7 tons per employee per year). To estimate a single business waste disposal rate for the proposed project, the average of the two anticipated extremes among the Employment Center categories (0.3 and 1.7 tons per employee per year) was used, resulting in a generation rate of 1.0 ton per employee per year. Using the average business waste disposal rate of 1.0 tons per employee per year results in 16,750 tons of waste generated annually by employees on the proposed project site.

Combining residential and business solid waste generation, the overall solid waste generation for the proposed project is estimated to be approximately 28,155 tons per year. This rate would not be reached until full buildout in 2025. Much lower generation rates would occur at project initiation in 2005, with a gradual increases to the rate until reaching full buildout. The Foothill Sanitary Landfill has sufficient permitted capacity to accommodate the project's solid waste disposal needs during all phases, considering it has approximately 44 million tons of available capacity, which is expected to last for more than four decades. In addition, the proposed project would comply with all federal, state, and local statutes and regulations related to solid waste reduction/recycling. Therefore, this impact is considered less than significant.

4.10.4 MITIGATION MEASURES

No mitigation measures are necessary for the following less-than-significant impacts.

4.10-h Increased Generation of Solid Waste

The following mitigation measures are provided for significant impacts.

4.10-a **<u>Obstruction of Roadways during Construction.</u>** Per City requirements, the applicant/contractor shall prepare and implement traffic control plans for construction activities that may affect road rights-of-way. The traffic control plans must follow California Department of Transportation standards and be signed by a professional engineer. Measures typically used in traffic control plans include advertising of planned lane closures, warning signage, flagmen to direct traffic flows when needed, and methods to ensure continued access by emergency vehicles. During project construction, access to existing land uses shall be maintained at all times, with detours being utilized as necessary during road closures.

Implementation of Mitigation Measure 4.10-a would reduce impacts associated with potential delays to emergency vehicles from obstruction of roadways during construction to less-than-significant levels.

4.10-b **<u>Increased Demand for Fire Protection Facilities and Services</u>** The City shall not authorize the occupancy of any structures in Phase 1a of the proposed project until the proposed interim fire station is in service. As development proceeds through Phase 1 and Phase 2 of the proposed project, the City shall authorize occupancy of new structures only if confirmation of 3- to 4-minute emergency response times to these structures can be provided using LMFPD methodologies. At some currently undetermined point during Phase 1, the new permanent fire station (tentatively planned in the Employment Center) would need to be constructed and brought into service to meet the response time requirement. Similarly, at some point during Phase 2, one or more additional fire stations would need to be constructed to meet the response time requirements. The LMFPD would build and equip necessary interim and permanent fire stations, as needed, on land dedicated by the project applicant. The applicant shall pay to the City all applicable fire service fees and assessments required to pay for its share of fire district facilities and services required to serve the River Islands project.

Construction of structures greater than 50 feet in height or four stories will not be permitted by the City until the LMFPD possesses appropriate equipment (e.g., aerial trucks) to provide fire suppression and emergency services to the upper stories of these buildings. The applicant shall pay to the City all applicable fire service fees and assessments required to pay for its fair share of this equipment.

Implementation of Mitigation Measure 4.10-b would reduce impacts associated with increased demand for fire protection facilities and services to less-than-significant levels.

4.10-c **<u>Increased Demand for Water-Related Emergency Services and Facilities.</u>** The project applicant and the LMFPD have developed a tentative agreement regarding the type, cost, schedule, and purchase conditions for a fire/rescue boat to be operated by the LMFPD to address water-related emergency services. The City shall not authorize the occupancy of any project structures adjacent to the San Joaquin River, Old River, Paradise Cut, or the internal project lake until this agreement has been finalized.

Implementation of Mitigation Measure 4.10-c would reduce impacts associated with increased demand for water-related emergency services and facilities to less-than-significant levels.

4.10-d <u>**Increased Demand for Fire Flow.**</u> The City shall not authorize the occupancy of any structures until the applicant has confirmed provision of adequate minimum fire flows as required by the LMFPD and the California Fire Code.

Implementation of Mitigation Measure 4.10-d would reduce impacts associated with increased demand for fire flow to less-than-significant levels.

4.10-e <u>**Increased Demand for Police Protection Facilities and Services.**</u> The project applicant shall pay to the City the startup costs incurred in the hiring and training for each of the new police officer positions needed to serve the project (four for Phase 1a, an additional 13 officers for Phase 1, and 27 more officers for Phase 2 [total of 44], assuming the existing 1.4-officer-to-1,000-resident ratio). This fee shall be incurred once per position (i.e., it shall not be used to train turnover staff). In addition, the following equipment costs shall be paid for by the applicant:

- standard safety equipment for each officer, including sidearm; belt, holster, etc.; body armor; mobile radio, etc.; and
- a fully equipped patrol vehicle for every two officers, including radio, siren, roof lighting, Opticom mobile strobe, mobile computer terminal, and vehicle video recorder.

The payment of the above startup fees and equipment costs shall be phased to coincide with the need for new officers generated by project development. Each time sufficient dwelling units are developed to generate 714 residents, the fee equivalent for one officer shall be paid to the City (based on a 1.4-officer-to-1,000-resident ratio). The resident threshold may be adjusted if City policy results in a different officer-to-resident ratio. Resident generation rates to be used for this calculation are:

- single family — 3.2 persons per dwelling unit
- multifamily — 2.5 persons per dwelling unit
- active adult — 1.5 persons per dwelling unit

As police officers and support staff members are hired to meet demand associated with the proposed project, the planned Government Center, or similar or interim facilities, would be completed before Police Department staff exceed available space in the 7th Street building. The project applicant shall also ensure the use of 3M Addressable Opticom Traffic Control Pre-emption devices and detectors/reflectors (or equivalent based on Police Department standards) in all traffic lights for which the project is responsible and the City has jurisdiction.

Implementation of Mitigation Measure 4.10-e would reduce impacts associated with increased demand for police protection facilities and services to less-than-significant levels.

4.10-f **Increased Demand for Animal Control Facilities and Services.** The project applicant and City of Lathrop shall negotiate an animal control services agreement element. The agreement shall be designed to ensure that resources are available for animal control facilities and staff to expand to meet demand associated with the proposed project. Credit may be given to the project applicant if a portion of the River Islands Animal Campus is dedicated to use by the City's Animal Control Division.

Implementation of Mitigation Measure 4.10-f would reduce impacts associated with increased demand for animal control facilities and services to less-than-significant levels.

4.10-g **Increased Demand for Public School Facilities and Services.** The City shall not allow occupancy of any project residences until a mitigation agreement has been executed between the project applicant and the BESD and TUSD regarding the provision of school services for the proposed project or payment of the state-mandated school impact fee City.

The BESD is considering becoming a unified school district and providing high school facilities to grade 9–12 students. If this occurs, and the BESD provides all K–12 school services to the project site, then the mitigation agreement needs to be executed only with the BESD and not with the TUSD.

Implementation of Mitigation Measure 4.10-g would reduce impacts associated with increased demand for school facilities and services and potential impacts to existing school services to less-than-significant levels.

4.10.5 RESIDUAL SIGNIFICANT IMPACTS

No residual significant impacts on public services would occur with implementation of the recommended mitigation measures.

4.11 PUBLIC UTILITIES

4.11 PUBLIC UTILITIES

This section describes the existing and proposed utilities systems associated with the proposed project: water, wastewater and recycled water, stormwater conveyance, and electricity and natural gas. The potential impacts of the proposed project on these utilities are described and environmental impacts of necessary onsite and offsite infrastructure improvements are evaluated. Sufficient detail is provided in this section to analyze issues related to water, stormwater, electricity, and natural gas at a project level of detail for both Phase 1 and Phase 2 of the proposed project. Wastewater treatment and recycled water disposal are addressed at a project level of detail for Phase 1 and at a program level for Phase 2. Wastewater treatment and recycled water disposal are addressed at this program level of detail for Phase 2 because approaches to providing these utility services for this project phase have not been defined beyond the options available in the Lathrop Water, Wastewater, and Recycled Water Master Plan (Master Plan) (Nolte Associates 2001). The Master Plan and associated EIR (EDAW 2001) evaluate on a programmatic level several methods for treating wastewater and disposing of recycled water generated on Stewart Tract (and elsewhere in Lathrop). Options for providing these utility services include expansion of Water Recycling Plant #1 (WRP #1), construction of WRP #3, land disposal of recycled water, and river discharge of recycled water. Methods proposed to provide these utilities for Phase 2 of the proposed project are consistent with those described in the Master Plan but are not more refined than those in the Master Plan. Because the proposed project addresses wastewater treatment and recycled water disposal for Phase 2 at the same level of detail as the Master Plan, and the Master Plan evaluates these utilities at a program level of detail, the Phase 2 analysis of these utilities in this SEIR also must be considered at a program level of detail.

4.11.1 REGULATORY BACKGROUND

The City of Lathrop General Plan (General Plan), West Lathrop Specific Plan (WLSP), and West Lathrop Specific Plan Environmental Impact Report (WLSP EIR) identify goals, policies, and mitigation measures associated with providing water, wastewater, recycled water, electricity and natural gas to new developments. In addition, new state legislation has been enacted that ties proposed development to the availability of adequate long-term water supplies to serve that project. These City and state requirements, as they apply to each utility element, are summarized below.

WATER

It is a goal of the General Plan to provide both for a secure source of fresh water for existing and future residents of Lathrop and for the reuse of wastewater and surface water so that there is no net increase in water pollution, including point and nonpoint sources (Lathrop General Plan, Goal 10: Water Supply, Wastewater and Surface Water Management).

The WLSP EIR requires that development in Stewart Tract be withheld until the extent of development to be approved is supported by assurance that a firm supply of potable water would be obtained and available for use commensurate with the amount of urbanization to be served (WLSP EIR, Water Supply, Mitigation Measure 1).

In addition to these City water-related goals and policies, the State of California has enacted new water legislation applicable to California Environmental Quality Act (CEQA) consideration of larger projects. Senate Bill (SB) 610 (§10910 of the Water Code) ties approval of large developments (e.g., more than 500 dwelling units), such as the River Islands project, to the availability of water supplies adequate to serve the proposed project, as well as other anticipated growth in the water supplier's service area in which the project is located, during both normal and drought conditions. Under SB 610, a water supply assessment must be prepared by the lead agency that demonstrates the availability of existing and future water supplies adequate to serve the project. The content requirements for the assessment include, but are not limited to, identification of the existing and future water suppliers and quantification of water demand and supply by source in 5-year increments over a 20-year projection. This information must be provided for average normal, single-dry, and multiple-dry years. An SB 610 water supply assessment has been prepared for this SEIR. The assessment is included in its entirety as Appendix J of this SEIR and summarized as part of the impact analysis later in this section.

WASTEWATER AND RECYCLED WATER

The existing wastewater collection system in Lathrop is restricted to the developed eastern portion of the City. The Master Plan includes a proposed wastewater collection system on Stewart Tract that would treat wastewater at a water recycling plant on Stewart Tract. Alternatives to this system allow for the treatment and disposal of wastewater generated from both Mossdale Village and Stewart Tract at the existing Water Recycling Plant No. 1 (WRP #1) in East Lathrop. The expansion of WRP #1 to accommodate Mossdale Village and River Islands development is the City's preferred approach.

It is an objective of the Master Plan that water recycling and reuse represent the preferred strategy for wastewater management and that they shall be maximized to both limit water discharges of tertiary-treated effluent to surface waters and reduce reliance on potable groundwater and surface water for irrigation purposes. To facilitate reclamation, dual distribution systems would be provided in new developments for nonpotable water use, such as landscape irrigation (EDAW 2001).

Consistent with the Master Plan, the River Islands project proposes to use recycled wastewater (tertiary-treated effluent) to irrigate proposed golf courses, parks, school grounds, and other public landscaping. Wastewater recycling in California is regulated under California Code of Regulations (CCR) Title 22, Division 4. The intent of these regulations is to ensure protection of public health associated with the use of recycled water. The regulations establish acceptable levels of constituents in recycled wastewater for a range of uses and prescribe means of ensuring reliability in the production of recycled wastewater. Use of recycled wastewater for nonpotable uses is common throughout the state and is an effective means of maximizing use of water resources. The California Department of Health Services (DHS) has jurisdiction over the distribution of recycled wastewater and the enforcement of Title 22 regulations. The Regional Water Quality Control Boards (RWQCBs) are also responsible for reuse requirements associated with wastewater reclamation at proposed projects.

Stormwater Conveyance

Because the proposed project site is on the west side of the San Joaquin River, it was not included in the City's first storm drainage master plan. The first storm drainage master plan for Stewart Tract (which covers the proposed project site) was prepared as part of the WLSP. This plan included the concept of large internal lakes for collecting and cleaning all drainage before it is discharged into the nearby rivers. Discharge of urban runoff is regulated by the RWQCB, the U.S. Environmental Protection Agency (EPA), and others through numerous interrelated water quality laws and programs. These are described in detail in section 4.8, "Hydrology and Water Quality."

Electricity and Natural Gas

The General Plan requires all gas and electrical distribution lines to be placed underground. If overhead transmission line rights-of way are required, they should be incorporated in open space corridors so as to minimize their visual impacts on the urban environment (Lathrop General Plan, Executive Summary, Energy Utilities, Solid Waste Management, Mitigation Measure 2).

The General Plan also states that the City should adopt an energy conservation ordinance, with provision for energy conservation features as part of all construction intended for human use (Lathrop General Plan, Executive Summary, Energy Utilities, Solid Waste Management, Mitigation Measure 4). Consistent with the General Plan, the City adopted energy conservation standards in 2001.

4.11.2 Existing Conditions

Lathrop Irrigation District

To provide some of the utility infrastructure for the River Islands project, the project applicant formed the Lathrop Irrigation District (LID), with the authority to provide irrigation and potable water, wastewater service, and electrical service to the project site. Local voters approved formation of the LID in May 2002. The LID would function as one among other public agencies available to provide utilities and services to the project site and to finance infrastructure development and construction through the use of land bonds, revenue bonds, and other forms of financing available to public agencies.

Water Supply

City of Lathrop

The City of Lathrop would serve as the water supplier for the proposed project. At present, the City relies exclusively on groundwater for its municipal potable water supply. City groundwater comes from the Central Valley aquifer system, which occupies most of a large basin in central California between the Sierra Nevada and the Coast Ranges. This groundwater basin, which is not adjudicated, is in overdraft but is considered to have an average safe yield of approximately 1 acre-foot per year (AFY) per surface acre. For Lathrop, this is equivalent to 7,200 AFY.

Most of the fresh groundwater in the City is encountered at depths of less than 2,500 feet. Several hydrologic formations underlie the Lathrop area; however, only the top two, the Victor and Laguna formations, are currently used as a source of fresh water. The Victor formation is the uppermost formation, extending from the ground surface to approximately 150 feet. Because of saltwater intrusion into the Delta region, and because of infiltration of runoff from the San Joaquin River, agricultural areas, and urban areas, groundwater quality in this shallow formation is generally considered poor. However, this poor-quality groundwater from the Victor formation generally is not used for drinking water purposes. The underlying Laguna formation extends to approximately 1,000 feet. Most municipal and industrial wells in Lathrop penetrate the Victor formation to draw higher quality water from the Laguna formation. As a result of bacteriological contamination, the City began chlorinating water at all of its municipal wells in 1996. However, groundwater drawn by the City from the Laguna formation meets all drinking water standards after treatment. For example, total dissolved solids (TDS) in water from the City wells generally averaged from 245 milligrams per liter (mg/l) to 422 mg/l, with an overall annual average of 297 mg/l (Nolte Associates 2000). The recommended secondary TDS standard for drinking water is 500 mg/l, with an upper limit of 1,000 mg/l for long-term use and 1,500 mg/l for short-term use. TDS also can provide a measure of the level of saltwater intrusion into a groundwater supply. These TDS levels indicate that saltwater intrusion is not a severe problem in the Laguna formation groundwater at the City of Lathrop.

The City's existing municipal water system consists of three water storage tank/booster pump stations that store and pump water from the City's four active wells through the City's municipal water pipeline network to residential, commercial, and other users in the City's service area. A fire booster pump and a potable water booster pump are included at the pump stations associated with each of the existing storage tanks. The pipelines include 47 miles of underground 2-inch- to 16-inch-diameter pipes used to distribute water to the City's approximately 2,600 water service connections. The wells are located on the east side of the City, between Lathrop Road and Yosemite Avenue. The total capacity of the four wells is approximately 5,000 gallons per minute (gpm). The 6-month high-demand period for water in the City occurs from May to October (approximately 65% of annual demand). The highest water demand experienced by the City's municipal water system occurred in July 1996, when a peak rate of 1,823 gpm was produced by the wells. The City's water use in 2000 was estimated at 2,100 AFY. Water demand in the City is projected to increase to a maximum of approximately 10,754 AFY in 2025 (not including the proposed project) (Nolte Associates 2002).

In the future, the City's water supply would originate primarily from surface water provided by the South San Joaquin Irrigation District (SSJID) South County Surface Water Supply Project (SCSWSP). The SCSWSP is a joint effort of SSJID and Lathrop, Escalon, Manteca, and Tracy to supply treated potable water from Woodward Reservoir to these participating cities via pipeline. The project includes 36.5 miles of 20- to 54-inch water transmission pipeline with turnouts and pumping facilities for each city. The SSJID's source for water is the Stanislaus River based on pre-1914 rights and post-1914 appropriative rights for direct diversion and diversion to storage.

An EIR for the SCSWSP project has been certified, and the project has been approved and adopted. SSJID is projected to begin construction on this project in 2003. It is anticipated that normal-year water deliveries from the SCSWSP to the City of Lathrop of 2,520 AFY would commence starting in 2005, with deliveries amounting to 8,000 AFY in 2010 and 11,791 AFY by 2025 (the full buildout year for the River Islands project) (Nolte Associates 2002).

Proposed Project Site

All potable water service at the project site is provided through onsite wells. Nonpotable water is also supplied to the proposed project site for agricultural uses with water drawn from the San Joaquin River, Old River, and Paradise Cut using existing riparian and appropriative water rights. The water is conveyed through a series of wells, pump stations, and pipelines. A portion of these facilities are privately owned and operated by the agricultural water users in the area, and the remainder are owned and operated by Reclamation District (RD) 2062.

WASTEWATER

City of Lathrop

Wastewater generated in the City is currently treated and disposed of at WRP #1 (a City-owned treatment plant located in the Crossroads Business Park) and at the Manteca Water Quality Control Facility (WQCF) in the City of Manteca. The City presently generates approximately 0.76 million gallons per day (mgd) of wastewater and is projected to generate 11.5 mgd by 2030 (which includes development anticipated on the project site as described in the Master Plan) (EDAW 2001). Approximately 95% of the currently generated wastewater (0.73 mgd) is conveyed to the Manteca WQCF, with the remainder (0.03 mgd) going to WRP #1.

WRP #1 was designed to accommodate an average daily flow of 0.60 mgd of low strength effluent. Effluent disposal is to land through on-site evaporation/percolation ponds. The three existing percolation ponds located at this site have a design capacity of 0.2 mgd each, but investigation and hydraulic analysis determined that the underlying soils have a lower transmissivity rate than expected, and the existing ponds have a maximum combined disposal capacity of approximately 100,000 gallons per day (gpd) (EDAW 2001). This severely limits the plant's capacity. A phased remedial project has been approved by the City to allow WRP #1 to accommodate disposal of the full design capacity of 0.6 mgd of wastewater. Sludge produced by sewage treatment processes at the treatment plant is currently disposed of on-site. The current sludge generation rate is approximately 15-20 cubic yards per year (Bennett, pers. comm., 2000).

The City has a contractual relationship with Manteca whereby 14.7% of the Manteca WQCF capacity (currently 1.1 mgd) is allotted for Lathrop flows (Burns Cochran, pers. comm., 2002). Flows from the City to the Manteca WQCF currently average approximately 0.73 mgd, or 0.37 mgd less than the allocated capacity. Treated wastewater (secondary effluent) from the Manteca WQCF is disinfected and then most of the water is discharged into the San Joaquin River. A portion of the secondary effluent is used to irrigate crops.

To accommodate projected City wastewater generation through 2030, new facilities are proposed to be built in Lathrop. Three WRPs are planned in the City under the Master Plan. WRP #1 would serve a mainly residential portion of East Lathrop and would treat between 3.0 and 6.1 mgd at buildout. WRP #2 would serve areas in WLSP sub-plan area #2 between I-5 and the San Joaquin River, treating between 2.8 and 3.2 mgd at buildout. If constructed, WRP #3 would serve Stewart Tract and would treat up to 4.5 mgd at buildout. Provisions are included in the Master Plan for WRP #1 to treat wastewater generated in Stewart Tract if development occurs there before development of WRP #2 or #3. This is the approach currently adopted by the City. Each of the City of Lathrop's planned WRPs would meet all applicable regulations for Title 22 tertiary treatment and disposal. Effluent produced by the City's three treatment plants is planned to be disposed of through a combination of recycling through land applications, conveyance to the Manteca WQCF, and eventually surface water discharge.

WRP #1 is currently proposed to be expanded in a series of phases, in addition to the remedial program identified above. Phase 1a would include conversion of the plant to tertiary treatment and expansion from 0.6 mgd (after remediation is complete) to 1.2 mgd. Phase 1b would expand the plant by an additional 2.4 mgd (total combined capacity of 3.6 mgd). An EIR is being prepared for these two phases of WRP #1 expansion, and construction of the expansion is expected to begin in 2003. This proposed WRP #1 Phase 1 Expansion Project also includes provision for storage and disposal of treated wastewater at each of the projects that the plant would serve. The Phase 1 Expansion Project is planned to serve various existing and planned projects and facilities, including some or all of the proposed River Islands and Mossdale Village projects, as well as provide additional capacity for the existing Crossroads Commerce Center. The EIR for the WRP #1 expansion project is being tiered off the Master Plan EIR (EDAW 2001). Consistent with the Master Plan, recycled water generated from future WRP projects may be disposed of through land application or river discharge.

Proposed Project Site

The project site is not currently served by the City's municipal sewer system. At present, wastewater generated at the project site is disposed of via private septic systems. The nearest municipal sewer pipeline is located at the Louise Avenue and Harlan Road intersection, approximately 6,300 feet east of the project site (east of I-5) (EDAW 2001).

RECYCLED WATER

Currently, the City does not maintain a citywide recycled water system, and there is no recycled water system at the project site. The Master Plan identifies the need to provide recycled water services to the City and forecasts that recycled water demand in the City would be approximately 1,900 AFY under near-term conditions (2000–2004), increasing to approximately 4,700 AFY by buildout (2030). Under the Master Plan, wastewater generated in the City would be treated to Title 22 disinfected tertiary levels by the three proposed WRPs discussed previously, in the "Wastewater" subsection. The treated wastewater would then be delivered to public landscaped areas, agriculture, and open space in the City for use as irrigation water via a new municipal recycled water distribution pipeline system (purple pipe) (EDAW 2001). Operational storage would be provided at the treatment plants and at the project sites served by the treatment plants to balance production and delivery requirements. All recycled water use would occur in accordance with applicable RWQCB and DHS water quality requirements. In the long term, tertiary-treated wastewater not used for irrigation under the Master Plan could be discharged to the San Joaquin River during the nonirrigation season (November through February).

STORMWATER CONVEYANCE

City of Lathrop

In newer developments in the City of Lathrop, conveyance of stormwater drainage consists of surface runoff to detention ponds, with subsequent conveyance to the San Joaquin River via a 36-inch pipe. Drainage in older developed and partially developed areas of the City is either lacking or of marginal character because of the lack of capability for positive offsite disposal.

Proposed Project Site

At present, stormwater drainage on the project site is provided by the agricultural drainage system. Stormwater and irrigation runoff that does not percolate to groundwater is collected in agricultural irrigation ditches and canals and pumped into Paradise Cut via a central drainage canal.

ELECTRICITY AND NATURAL GAS

The City of Lathrop obtains its electrical and natural gas supply from Pacific Gas and Electric Company (PG&E). PG&E also provides electrical service to the proposed project site, via two 12-kilovolt (kV) electrical lines (Exhibit 3-14). Since its approval in May 2002, the LID may also deliver electrical power to the project site. No natural gas service is available on the project site. Propane is used for gas appliances.

4.11.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Impacts on water, wastewater, recycled water, stormwater conveyance, electricity and natural gas services that would result from the proposed project were identified by comparing existing service capacity and facilities against anticipated future demand associated with project implementation. Because temporary impacts could occur if utilities are not provided concurrently with the project developments (residential, commercial) that create demand for these services, an evaluation of project phasing is included.

Numerous technical and environmental documents describe the projected utility demands associated with development of the project area, including:

- City of Lathrop SB 610 Water Supply Assessment Report for Mossdale Landing, River Islands at Lathrop, and Lathrop Station prepared by Nolte Associates, August 2002;
- Electrical Study, prepared by Navigant Consulting, Inc., March 2002;

- Gas System Requirements Study, Navigant Consulting, Inc., March 2002; and
- Lathrop Water, Wastewater, and Recycled Water Master Plan Draft Environmental Impact Report, prepared by EDAW, Inc, March 2001.

Data on projected wastewater generation were also provided by Carlson, Barbee, and Gibson.

The analysis of utility services for the River Islands project is made in light of these future planned projects:

- Lathrop Water Recycling Plant No. 1 Phase 1 Expansion Project,
- SCWSP Surface Water Supply Project,
- City of Lathrop Well Field Expansion, and
- other projects outlined in the Master Plan.

This analysis also assumes the development of the stormwater management system as described in Chapter 3, "Description of Proposed Project," and section 4.8, "Hydrology and Water Quality" (e.g., use of parks and paseos to hold and treat stormwater, storage of stormwater in the central lake).

A project-level analysis of issues related to water supply, stormwater conveyance, electricity, and natural gas was conducted for both Phase 1 and Phase 2 rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. Information regarding the availability, demand, and delivery of these utilities during Phase 2 is at a sufficient level of detail to allow equal levels of analysis for both project phases.

A project-level analysis also was conducted for wastewater treatment and recycled water disposal under Phase 1. However, wastewater treatment and recycled water disposal are addressed at a program level of detail for Phase 2 because approaches to providing these utility services for this project phase have not been defined beyond the options available in the Master Plan (Nolte Associates 2001). The Master Plan and associated EIR (EDAW 2001) evaluate on a programmatic level several methods for treating wastewater and disposing of recycled water generated on Stewart Tract (and elsewhere in Lathrop). Options for providing these utility services include expansion of WRP #1, construction of WRP #3, land disposal of recycled water, and river discharge of recycled water. Methods proposed to provide these utilities for Phase 2 of the proposed project are consistent with those described in the Master Plan but are not more refined than those in the Master Plan. Because the proposed project addresses wastewater treatment and recycled water disposal for Phase 2 at the same level of detail as the Master Plan, and the Master Plan evaluates these utilities at a program level of detail, the Phase 2 analysis of these utilities in this SEIR also must be considered at a program level of detail. After methods to address wastewater and recycled water for Phase 2 are more fully defined, additional project-level CEQA analysis would be required.

PRIOR WLSP EIR ANALYSES

The WLSP EIR evaluated the impacts of extending utility service to Stewart Tract to support the various projects proposed in the planning area. The WLSP EIR acknowledges impacts on water, wastewater, and recycled water from project implementation. These impacts would be mitigated, in part, by increased groundwater use, surface water importation, wastewater treatment facility expansion and construction, and compliance with all relevant health and safety codes regarding the use of recycled water. The WLSP EIR determined that impacts associated with water, wastewater, and recycled water would be mitigated to a less-than-significant level.

Since completion of the WLSP EIR, the Master Plan has been adopted, guiding development of water, wastewater, and recycled water facilities in the City of Lathrop. The EIR for the SCSWSP has also been approved, moving forward the ultimate delivery of surface water to Lathrop from SSJID. Planned expansion of WRP #1 has been further refined since completion of the WLSP EIR, and new water supply and demand data are available via the SB 610 Water Supply Assessment (Appendix J). Given these new conditions, as well as the changes in utility demand associated with the River Islands project compared to the project analyzed in the WLSP EIR, an independent analysis of utility impacts is included in this SEIR.

THRESHOLDS OF SIGNIFICANCE

The River Islands project would cause a significant impact on utilities if it would:

- create demand beyond available service capacity;
- create demand for wastewater treatment/disposal beyond available service;
- cause generation of recycled water beyond available disposal capacity;
- substantially increase the rate or amount of surface runoff in a manner that would exceed the capacity of existing/planned drainage facilities and/or result in flooding on- or off-site; or
- create demand for electrical or natural gas service that is substantial in relation to the existing demands.

IMPACT ANALYSES

Impact
4.11-a

<u>Public Utilities - Demand for Potable Water.</u> *The proposed project would create demand for potable water that could not be met by existing City water production facilities (i.e., wells). This impact is considered* ***significant****.*

The SB 610 Water Supply Assessment prepared for the River Islands project (Nolte Associates 2002) (Appendix J) evaluates the adequacy of existing and future water supplies to meet the water demand created by the River Islands project in conjunction with existing and future cumulative development in the City over the next 20 years. The assessment accomplishes this by identifying water demand and supply in 5-year increments over a 20-year time horizon, taking into account not only existing water supplies but also planned and/or approved water supplies not yet constructed (such as new municipal wells planned for under the adopted Lathrop Water, Wastewater, and Recycled Water Master Plan, and new surface water supplies under the approved SSJID SCSWSP).

Estimated potable water supply and demand in the City of Lathrop as described in the SB 610 analysis is shown in Table 4.11-1. Available supply for normal year and multi-dry year drought conditions are both shown in the table. Water demand associated specifically with the River Islands project is also provided. It is assumed that future water supply for the City would consist of groundwater from the City's existing and planned municipal wells and surface water deliveries from the SCSWSP. It is estimated that the River Islands project would require approximately 221 AFY in 2005 (initiation of Phase 1a), or roughly 3% of the City of Lathrop's normal year supply; approximately 2,356 AFY in 2015 (completion of Phase 1), or 19% of the City's total normal year water supply; and an estimated 5,114 AFY at full buildout in 2025, or 30% of the City's total normal year supply (Nolte Associates 2002).

Table 4.11-1
City of Lathrop and River Islands Estimated Water Supply and Demand, 2005–2025

Year	Estimated Total Water Demand in the City of Lathrop (AFY)*	Portion of Total Estimated Water Demand from River Islands (AFY)	Available Water Supply in the City of Lathrop Normal Year (AFY)		Available Water Supply in the City of Lathrop Multi-Dry Year Drought (AFY)	
2005	4,514	221	Well	2,700	Well	2,700
			Surface	5,200	Surface	4,524
			Total	7,900	Total	7,224
2010	7,891	1,237	Well	3,525	Well	3,525
			Surface	8,000	Surface	6,960
			Total	11,525	Total	10,485
2015	10,410	2,356	Well	4,350	Well	4,350
			Surface	8,000	Surface	6,880
			Total	12,350	Total	11,230
2020	13,189	3,735	Well	2,700	Well	4,000
			Surface	10,780	Surface	9,271
			Total	13,480	Total	13,271
2025	15,868	5,114	Well	5,100	Well	5,800
			Surface	11,791	Surface	10,140
			Total	16,891	Total	15,940

* Includes existing City baseline demand and anticipated additional future growth, including the Mossdale Landing, River Islands at Lathrop, and Lathrop Station projects.

Source: Nolte Associates 2002

Groundwater pumping during normal years would range from 2,700 AFY in 2005 to 5,100 AFY in 2025, with increased groundwater use during dry years when surface water deliveries are reduced. Deliveries from the SCSWSP are planned to begin in 2005 and during normal years would range from 5,200 AFY in 2005 to 11,791 AFY in 2025. Combined normal year future supply would range from 7,900 AFY in 2005 to 16,891 in 2025, and during multi-dry year drought conditions supply would range from 7,224 AFY in 2005 to 15,940 AFY in 2025. At the same time, it is projected that future water demand (i.e., proposed project plus existing and future cumulative development) would range from 4,514 AFY in 2005 to 15,868 AFY in 2025. As indicated in Table 4.11-1, future water supply available to the City during normal years and multi-drought years would be adequate to meet future water demand during all horizon years and therefore all project phases.

The potable water required to serve the proposed project would be provided, in part, by the City's municipal well system. To provide the 2,700 AFY of groundwater production assumed in the SB 610 analysis, construction of a new well, Well # 21, would be required. Up to four additional wells (#22 and #23 and Emergency Wells #1 and #2) would be required to provide the 2025 normal year deliveries (5,100 AFY) and the 2015 and beyond multi-dry year deliveries (4,000–5,800 AFY). All of these wells have been planned for under the Master Plan, and Well #21 is currently undergoing separate project-level CEQA review as part of larger City-initiated well project. Well #21 would be developed near the southwestern corner of Yosemite Avenue and McKinley Avenue in an expanded City well field planned for under the Master Plan (Exhibit 4.11-1). This well would have a capacity of 1,250 gpm, or 1,800,000 gpd, and would connect to the City's existing municipal water system. Although some remaining unused capacity exists in the City's existing municipal water system, the City has determined that development of Well #21 is required to meet the near-term incremental increase in demand for water associated with the River Islands project and other currently proposed projects (i.e., Mossdale Landing, Lathrop Station).

As indicated above, Well #21 would be an initial source of potable water for the proposed project. Upon commencement of deliveries of surface water to the City from the SCSWSP, water for the project would be provided through conjunctive use of both groundwater from Well #21 and surface water from the SCSWSP. After SCSWSP water becomes available, it is the intent of the City that SCSWSP water be used as the primary water source for the City, with Well #21 and other wells providing supplemental water during peak demand and needed water pressure for fire flows.

The City must have water available from the planned new wells and SCSWSP or the proposed project would create a demand for potable water that could not be met by existing City water production facilities. This is true for all project phases and represents a significant impact.

If sufficient municipal water were not available from the City, the project applicant could exercise its existing riparian and appropriative rights to water in the San Joaquin River, Old River, and Paradise Cut. However, this option is not currently proposed and would require construction of a water treatment facility capable of processing local surface waters. Because this approach is not proposed, further discussion of this option is not warranted.

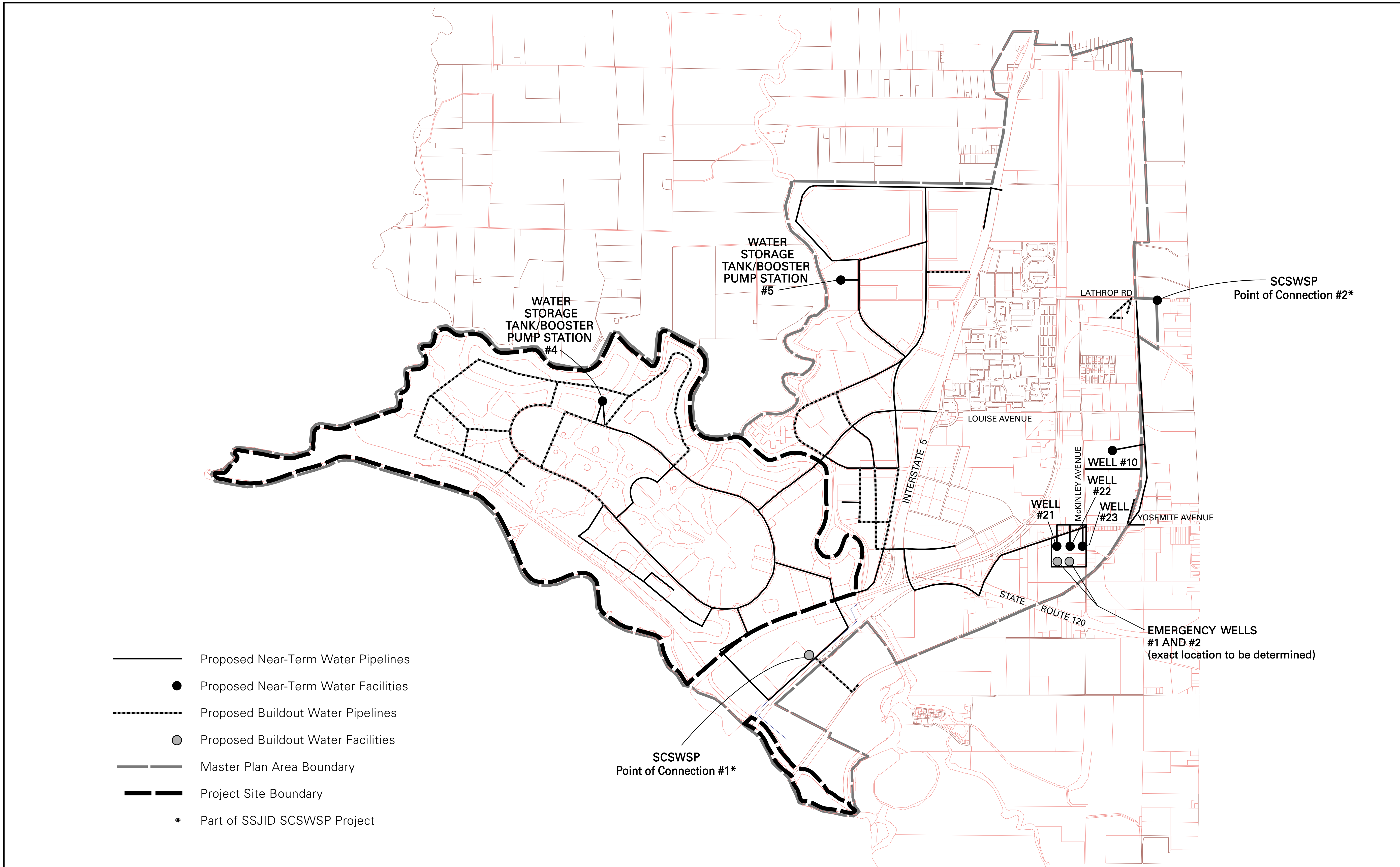
New water pipelines would be developed both along Louise Avenue and Manthey Road, with the Louise Avenue pipeline connecting to an existing City water pipeline at Louise Avenue/Harlan Road. From this point, the pipeline would follow the extended Louise Avenue/North River Islands Parkway alignment to the San Joaquin River and cross the river attached to the Bradshaw's Crossing Bridge. The new Manthey Road pipeline would extend under I-5 through a jack and bore to an existing City water pipeline at Nestle Way. It would then follow the Manthey Road right-of-way toward the project site and cross the San Joaquin River at the Manthey Bridge or UPRR bridge. These proposed pipelines would be consistent with the pipeline improvements proposed in the Master Plan, and impacts are expected to be minimal because construction would occur in existing road rights-of-way. However, potential impacts associated with development of these pipelines are addressed elsewhere in this chapter as appropriate in discussions of offsite facilities (see section 4.14, "Terrestrial Biology," and section 4.16, "Cultural Resources").

Impact
4.11-b

Public Utilities - Environmental Impacts Associated with the Development of New City Wells. *According to the Master Plan EIR, the construction and operation of planned new City wells (Wells #21-23 and Emergency Wells #1 and #2) could contribute to* ***significant*** *geotechnical, groundwater, flooding, noise, farmland, aesthetics/views, terrestrial biology, and cultural resources impacts. These impacts would be reduced to* ***less-than-significant*** *levels with implementation of the mitigation measures identified in the Master Plan EIR.*

According to the Master Plan EIR, Wells #21, #22, and #23, and Emergency Wells #1 and #2 would each consist of a well head and pump rated at 1,250 gpm, would each be a maximum of 10 feet tall, and would have a footprint and fenced area ranging from 1.0 to 1.3 acres in size. According to the Master Plan EIR, the construction and operation of these wells would result in the following potentially significant environmental effects:

- exposure of soils to erosion and loss of topsoil during construction,
- facility damage or disruption of water service as a result of seismic events and/or shrink-swell of underlying soils,
- advancement eastward of the 500 mg/l total dissolved solids (TDS) groundwater concentration front,
- localized flooding,
- construction noise,
- stationary source noise,
- conversion of State-designated farmland to urban use,
- aesthetic degradation and view blockage,
- loss of burrowing owls or active nests,
- destruction of undiscovered/unrecorded cultural resource sites, and
- exposure to preexisting listed and unknown hazardous materials contamination.



Source: Nolte Associates 2000

Proposed Master Plan Water Distribution System

EXHIBIT 4.11-1

River Islands at Lathrop
CITY OF LATHROP
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NORTH
EDAW

As indicated in the Master Plan EIR, each of the above impacts, with the exception of farmland conversion, would be reduced to less-than-significant levels with the implementation of the mitigation measures recommended in the Master Plan EIR (EDAW 2001). In addition, it is not anticipated that the construction and operation of Well #21 by itself would generate the majority of the significant environmental effects identified above before mitigation given its small size, small scale, and lack of sensitive adjacent land uses. Therefore, a less-than-significant impact would occur associated with the construction and operation of Well #21.

In accordance with the Master Plan, the City is preparing plans and a project-level CEQA analysis for a City-sponsored well project. This well project would include, but not be limited to, the development of Well #21. Any significant impacts not identified in the Master Plan EIR that may occur associated with the City-sponsored well project would be identified in the associated project-level CEQA analysis. Applicable mitigation measures from the Master Plan EIR, along with any additional required mitigation, also would be identified. This same process would be used for any additional well projects addressed in the Master Plan. See Chapter 5 of this SEIR, "Cumulative Impacts," for a description of the City-sponsored well project currently under project-level CEQA review.

Impact
4.11-c

Public Utilities - Demand for Wastewater Treatment Capacity during Phase 1a and Phase 1. *Implementation of Phase 1a and Phase 1 of the proposed project would create a demand for wastewater treatment that could not be met by existing City facilities. Development and operation of the WRP #1 Phase 1 Expansion Project would be required to provide the River Islands project with adequate treatment capacity during Phase 1a and Phase 1. This impact is considered* ***significant****.*

The proposed project would generate an estimated 269,320 gpd (0.27 mgd) of wastewater during Phase 1a and 1,588,508 gpd (1.59 mgd) during Phase 1 (based on data provided by Carlson, Barbee, and Gibson and included in Appendix K). This would represent approximately 36% and 210%, respectively, of the 0.76 mgd of wastewater currently treated by the City's municipal wastewater treatment system (i.e., WRP #1 and the Manteca WQCF) and would substantially exceed the current 100,000 gpd of wastewater capacity at WRP #1. Wastewater generated by the proposed project would be treated at the expanded WRP #1. At present, WRP #1 has inadequate treatment capacity to serve development under Phase 1a or Phase 1 of the proposed project. In addition, WRP #1 currently treats wastewater to secondary standards. The on-site land disposal of treated wastewater proposed under the River Islands project requires that project wastewater be tertiary treated and disinfected to Title 22 standards for unrestricted use. Therefore, a significant impact would occur.

As described previously, the City is preparing plans and a project-level EIR for the initial expansion and upgrade of WRP #1, consistent with the Master Plan. The WRP #1 Phase 1 Expansion Project would increase the ultimate treatment capacity of WRP #1 up to 3.6 mgd to serve various planned and existing projects and facilities in the City. Given that there would be sufficient treatment capacity at the facility to support Phase 1a and Phase 1 project demand and that the project applicant would be required to fund the project's fair share of cost for expansion of the plant based on treatment capacity to be allotted to the project, it is assumed that the project's needed capacity during Phase 1 would be provided at WRP #1.

Impact
4.11-d

<u>Public Utilities - Demand for Wastewater Treatment Capacity for Phase 2.</u> *Inadequate wastewater treatment capacity currently exists to serve Phase 2 of the proposed project. This impact is considered* ***significant****. Continued expansion of WRP #1 and/or development and operation of WRP #2 or WRP #3 would be required to provide the River Islands project with adequate treatment capacity at buildout.*

The proposed project would generate an estimated 3,647,036 gpd (3.65 mgd) of wastewater at full buildout (implementation of Phase 2) (based on data provided by Carlson, Barbee, and Gibson and included in Appendix K). Insufficient treatment capacity would be provided by the WRP #1 Phase 1 Expansion Project (3.6 mgd) to serve ultimate buildout of the River Islands project and additional development in the City (e.g., Mossdale Landing, Lathrop Station). Therefore, full expansion of WRP #1 to 6.1 mgd and/or development and operation of WRP #2 and/or WRP #3, as evaluated in the Master Plan and the Master Plan EIR, would be required for Phase 2 of the River Islands project to go forward. Insufficient wastewater treatment capacity would represent a significant impact.

Impact
4.11-e

<u>Public Utilities - Environmental Impacts Associated with the Expansion of WRP-#1 and Construction of WRPs #2 and #3.</u> *According to the Master Plan EIR, the expansion of WRP #1, construction of WRPs #2 and #3, and the potential discharges of treated wastewater to the San Joaquin River during later expansion phases could contribute to significant geotechnical, groundwater, flooding, air, odor, noise, land use, aesthetics/views, terrestrial biology, cultural resources, and emergency response impacts. These impacts would be reduced to less-than-significant levels with implementation of the mitigation measures identified in the Master Plan EIR, with the exception of odor impacts and cumulative surface water quality and fisheries impacts, which would be* ***significant and unavoidable****.*

The City's adopted Master Plan provides for expansion of WRP #1 and construction of WRPs #2 and #3 over the next 30 years to serve forecasted growth in the City, including the River Islands project and various other projects. The Master Plan calls for expansion of WRP #1 to between 0.46 mgd and 3 mgd during the near term (2001–2004) and to between 3.0 mgd and 6.1 mgd at buildout (2030), with potential disposal of the treated wastewater during the later phases accomplished through discharges to the San Joaquin River. WRP #2 would have treatment capacity of up to 3.2 mgd, and WRP #3 would have capacity to treat up to 4.5 mgd, and all or a portion of the treated wastewater from each could be discharged into the San Joaquin River. The EIR prepared for the Master Plan, and certified by the City in 2001, evaluated the impacts of the Master Plan at a programmatic level, including expansion and improvement of WRP #1 and construction of WRP #2 and #3. According to the Master Plan EIR, implementation of these actions would result in the following potentially significant environmental effects:

- exposure of soils to erosion and loss of topsoil during construction,
- facility damage or disruption of wastewater treatment service as a result of seismic events and/or shrink-swell of underlying soils,
- localized flooding,

- surface water quality (cumulative impacts),
- construction air emissions,
- odor impacts,
- construction noise,
- stationary source noise,
- land use incompatibility,
- aesthetic degradation and view blockage,
- loss of burrowing owls or active nests,
- loss of valley elderberry shrubs and the associated valley elderberry longhorn beetle,
- loss of Swainson's hawk nests and other protected raptor nests,
- loss of jurisdictional waters of the United States,
- fisheries (cumulative impacts),
- destruction of undiscovered/unrecorded cultural resource sites,
- exposure to preexisting listed and unknown hazardous materials contamination, and
- disruption of WRP operation during an emergency (power failure).

As indicated in the Master Plan EIR, most of the above impacts would be reduced to less-than-significant levels with the implementation of the mitigation measures identified in the Master Plan EIR. The three exceptions would be odor impacts and cumulative surface water quality and fisheries impacts associated with discharges to the San Joaquin River. These impacts would be significant and unavoidable (EDAW 2001). However, if Total Maximum Daily Loads (TMDLs) established by the RWQCB for the San Joaquin River (see section 4.8, "Hydrology and Water Quality") are effective in improving water quality in the river, cumulative impacts associated with surface water quality and fisheries may no longer be significant.

In accordance with the Master Plan, the City is preparing plans and a project-level EIR for initial expansion of WRP #1 (as described in section 4.11.2, "Existing Conditions"). Any significant impacts not identified in the Master Plan EIR that may occur associated with the WRP #1 Phase 1 Expansion Project would be identified in the associated project-level EIR. Applicable mitigation measures from the Master Plan EIR, along with any additional required mitigation, also would be identified.

Impact
4.11-f

Public Utilities - Demand for Recycled Water Storage and Disposal Capacity during Phase 1a and Phase 1. *The proposed project would increase the demand for recycled water storage and disposal areas. Because adequate storage and disposal areas are available to accommodate the quantity of treated wastewater to be generated by the project during Phase 1a and 1, this impact is considered* ***less than significant****.*

All of the wastewater generated by the proposed project during Phase 1a and 1 is planned to be conveyed to WRP #1 via wastewater pipelines and treated at WRP #1. Recycled water generated by this wastewater would be disposed of at facilities associated with WRP #1 as well as returned to the project site via recycled water pipelines for disposal. Impacts associated with the planned expansion of WRP #1 to allow recycled water disposal were evaluated in the Master Plan and are summarized under Impact 4.11-e. Recycled water systems proposed under the River Islands project would be designed in accordance with the Master Plan. Two connections to the City's future recycled water system are proposed, with pipeline routes following the same paths as water pipelines described under Impact 4.11-a. Recycled water deliveries to the project site would be initiated once volumes are sufficient to allow efficient use of the infrastructure (e.g., pumps and pipelines).

Assuming that recycled water volumes leaving WRP #1 would be similar to wastewater volumes entering the facility, the proposed project during Phase 1a would be expected to generate 0.27 mgd of recycled water requiring disposal. The estimated wastewater generation during Phase 1 would be 1.59 mgd. It is planned that 100% of the recycled water generated by the proposed project during Phases 1a and 1 would be disposed of at WRP #1 facilities and land disposed at the project site. Onsite land disposal would occur via use as irrigation for onsite public areas (e.g., parks, play fields, parkway strips, medians) and/or irrigation of agricultural lands in the Phase 2 area (which would not yet be developed) and/or Paradise Cut. The recycled water would be applied at agronomic rates so as to minimize percolation below the root zone and avoid ponding at the surface. During the winter months (approximately November through February), insufficient demand for irrigation water at the project site would require that a portion of this treated wastewater be stored in on-site storage ponds in the Phase 2 area and associated with WRP #1. The storage ponds would have an average depth of 9 feet and would be lined with clay or a synthetic material. To accommodate project-generated recycled water flows during Phase 1a and Phase 1, sufficient land would be set aside in the Phase 2 area to accommodate 40 acres of storage ponds and an estimated 444 acres of crop irrigation area. Some or all of the crop irrigation acreage might also be located in Paradise Cut. As public landscape areas in Phases 1a and 1 are developed and recycled water is used to irrigate these locations, the acreage of agricultural lands irrigated with recycled water may be proportionately reduced.

Because sufficient treated wastewater storage and disposal capacity would be provided on the project site and associated with WRP #1 to dispose of the treated wastewater generated by the project during Phase 1a and Phase 1, this impact is considered less than significant.

Impact
4.11-g

Public Utilities - Demand for Recycled Water Storage and Disposal Capacity for Phase 2. *Implementation of Phase 2 of the proposed project would result in an incremental increase in project-generated recycled water requiring disposal. However, insufficient area would exist at the project site to dispose of this additional recycled water, and no offsite land disposal sites have been identified. Because there is not sufficient existing recycled water disposal capacity and there would not be sufficient capacity on the project site, this impact is considered* ***significant****.*

Adequate disposal capacity would be provided at the project site and at WRP #1 facilities to dispose of 100% of the treated wastewater generated by the proposed project during Phase 1a and Phase 1 (Impact

4.8-f). However, during development of Phase 2, wastewater generation would increase while the available onsite storage and disposal area would be decreased. The proposed project would generate an estimated 3.65 mgd of recycled water at buildout (2.06 mgd more than Phase 1 conditions). At the same time, the storage ponds and agricultural lands in the Phase 2 area that would have been irrigated with recycled water would be replaced with development, thus reducing the onsite disposal area. However, agricultural lands in Paradise Cut would continue to be available for irrigation with recycled water, providing up to approximately 450 acres of disposal area.

With irrigation of agricultural lands in Paradise Cut and public landscaped areas in the RID Area, there may be sufficient land application area to dispose of recycled water generated by the proposed project. However, a water balance study has not been conducted to determine whether or not sufficient area is available. During the winter months, the recycled water must be stored because irrigation can occur only during the growing season. There would not be enough area on the project site available at full buildout to construct storage ponds sufficient to store all the recycled water generated by the proposed project. Therefore, offsite recycled water disposal and/or river discharge, as evaluated in the Master Plan and Master Plan EIR, would be required for Phase 2 of the River Islands project to go forward. Insufficient recycled water disposal capacity would represent a significant impact.

Impact
4.11-h

Public Utilities - Stormwater/Surface Runoff Management. *The proposed project would generate substantial amounts of stormwater/surface runoff through the development of roughly 2,900 acres with land uses that create impervious surfaces. However, the project includes an extensive system of parks and paseos, created wetlands, and the central lake to manage, store, and clean stormwater runoff. This system is designed to provide onsite stormwater storage and discharge capability sufficient to protect the RID Area during a 1-in-100 Annual Exceedence Probability (AEP) event (i.e., 100-year flood event). This impact is considered* ***less than significant.***

Project elements that would result in the development of impervious surfaces (e.g., housing, Employment Center, Town Center, streets, schools) cover approximately 2,900 acres of the project site. With the exception of some roads, bridges, and minor offsite features, these land uses occur almost exclusively in the River Islands Development Area (RID Area). Although the entire surface area of these land use elements would not be covered by impervious surfaces (there would be lawns, landscaping, etc.), a substantial amount of stormwater runoff would still be generated in the RID Area by the proposed project. However, as described in Chapter 3, "Description of the Proposed Project," and section 4.8, "Hydrology and Water Quality," the proposed project includes an extensive system of parks and paseos, created wetlands, and the central lake to manage, store, and clean stormwater runoff. Various analyses have been conducted to confirm the adequacy of the proposed stormwater management system to meet project requirements. These include the River Islands Interior Lake Water Budget (HSI Hydrologic System 2002a) (Appendix F) and the River Islands Preliminary Interior Hydrology and Stormwater Runoff Analysis (HSI Hydrologic Systems 2002cb) (Appendix G).

The stormwater system has been designed to provide onsite stormwater storage and discharge capability sufficient to protect the RID Area during a 1-in-100 AEP event (see Appendices F and G). Ultimately, all stormwater runoff generated in the RID Area would enter the central lake. The central lake would be managed to retain an elevation between approximately +2 and +6 National Geodetic Vertical Datum (NGVD). Water could be pumped out of the lake into Paradise Cut when lake levels exceed the desired limit, providing a mechanism beyond storage to prevent flooding in the RID Area. Because the project's planned stormwater system is sufficient to prevent flooding through storage, and pumping when necessary, this impact is considered less than significant.

Impact
4.11-i

<u>Public Utilities - Demand for Electricity and Natural Gas at Buildout.</u> *The proposed project would generate an increase in the demand for electricity and natural gas. Because PG&E is able to provide electricity and natural gas to the project, because the increase in demand for electricity and natural gas would not be substantial in relation to the existing electricity and natural gas consumption in PG&E's service area, and because the proposed electricity and natural gas improvements would be sufficient to provide the project with electricity and natural gas, this impact is considered* ***less than significant****.*

The proposed project would, at buildout (2025), increase electricity and natural gas demand in the City by approximately 1,310,000 kilowatt hours per day (kWh/day) and 32,576 cubic feet (cf) per day, respectively (Navigant 2002a, 2002b). PG&E has acknowledged that it has adequate electricity and natural gas supplies to support the proposed project without affecting service to current users (D'Alessandro, pers. comm., 2001). In addition, multiple new power plants have come on-line, and multiple other power plants are in the planning and construction stages, since the state's energy crises of early summer 2001. The LID also is able to purchase electricity from suppliers other than PG&E if desired. The energy demands to be created by the proposed project cannot be considered "substantial" in relation to the total amount of energy supplied by PG&E in its northern and central California service area (estimated in 2000 to be 81,923 million kW per day of electricity and 887 million cf per day of natural gas (Palermo 2001) and available energy expected in the future. Therefore, although PG&E has acknowledged that the River Islands project would experience the same possibility of electric service interruption attributable to a lack of statewide electric supply availability as any other development in the California Independent System Operator's jurisdiction, the project's potential impacts on existing electricity and natural gas supplies are considered less than significant.

The preferred alternative for providing electricity to the site would be to connect to the existing PG&E Manteca-Kasson 115-kV line east of I-5 in Stewart Tract. Approximately 4,500 feet of overhead lines would be used to link the 115-kV to 12-kV substations in the eastern corner of the Employment Center. The lines would be mounted on a standard pole (60–70 feet tall) system designed to meet or exceed existing codes. Electrical distribution lines on the project site would be placed underground. The preferred alternative for providing natural gas services to the River Islands project is to connect to PG&E's Louise Avenue feeder, located on the east side of I-5, on Louise Avenue, east of South Harlan Road. An underground gas distribution regulator station located approximately 1,000 feet east of I-5 is the endpoint of the feeder and the location where the source gas pipeline for the River Islands project would begin. PG&E would determine precise locations and types of connections at the design stage of the proposed project. Because the proposed electrical and natural gas utility improvements would be required to comply with all existing City, PG&E, and applicable Building Code requirements, it is anticipated that the proposed electricity and natural gas utility improvements would be sufficient to serve the proposed project. No impact would occur.

4.11.3 Mitigation Measures

No mitigation measures are provided for the following less-than-significant impacts and impacts summarized from the Master Plan.

4.11-b	Environmental Impacts Associated with the Development of New City Wells
4.11-e	Environmental Impacts Associated with the Expansion of WRP #1 and Construction of WRPs #2 and #3
4.11-f	Demand for Recycled Water Storage and Disposal Capacity during Phase 1a and Phase 1
4.11-h	Stormwater/Surface Runoff Management
4.11-i	Demand for Electricity and Natural Gas at Buildout

The following mitigation measures are provided for significant impacts.

4.11-a **Demand for Potable Water at Buildout.** No portion of the proposed project shall be occupied until sufficient multi-drought year water supply is available to serve that portion of the project site being developed and water infrastructure (e.g., pipelines) to serve the area is complete.

Implementation of Mitigation Measure 4.11-a would reduce impacts associated with potable water supplies to a less-than-significant level.

4.11-c **Demand for Wastewater Treatment Capacity during Phase 1a and Phase 1.** Occupancy of individual developments included in Phase 1a and Phase 1 shall not be permitted by the City until both adequate wastewater treatment capacity and tertiary treatment to Title 22 standards for unrestricted use are available at WRP #1 or WRP #3 to serve this development.

Implementation of Mitigation Measure 4.11-c would reduce impacts associated with demand for wastewater treatment capacity during Phase 1a and Phase 1 to a less-than-significant level.

4.11-d **Demand for Wastewater Treatment Capacity for Phase 2.** Elements of Phase 2 project development that would generate demand for wastewater treatment capacity shall not commence until both adequate wastewater treatment capacity and tertiary treatment to Title 22 standards for unrestricted use are available to serve the particular development area. It is expected that the necessary treatment capacity would require additional expansion of WRP #1 and/or construction of WRP #2 or #3.

Implementation of Mitigation Measure 4.11-d would reduce impacts associated with demand for wastewater treatment capacity during Phase 2 to a less-than-significant level.

4.11-g **Demand for Recycled Water Storage and Disposal Capacity for Phase 2.** Elements of Phase 2 project development that would generate recycled water shall not commence until storage and disposal capacity is provided to address the incremental increase in recycled water generation associated with Phase 2 development. The additional disposal capacity may be provided through either land disposal or discharge to the San Joaquin River. If land disposal is selected, buildout shall not commence until:

- sufficient acreage of storage ponds and spray fields is found for the disposal of the additional recycled water generated by the particular development area,
- infrastructure is developed to convey this additional recycled water to the storage and disposal areas,
- the storage ponds are lined,
- the application occurs at agronomic rates, and
- the off-site disposal system is operational.

If river disposal is selected, buildout shall not commence until river discharges of recycled water are permitted for expanded and/or new WRPs under the Master Plan.

Implementation of Mitigation Measure 4.11-g would reduce impacts associated with demand for recycled water storage and disposal during Phase 2 to a less-than-significant level.

4.11.4 Residual Significant Impacts

As described under Impact 4.11-c, expansion of WRP #1 and construction of WRP #2 and #3 in accordance with the Master Plan would result in significant and unavoidable odor impacts and cumulative surface water quality and fisheries impacts. However, if TMDLs established by the RWQCB for the San Joaquin River are effective in improving water quality in the river, cumulative impacts associated with surface water quality and fisheries would no longer be significant.

No other residual significant public utility impacts would occur with implementation of the recommended mitigation measures.

4.12 RECREATION

4.12 Recreation

This section describes the existing recreational facilities in the City of Lathrop and the nearby region and the impacts of the proposed project on these facilities. This section also evaluates the adequacy of the recreational facilities included as part of the proposed project in meeting the demand generated by the proposed development.

4.12.1 Regulatory Background

City of Lathrop General Plan

The Resource Management Element of the City of Lathrop General Plan (General Plan) includes several policies and standards related to recreation. The following policies are applicable to the proposed project.

Recreation Policies

> **Policy 1:** It is the policy of the City and the School District, functioning under a joint powers or other appropriate written agreement, to provide the quantity and quality of recreation opportunity necessary for individual enjoyment and to assure the physical, cultural, and spiritual benefit of recreation for all people of the community. *[This policy originally applied to the Manteca Unified School District and may be applicable to areas served by other school districts within the city.]*
>
> **Policy 4:** The range of recreation opportunities…will be provided through the development of general and specialized areas and facilities at the neighborhood and community level throughout the urban area.
>
> **Policy 7:** The City will encourage and, where appropriate, require the provision of recreation areas and facilities within residential areas and the community as a whole to meet the general and specialized needs of existing and future residents. The Recreation component of the Resource Management Element of the General Plan is intended to meet the criteria and standards required by the State Subdivision Map Act and by the Quimby Act for determining financial responsibilities of developers in meeting recreation needs of the community.

Recreation Area Types

The General Plan identifies neighborhood parks, community parks, and landscaped open space corridors (described below) as the three types of parkland that would fulfill the active and passive recreation needs of the community as described in the recreation policies. In addition to identifying these types of parkland, the General Plan recommends the provision of specialized recreational facilities, such as a senior citizen center, a public golf course, and an auditorium or theater and/or shared facilities with public schools as appropriate.

Neighborhood Parks

A neighborhood park is intended to serve the same area as an elementary school; thus, a neighborhood park is ideally created in conjunction with an elementary school. Where a neighborhood park would not be developed adjacent to a school, the park should occupy an area of between 3 and 5 acres, either free standing or in conjunction with drainage basin sites. A neighborhood park should generally be within ⅓ to ½ mile of all residences to be served by the park.

Community Parks

Community parks are designed to serve the community and may be developed in conjunction with high school facilities and/or specialized facilities. Ideally, all the community parks should be connected by open space corridors. Community parks may include or be adjacent to a sports stadium or public golf course, athletic fields, other sports facilities, family picnic areas, lawn areas, off-street parking, an auditorium or theater, a center for the elderly, or a center for teenagers.

Landscaped Open Space Corridors

A landscaped open space corridor would serve as a linkage between school and park sites, shopping areas, a civic center or cultural center, and other important activity centers in the community. The landscaped open space corridor may be a pedestrian walkway separate from auto traffic, a combined vehicle and pedestrian parkway, a buffer zone between residential and commercial or industrial areas, or a linear park that may connect with other components of the park and recreation system. Communitywide landscaped open space corridors would be publicly owned and maintained. Local facilities may be either publicly or privately owned and maintained.

The General Plan states that a landscaped open space corridor along the San Joaquin River would function as a communitywide open space corridor that may eventually link to regional facilities to the north. A recreation and open space corridor around the perimeter of Stewart Tract is also called for in the General Plan.

Provision of Recreation Areas

City Standard

The General Plan includes the following standards for the provision of neighborhood and community parkland:

- 2 acres of neighborhood parkland per 1,000 City residents and
- 3 acres of community parkland per 1,000 City residents.

The City has no standards for the provision of a landscaped open space corridor on a per capita basis. However, the General Plan has designated the location of the landscaped open space corridor described above.

WEST LATHROP SPECIFIC PLAN

The West Lathrop Specific Plan (WLSP) includes objectives to meet the goals of the City's General Plan. Specific to recreation, the WLSP includes the following objectives designed to fulfill General Plan Goal Number 3, Community Identity:

> **Objective 3B:** Provide central areas that act as focal points for community events, social gatherings and convenient shopping
>
> **Objective 3C:** Link all key activities such as schools, parks and retail with landscaped parkways or pedestrian-oriented corridors which encourage non-vehicular travel
>
> **Objective 3D:** Create ample outdoor and indoor areas for public gatherings and events that offer the chance for entertainment, education, relaxation and recreation for West Lathrop residents
>
> **Objective 3E:** Focus neighborhoods around local schools and parks that are linked along a network of non-vehicular rights-of-way
>
> **Objective 3J:** Create a West Lathrop park and open space system that is linked to citywide and capable of linkage to regional open space and trail systems

THE QUIMBY ACT

The Quimby Act was established by the California Legislature in 1965 to preserve open space and parkland in the rapidly urbanizing areas of the state. The Quimby Act allows cities and counties to establish requirements for new development to dedicate land for parks, pay an in-lieu fee, or perform a combination of the two. The Quimby Act requires a city or county to adopt standards for recreational facilities in its general plan recreation element if it is to adopt a parkland dedication/fee ordinance.

The City of Lathrop has collected Quimby Act fees since its incorporation in 1989. Before 1989, the County collected Quimby Act fees in the area and turned these funds over to the City when it was incorporated. These fees contribute to a fund that would be used to acquire properties for parkland. The City would continue to collect fees to meet the General Plan parkland requirement.

The General Plan states that in determining the amount of land dedication, land development, and/or in-lieu fee required of a developer, the requirement shall not exceed a combined standard of 5 acres per 1,000 City residents for neighborhood and community parkland.

LATHROP BICYCLE TRANSPORTATION PLAN

The Lathrop Bicycle Transportation Plan is a long-range plan for a comprehensive bikeway system in the City. This plan was developed in coordination with the San Joaquin County Regional Bicycle Master Plan, the City's General Plan, and the WLSP. The Lathrop Bicycle Transportation Plan includes goals, policies, and programs and provides direction for the development of new bikeways in the City. Bikeways are proposed in the plan that would serve the entire City, including those portions on Stewart Tract encompassing the proposed project site. Planned City bike trails would also connect to a regional bike trail system proposed by San Joaquin County linking Lathrop, Stockton, French Camp, Manteca, and Tracy (City of Lathrop 1995).

4.12.2 EXISTING CONDITIONS

CITY OF LATHROP FACILITIES

The City of Lathrop currently operates four neighborhood parks and one community park throughout the City (Wall, pers. comm., 2002). On the basis of the City's General Plan standards, the City has a deficit of 4.23 acres of neighborhood parks and 25 acres of community parks (Table 4.12-1). However, the City plans to purchase additional parkland using existing Quimby Act funds.

Table 4.12-1
Standards for Provision of Parkland

	Existing Park Acreage[1]	Existing Population[2]	General Plan Standard[3]	Park Acreage to Meet General Plan Standards[4]	Existing Deficiency (acres)
Neighborhood park	18.77	11,586	2 acres per 1,000 people	23	4.23
Community park	10.00	11,586	3 acres per 1,000 people	35	25.00
Total	28.77	--	--	58	29.23

[1] Source: Wall, pers. comm., 2002.
[2] Source: San Joaquin Council of Governments Research and Forecasting Center 2000
[3] Source: City of Lathrop 1991.
[4] Based on population rounded to nearest thousand.

The City also operates other types of recreational facilities, including a senior center and a community center.

REGIONAL RECREATIONAL OPPORTUNITIES

The project site is located in the Sacramento-San Joaquin River Delta, which has nearly 1,000 miles of navigable channels. As such, recreation in the project vicinity is generally water oriented, primarily consisting of boating and fishing. Other common activities include waterskiing, wake-boarding, sailing, operating personal watercraft (e.g., jet skis), houseboating, fishing, swimming, boat camping, and windsurfing. Land-based recreational activities in the Delta include hunting, camping, picnicking, walking, bicycling, viewing and photographing wildlife, sightseeing, and attending festivals and special events (DPC 2002).

The existing recreational opportunities in the project vicinity primarily involve the use of the San Joaquin River and Old River. Except for areas near marinas and other boat access points, segments of these rivers in the project vicinity provide boating opportunities that are not limited by speed restrictions. Boat access to these waterways nearest the project site is provided by two public and two private marinas (described below). Shore fishing is also popular in the project area along the rivers, as well as the Paradise Cut channels.

San Joaquin County operates two recreational facilities in the vicinity of the project site. Across the San Joaquin River, opposite the project site, is the 3.7-acre Mossdale Crossing County Park, which provides boat launching facilities, including a two-lane boat ramp with floating dock. This park also includes a picnic area and parking. Further north along the San Joaquin River is the 9.85-acre Dos Reis County Park, which features boat launching facilities with a floating dock, full hookup campsites, children's play area, picnicking, and fishing access to the San Joaquin River.

The Mossdale Marina is a private houseboat marina with 32 boat berths on the west side of the San Joaquin River near the Manthey Road Bridge. The Haven Acres Marina, which is located along the San Joaquin River north of the project site and past the Dos Reis County Park, is another nearby private facility that offers boat access to the San Joaquin River; it has 10 boat berths (DPC 2002).

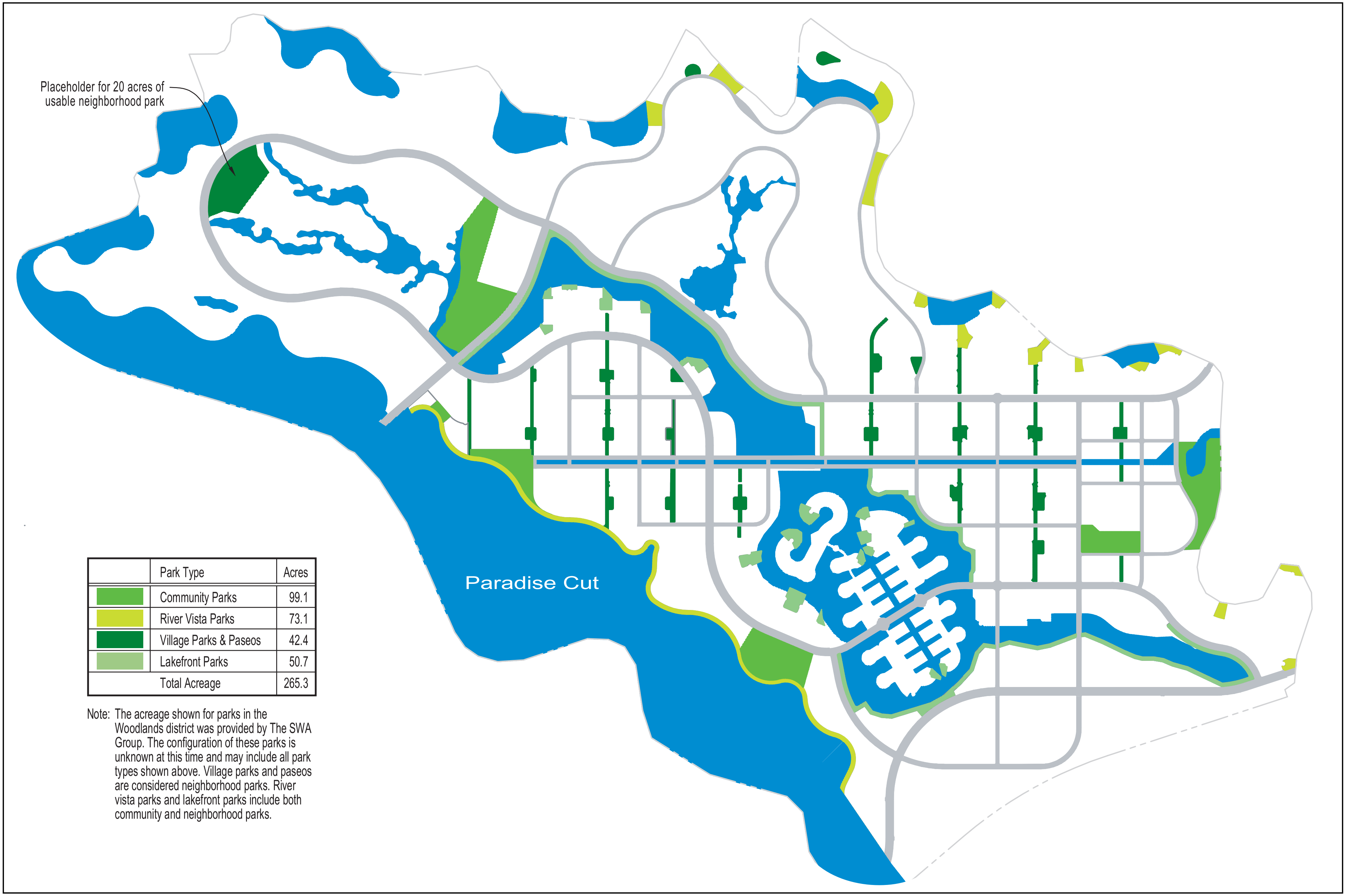
The Grant Line Canal, located approximately 1.5 miles west of the project site, is a popular site for waterskiing (DWR 2002). From the project site, Grant Line Canal would be accessed via Old River and other waterways.

An existing bike trail passes near the project site, connecting the City of Lathrop to a regional bike trail that parallels Interstate 205 (I-205). The bike trail begins in East Lathrop at Howland Road near State Route 120 (SR 120), passes under SR 120 and I-5, crosses over the Manthey Road Bridge onto Stewart Tract, continues along Manthey Road across Stewart Tract and Paradise Cut, and then parallels I-205. No other identified bike trails or routes cross the proposed project site. As stated previously, the Lathrop Bicycle Master Plan envisions a comprehensive bikeway system in the City that would also connect to a regional bike trail system proposed in the San Joaquin County Regional Bicycle Master Plan. The bike trail described above would be part of the local and regional system.

4.12.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

The evaluation of recreational resources is based on a comparison between existing and planned future recreational facilities (including open space) and relevant City of Lathrop General Plan policies to determine whether the existing and proposed facilities would be adequate to meet the demand created by the proposed project. In general, demand for recreational resources was estimated based on General Plan standards for parkland acreage relative to population size. The number of residents on the project site was estimated based on per-dwelling-unit population generation factors provided by the City. Parklands, trails, open space, waterways, and several other recreational features included as part of the proposed project can be seen in Exhibit 4.12-1 and are the focus of this analysis. This analysis does not address various public and commercial recreational facilities, such as community centers, movie theaters, gymnasiums, and bowling alleys, which can be expected to be developed as part of the proposed project but which have not been specifically identified at this time. Because temporary impacts could occur if recreational facilities are not completed concurrently with the residential developments that create the



	Park Type	Acres
	Community Parks	99.1
	River Vista Parks	73.1
	Village Parks & Paseos	42.4
	Lakefront Parks	50.7
	Total Acreage	265.3

Note: The acreage shown for parks in the Woodlands district was provided by The SWA Group. The configuration of these parks is unknown at this time and may include all park types shown above. Village parks and paseos are considered neighborhood parks. River vista parks and lakefront parks include both community and neighborhood parks.

Source: Data provided by Carlson, Barbee & Gibson 2002

Parks of the River Islands Project

EXHIBIT 4.12-1

River Islands at Lathrop
CITY OF LATHROP
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demand for such facilities, an evaluation of project phasing is included. The impact of the proposed project on water-related recreational opportunities in the project vicinity is also evaluated. A project-level analysis of issues related to recreational resources was conducted for both Phase 1 and Phase 2 rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. Information regarding the demand for and availability of recreational resources during Phase 2 is at a sufficient level of detail to allow equal levels of analysis for both project phases.

PRIOR WLSP EIR ANALYSIS

The analysis of recreation-related impacts in the 1996 WLSP Environmental Impact Report (EIR) focused almost exclusively on a proposed 200- to 300-berth marina on the San Joaquin River. The WLSP EIR states that the economic and environmental feasibility of the proposed marina was too uncertain at the time of document preparation to permit a full evaluation of impacts. Site-specific evaluation was postponed until a specific development proposal for the marina was submitted to the City of Lathrop for review. Increases in recreational opportunities associated with development of the proposed theme parks and other facilities were not quantified.

Several differences between the River Islands project and the project analyzed in the WLSP EIR alter the evaluation of potential impacts on recreational resources, most notably the absence of theme parks and similar recreational facilities from the River Islands project and an increase in the number of residents under the proposed project, affecting demand for recreational facilities. Therefore, an independent analysis of recreational resources is included in this SEIR.

THRESHOLDS OF SIGNIFICANCE

The River Islands project would result in a significant impact on recreational resources if it would:

- increase demand on existing neighborhood and community parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated;
- include new recreational facilities, or require the construction or expansion of existing recreational facilities, which might have a substantial adverse physical effect on the environment; or
- substantially restrict or reduce the availability or quality of existing recreational opportunities in the project vicinity.

IMPACT ANALYSIS

Impact
4.12-a

<u>Recreation - Demand for Neighborhood and Community Parks.</u> *Residential development proposed for Phase 1a would require 12.8 acres of parkland to meet the General Plan standard of 5 acres of parkland (2 acres of neighborhood park and 3 acres of community park per 1,000 residents). Phase 1a development with a nontraditional school system would include 38.2 acres of parkland. The completion of Phase 1 would increase the demand to 62 acres, and the project would provide 98.4 acres by the completion of Phase 1. Completion of*

Phase 2 would increase the total demand to 153.3 acres, and the project with a nontraditional school system would provide 265.3 acres in total. As such, development of the project with a nontraditional school system would create parkland in excess of anticipated demand. Development of the project with a traditional school system would result in 272.9 or more acres of parkland, which would also exceed demand established by the General Plan standards. The proposed project therefore would be expected to alleviate the demand on existing neighborhood and community parks. No substantial physical deterioration of existing parkland would result. This impact is considered ***beneficial.***

The River Islands project proposes a system of parks and open space. When viewed as a whole, the system meets the recreation services demand that would be created by the residents generated by the project. Overall, the park and open space dedication exceeds the Quimby Act requirements even though most neighborhood park and community park parcels identified are individually smaller than the General Plan identifies as acceptable.

Phase 1a of the proposed project would include 800 single-family housing units, which would generate 2,560 new residents. On the basis of the City's General Plan standards, the new residents in Phase 1a would require 5.12 acres of neighborhood park and 7.68 acres of community park, for a total of 12.8 acres of parkland. Under the nontraditional school system discussed in Chapter 3, Phase 1a would include 38.2 acres of parkland throughout the Phase 1a development area, and all the Phase 1a residential units would be located within ⅓ mile of at least one of these parks. Parkland under the proposed project can be seen in Exhibit 4.12-1. Based on their size and the facilities provided, the approximately 18-acre Lathrop Landing Park in Phase 1a would be considered a community park, and the remaining roughly 20 acres of parkland would be considered neighborhood parks.

Phase 1a development would include neighborhood and community park acreage in excess of anticipated demand. Morever, the proposed neighborhood and community parks would assist in fulfilling the existing deficit of these park types in the City. This would be expected to reduce demand on, and therefore increase availability of, these existing facilities. Thus, with regard to neighborhood and community parks, implementing Phase 1a of the proposed project would result in beneficial impact.

The General Plan states that neighborhood parks should be a minimum of 5 acres in size if they stand alone and a minimum of 3 acres in size when associated with a school. The Parks and Recreation Commission has agreed that the proposed River Islands parks that are less than 3 acres would qualify as neighborhood parks if the system components (a singular park or several small parks in a geographic area) meet the recreational need of the population in each individual neighborhood the park is designed to serve. Qualifying components include village parks, lakefront neighborhood parks, and approximately half of the river vista parks (Wall, pers. comm., 2002).

Community parks are defined in the General Plan as facilities of 20 acres or greater. The River Islands community parks generally contain less than the defined acreage but as a system are designed to meet the recreational needs and intent of purpose.

a) Three of the community parks would be adjacent to K-12 schools or high schools. These parks (Town Center, Paradise Cut, Central Lake), each with approximately 10 acres of identified parkland, would meet the sports and athletic needs of the community if access and joint use are provided for through an agreement with the school district that allows true community access to fields, sports facilities, and parking on (additional) acreage owned by the school district. Please note: If these parks are divested from an adjacent magnet or high school, a minimum of 15 acres would be required to meet the community park recreation need/acreage requirement for these facilities.

b) Two community parks, Lathrop Landing and Paradise Cut, are specifically designed to meet the space needs for community events and large family gatherings. These facilities are designed to be focal points in the community and would provide facilities for activities such as community concerts and farmer's markets.

c) Several linear lake front parks and river vista parks containing recreational trails, picnic tables, and open space for passive recreation activities would be located along sections of the lake and river in areas that are not associated with a particular neighborhood but that are accessible to the community and designed to be used by residents and visitors. This acreage would be considered for community park credit.

When viewed as a system, the park acreage outlined in the River Islands project generally satisfies the intent of the Recreation Element of the General Plan; therefore, the impact is not significant.

By the completion of Phase 1, there would be 3,231 single-family residential units and 829 multifamily residential units on the project site, which would generate an estimated 12,412 new residents. Based on the City's General Plan standards, the new residents on the project site by the completion of Phase 1 would generate a demand for 24.8 acres of neighborhood park and 37.2 acres of community park, for a total of 62 acres of parkland. Under the nontraditional school system discussed in Chapter 3, 98.4 acres of parkland would be developed by completion of Phase 1: the same 18 acres of Lathrop Landing Park developed in Phase 1a, 10 acres of the Town Center Community Park associated with the school campus, and 70.2 acres of other community and neighborhood parkland on the project site (including the 20 acres developed during Phase 1a).

"Other parkland" includes portions of the Lake Front Linear Park and River Vista Linear Park that would provide recreational opportunities on a community level and would be considered community parks. "Other parks" also includes smaller parks that would serve the local residents and may be considered neighborhood parks. All of the residences would be within ⅓ mile of these parks. As such, implementing Phase 1 would result in park acreage in excess of anticipated demand. This would result in a beneficial impact regarding neighborhood and community parkland under the same mechanism as described for Phase 1a.

By the completion of Phase 2, there would be 7,971 single-family residential units, 1,400 active adult housing units, and 1,629 multifamily residential units on the project site, generating approximately 31,680 total residents at buildout. On the basis of the City's General Plan standards, the completion of

Phase 2 would generate a demand for 63.4 acres of neighborhood park and 95 acres of community park, for a total of 158.4 acres of parkland. By the completion of Phase 2, a total of 265.3 acres of parkland would be developed on the project site, including the 18-acre Lathrop Landing Community Park, 10-acre Town Center Community Park, 38.9-acre Woodlands Community Park, 20-acre Paradise Cut Community Park, and 163.5 acres of other parkland, including linear parks and neighborhood parks of various types. All of the residences would be within ⅓ mile of some parkland. As such, at buildout of the proposed project with a nontraditional school system, neighborhood and community park facilities would exceed demand. More acres of parkland would be provided with a traditional school system than with a nontraditional school system. As such, development of the project under either the traditional or nontraditional school system would satisfy and exceed the General Plan requirements for parkland.

As described in the discussion of Phase 1a, this excess of available parkland would be expected to alleviate demand on, and therefore increase availability of, existing parkland in the City of Lathrop. Therefore, the proposed project would result in a beneficial impact relative to parkland.

Impact
4.12-b

Recreation - Reduced Recreational Boating Opportunities. *The proposed project would construct numerous new docks along the San Joaquin River and Old River that would require establishment of new areas with boat speed limits near the project site, thus limiting some recreational boating opportunities (e.g., water skiing). However, overall the proposed project would provide additional public access to boating facilities in the project vicinity and increase recreational opportunities. This impact is considered* ***less than significant.***

The proposed project would include docks for up to 921 boats along the exterior water system: 200 in Paradise Cut, 356 in back bays, and 365 along the San Joaquin River and Old River (Exhibit 3-8). The development of many of these facilities would require the establishment of "no-wake zones" (i.e., restricted-speed areas) near the docks. No-wake zones generally extend 200 feet from the edge of a marina, dock, or piers to prevent wake damage to these facilities and the shoreline. Therefore, activities such as waterskiing and wakeboarding, which currently can occur on the San Joaquin River and Old River adjacent to the project site, would no longer be permitted in these areas.

Because there is currently no boat access to Paradise Cut, placing speed restrictions to protect docks in this area would not reduce recreational opportunities relative to the existing condition. Speed restrictions on the San Joaquin River and Old River would not be needed to protect docks in back bays because the levee remnants associated with the back bays would block boat wakes and prevent them from reaching the docks. Therefore, speed restrictions would be required only along river segments where the 365 individual docks along the San Joaquin River and Old River are proposed (Exhibit 3-8). There would be areas between the river segments with docks where speed restrictions would not be necessary; however, they would not be long enough to allow water skiing or similar activities. Therefore, although speed restrictions may not be applied to the entire river shoreline adjacent to the proposed project (approximately 8.5 miles), recreational opportunities would be limited along this entire area. However, watercraft could still be used in the San Joaquin River and Old River within navigable distance from the project site. Thus, the project would not preclude the use of watercraft in the project vicinity (Walters, pers. comm., 2002).

Some of the back bays and parks proposed in the project design would include boat launching facilities for public use. These facilities would substantially increase the accessibility of the offsite waterways to recreational activities. Furthermore, the Paradise Cut channel would be deepened and widened, expanding the area available for recreational watercraft.

The internal project lakes also would provide new boating opportunities for rowboats, paddleboats, electric boats, small sailboats, and similar small watercraft. Most of the private lots with lake frontage would have docks where a small boat can be stored. One dock, associated with a lakefront park facility, is also planned. In total, the internal lake would allow berthing of up to 514 boats.

Overall, the project would increase boating-related recreational opportunities in the project vicinity. The proposed development would substantially increase the number of private and public boat launching facilities and docks, as well as extend and widen the navigable channels in Paradise Cut. According to the California Department of Boating and Waterways, capacity limitations of existing boat launch facilities is usually the limiting factor on boating opportunities (Johnson, pers. comm., 2002). Although new watercraft speed restrictions would be required near the proposed docks along the San Joaquin River and Old River, non-speed-restricted use of watercraft would be available elsewhere in the project vicinity, including the Grant Line Canal. Because boat speed restrictions would be instated in a relatively small area of the Delta and new boating-related recreational opportunities would be provided as part of the proposed project, impacts associated with reductions in available area for waterskiing, wakeboarding, and similar recreational activities are considered less than significant.

Impact
4.12-c

Recreation - Consistency with Open Space Designation. *The General Plan designates a network of landscaped open space corridors on the proposed project site. The project includes habitat restoration, parks, and landscaped parkways in most of these areas and expands the network in other locations on the project site (i.e., landscaped areas along the internal lakes and an extensive network of bicycle and pedestrian trails). As such, the project would exceed open space requirements in the General Plan, enhancing the availability of recreational opportunities in the project vicinity, resulting in a* ***beneficial*** *impact.*

The City's General Plan gives an Open Space designation to Paradise Cut and the shoreline of Stewart Tract. In addition, the General Plan gives an Open Space designation, in the form of landscaped parkways, to the major roadways extending from Bradshaw's Crossing bridge to Paradise Cut. As discussed above, these areas are described in the General Plan as landscaped open space corridors.

The proposed project includes an internal two-level looped trail system that provides access to virtually all the project districts. The core of the system is the Main Loop, a bicycle and pedestrian trail that would be separated from vehicular traffic for most of its length. In addition, the project proposes landscaping along all the major roadways, including those that extend to Bradshaw's Crossing bridge and Paradise Cut. Furthermore, these roadways would be combined with bicycle trails and pedestrian walkways that would provide access on a communitywide basis, as shown in Exhibit 3-9. As such, the project would improve access to recreational opportunities and would be considered consistent with the Open Space designation.

The General Plan calls for a recreation and open space corridor around the perimeter of Stewart Tract. Under the proposed project, to provide privacy for waterfront residents in natural areas along the levees, the proposed trail system would not include a continuous loop around the levee/high-ground corridor system. However, the proposed project's expanded internal system would connect to existing and planned trails in Lathrop and surrounding areas via pedestrian/bicycle lanes incorporated into project bridges over the San Joaquin River. The proposed open space areas along the San Joaquin River would consist of landscaped levee outboard slopes (development of which would be restricted with an easement), river edge riparian habitat, and developed parks. Formal pedestrian access to the river would be provided by the parks, and passive access would be offered on the river edge areas. Although the proposed residences and commercial areas would obstruct some views of the San Joaquin River from the project site, public visual access would be provided at the parks and some roadway segments. Although the proposed shoreline development along San Joaquin River would not strictly follow the General Plan prescription of a recreation and open space corridor around the perimeter of Stewart Tract, it would still provide multiple opportunities for public visual, pedestrian, and recreation access to the San Joaquin River. For the purpose of this analysis, it is determined that the proposed development along the San Joaquin River would still allow for increased availability of recreational opportunities along the river and would be consistent with the General Plan's Open Space designation.

The shoreline of Old River is also designated for Open Space by the General Plan. The shoreline of Old River would be developed in a manner similar to the way the San Joaquin River would be developed, as described above. Given these proposed open space uses and the trail system, the proposed development along Old River also would allow for increased availability of recreational opportunities in this area and would be consistent with the General Plan designation.

Because the proposed project would be consistent with the General Plan regarding landscaped open space corridors and would increase the availability of recreational opportunities along the San Joaquin River, along Old River, and in the River Islands Development Area via the proposed trail system, this impact is considered beneficial.

4.12.4 MITIGATION MEASURES

No mitigation measures are necessary for the following beneficial or less-than-significant impacts.

4.12-a	Demand for Neighborhood and Community Parks
4.12-b	Reduced Recreational Boating Opportunities
4.12-c	Consistency with Open Space Designation

4.12.5 RESIDUAL SIGNIFICANT IMPACTS

No residual significant impacts on recreation resources would occur.

4.13 AGRICULTURAL RESOURCES

4.13 AGRICULTURAL RESOURCES

This section describes the existing agricultural resources, applicable regulations, and potential impacts of the River Islands project on agriculture. Sufficient detail is provided in this section to analyze issues related to agricultural resources at a project level for both Phase 1 and Phase 2 of the proposed project.

4.13.1 REGULATORY BACKGROUND

The following regulations, policies, and programs apply to agricultural resources in the River Islands project area.

FEDERAL FARMLAND PROTECTION POLICY ACT

The Natural Resources Conservation Service (NRCS), a federal agency in the U.S. Department of Agriculture (USDA), is the agency primarily responsible for implementing the federal Farmland Protection Policy Act (FPPA). The purpose of the FPPA is to minimize federal contributions to the conversion of farmland to nonagricultural uses by ensuring that federal programs are administered in a manner compatible with state government, local government, and private programs designed to protect farmland. The FPPA established the Farmland Protection Program (FPP) and the Land Evaluation and Site Assessment (LESA) system, which are discussed below in further detail.

NRCS administers the FPP, which is a voluntary program that provides funds to help purchase development rights to keep productive farmland in agricultural uses. The program provides matching funds to state, local, or tribal government entities and nongovernmental organizations with existing farmland protection programs to purchase conservation easements. Participating landowners agree not to convert the land to nonagricultural use and retain all rights to use the property for agriculture. A minimum of 30 years is required for conservation easements, and priority is given to applications with perpetual easements. NRCS provides up to 50% of the fair market easement value (NRCS 2002).

The LESA system helps state and local officials make sound decisions about land use and accurately ranks lands for suitability and inclusion in the FPP. LESA evaluates several factors, including soil potential for agriculture, location, market access, and adjacent land use. These factors are used to rank land parcels for inclusion in the FPP based on local resource evaluation and site considerations (NRCS 2002).

CALIFORNIA LAND CONSERVATION ACT (WILLIAMSON ACT)

The Land Conservation Act, administered by the California Department of Conservation (CDC), was enacted when population growth and rising property taxes were recognized as a threat to the viability of valuable farmland in California. John Williamson authored Assembly Bill 2117 in 1965, which proposed developing a contract between landowners and local governments to voluntarily restrict development on property in exchange for lower tax assessments. The originators of the act conceived a strategy for local governments to protect open space and agricultural lands while integrating long-term planning and growth patterns.

Under a Williamson Act contract, the property owner is guaranteed that the property would be taxed according to its potential agricultural income, as opposed to the maximum valued use of the property, such as for residential development. The State of California passed Article 13, which allows Williamson Act contracts to be used for recreational, scenic, and natural resource areas in addition to crop production. Contracts are entered for a 10-year period and can be terminated only by a cancellation or nonrenewal.

Cancellation involves an extensive review and approval process, in addition to a payment of fees of up to 12.5% of the property value. Under a nonrenewal, a notice is filed by the property owner, after which the 10-year contract expires over time. The nonrenewal allows for tax rates to gradually increase over the remainder of the contract, reaching the market value rate by the end of the term (CDC 2001). Subdivision of lands under Williamson Act contracts is limited to a minimum of 10-acre parcels and must incorporate a 200-foot setback from incompatible adjacent uses (CDC 2001).

Since the early 1980s, approximately 16 million acres of land statewide have been enrolled under Williamson Act contracts (CDC 2001). For the 1998 tax year (the most recent data available), San Joaquin County had 543,549 acres of farmland under Williamson Act contracts, including both continuing contracts and nonrenewals. This amount is 4,703 fewer acres (1%) than the previous year. The CDC estimates that in 1999, San Joaquin County had 548,252 acres of land under Williamson Act contract (CDC 2001).

CALIFORNIA IMPORTANT FARMLAND INVENTORY SYSTEM AND MAPPING AND MONITORING PROGRAM

As discussed above, the LESA system under the FPP is used for ranking land for inclusion in the FPP. The LESA system classifies land based on 10 soil and climatic characteristics. The CDC augmented that program in 1980 by initiating a system of inventorying, mapping, and monitoring the acreage of farmland in California. The CDC inventory system was designed to document how much agricultural land in California was being converted to nonagricultural land or transferred into Williamson Act contracts. The CDC classifications in the Important Farmland Inventory System are described below:

> Prime Farmland - Land that has the best combination of features for the production of agricultural crops
>
> Farmland of Statewide Importance - Land other than Prime Farmland that has a good combination of physical and chemical features for the production of agricultural crops
>
> Unique Farmland - Land of lesser quality soils used for the production of the state's leading agricultural cash crops
>
> Farmland of Local Importance - Land that is of importance to the local agricultural economy
>
> Grazing Land - Existing vegetation that is suitable to grazing
>
> Urban and Built-up Lands - Occupied by structures in density of at least one dwelling unit per 1.5 acres

Land Committed to Nonagriculture Use - Vacant areas; existing lands that have a permanent commitment to development but have an existing land use of agriculture or grazing lands

Other Lands - Does not meet criteria of remaining categories (CDC 2001)

Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance are often described together under the term "Important Farmland."

State Farmland Security Zones

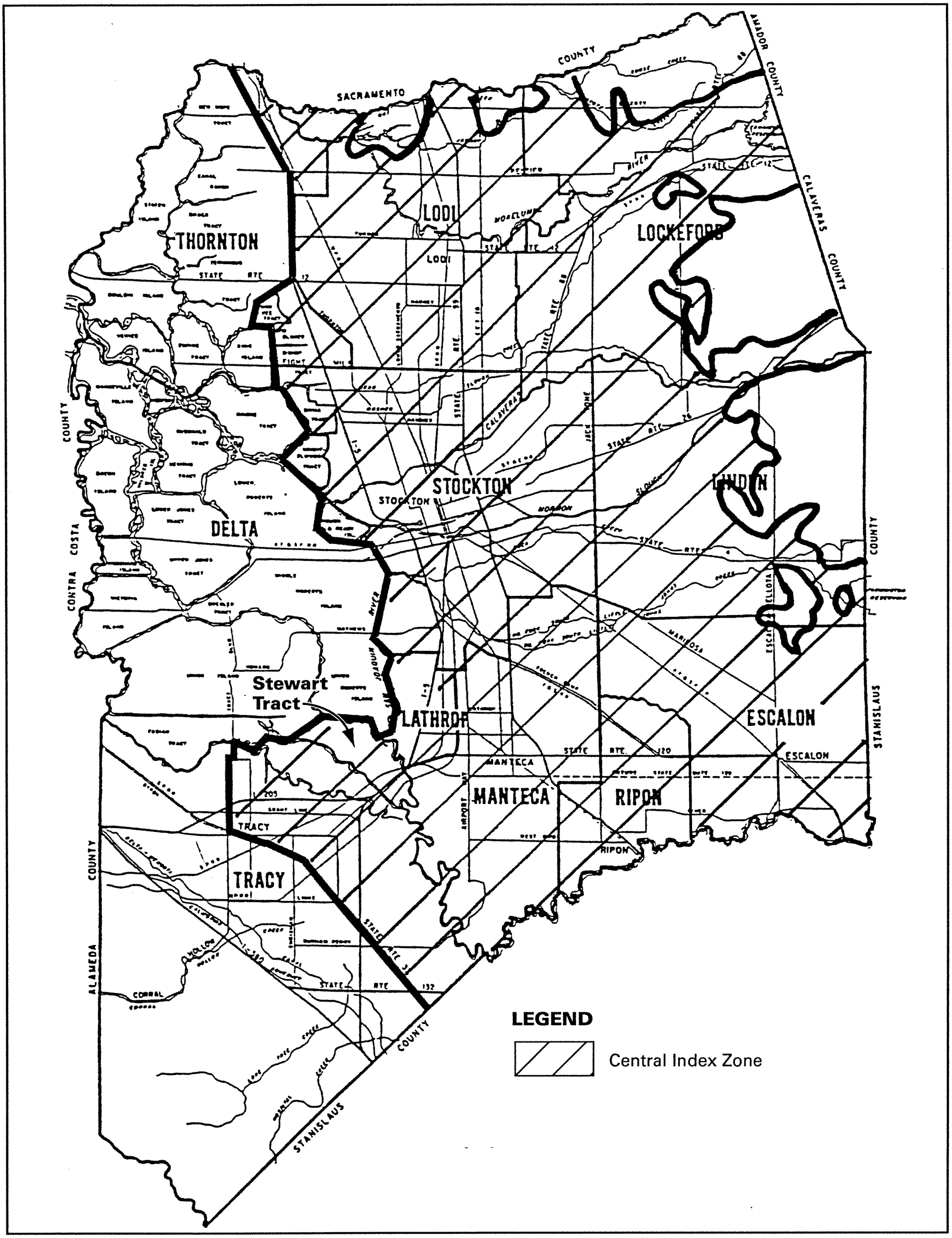
Farmland Security Zones (FSZs) were established by the CDC with the same intent as Williamson Act contracts. An FSZ must be located in an Agricultural Preserve (area designated as eligible for a Williamson Act contract) and designated as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance. Agricultural and open space lands are protected for a minimum of a 20-year term under an FSZ designation and receive an even greater property tax reduction than a Williamson Act valuation. Land protected in an FSZ cannot be annexed by a city or county government or school district (CDC 2001).

An FSZ can be terminated through a nonrenewal or cancellation. The nonrenewal allows for a rollout process to occur over the remainder of the term of the contract, where the tax rates would gradually rise to the full rate by the end of the 20-year term. A cancellation must be applied for and approved by the director of the CDC, and specific criteria must be met. The cancellation must be in the public interest and consistent with the Williamson Act criteria (CDC 2001). If a cancellation is approved, a payment of fees equal to 25% of the full market value of property must be paid (CDC 2001).

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan

The San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) provides comprehensive measures for compensation and avoidance of impacts on various biological resources and habitats, including agricultural land. One of the primary goals of the SJMSCP is to preserve productive agricultural land that is compatible with protecting and preserving lands with biological resources and habitat. Conservation lands under the SJMSCP are anticipated to be acquired, in large part, through the purchase of conservation easements on agricultural lands that would allow the landowner to retain ownership of the land and continue agricultural operations. The SJMSCP predicts that the ratio of conservation easements to fee title lands under the SJMSCP would be approximately 90% conservation easements and 10% fee title lands (San Joaquin County 2000).

Funds for purchasing easements are collected from project proponents through development fees calculated on an acre-by-acre basis. For each acre of open space, wildlife habitat, or agricultural land that is converted to development, the proponent pays a fee to the San Joaquin Council of Governments (SJCOG), which administers the SJMSCP. The SJMSCP designates index zones in San Joaquin County. When open space conversions occur in an index zone, the compensation preserve typically must be located in the same zone. The River Islands project is located in the Central Index Zone (Exhibit 4.13-1).



Source: EDAW 2002

SJMSCP Central Index Zone

EXHIBIT 4.13-1

River Islands at Lathrop
CITY OF LATHROP
G 1T013.01 10/02

0 2.5 5 MILES

NORTH

EDAW

Potential compensation preserves identified in this index zone and at or near the project site include Tom Paine Slough below its confluence with Old River and Paradise Cut (San Joaquin County 2000).

CITY OF LATHROP RIGHT-TO-FARM ORDINANCE

The City of Lathrop Agricultural Land Preservation Ordinance, known as the Right-to-Farm Ordinance, was adopted in 1991 to conserve and protect agricultural land in the City and protect agricultural landowners from nuisance complaints related to cultivation, irrigation, spraying, fertilizing, and other activities related to normal agricultural operations. A disclosure statement is required whenever adjacent property is sold or building permit applications are submitted, notifying the buyer of adjacent agricultural land and possible discomforts related to agricultural operations (City of Lathrop 2001). The focus of the ordinance is to reduce the loss of agricultural resources in the City by clarifying the circumstances under which agricultural operations may be considered a nuisance.

CITY OF LATHROP GENERAL PLAN

The Resource Management Element of the General Plan contains four agricultural land policies, two of which may be relevant to the proposed project.

> **Policy 3:** The protection of agricultural lands outside the three sub-plan areas shall be reinforced by firm policies of the City to not permit the extension of sewerage and water services to such lands.

> **Policy 4:** The City, the County, and affected landowners should develop a comprehensive approach to the cancellation of Williamson Act contracts on lands needed for early phases of urban development. Projects that are intended to take more than five years to complete shall be phased to allow agricultural operations to continue as long as feasible on lands to be developed after five years.

The General Plan also includes several phasing policies specific to development planned on Stewart Tract. The following policy is applicable to agricultural resources on the proposed project site.

> **Policy 3:** All development phasing shall be undertaken to avoid the premature conversion of agricultural land to urban use, and to avoid conflicts with existing farming operations.

WEST LATHROP SPECIFIC PLAN

Generally, discussions of the regulatory background related to agricultural resources evaluate zoning designations and highlight proposed zoning changes from agricultural uses to development. However, the approved West Lathrop Specific Plan (WLSP) provides development zoning designations for the project site, although agricultural operations are continuing. The WLSP adopted various land use zoning designations for development, including Recreation Commercial (C-REC), Regional Commercial (CR), Recreation Residential (REC-RES), and Mixed Use (MU). The Paradise Cut parcel is currently zoned as Resource Conservation/Open Space (RCO) (City of Lathrop 1996). Although development land use designations would differ for the River Islands project, for the purposes of converting agricultural land to development, the proposed project is generally consistent with the zoning identified in the WLSP. For a more specific discussion of zoning designations in the WLSP and for the proposed project, please refer to section 4.2 of this SEIR, "Land Use."

4.13.2 Existing Conditions

Crop Production and Farmable Land

The River Islands project site, in the area known as West Lathrop, is located on Stewart Tract, an island in the Sacramento-San Joaquin River Delta. Agricultural lands located on the project site are used to produce a variety of crops, including melons, tomatoes, alfalfa, corn, and safflower. Agricultural lands on the site cover approximately 4,645 acres. This includes both the River Islands Development Area (RID Area) and the Paradise Cut Conservation Area (PCC Area), but excludes the existing levee acreage. There are no agricultural lands in the Upper Paradise Cut Improvement Project Area (PCIP Area). Of the 4,645 acres of agricultural lands, 4,096 acres on the project site were planted in various types of crops in 2001. Table 4.13-1 displays the acreage and crop types grown on the project site in 2001. The remaining 549 acres is considered nonfarmable land consisting of roads, houses, farm structures, channels, and other facilities on the project site. Therefore, approximately 88% of the gross acreage is farmed.

Data on crop production in the RID and PCC Areas were available as a whole, but not for the individual areas. Therefore, exact acreages of farmable land in each area could not be determined from the crop data. It is reasonable to assume that the 88% farmed acreage to gross acreage ratio calculated above for the combined RID and PCC Areas could be applied to each individual area to determine the farmable acreage for each. The RID Area alone consists of approximately 4,115 gross acres. Therefore, it is estimated that roughly 3,620 acres of farmable land occurs in this area (4,115 acres x 88%). Using this same methodology, roughly 615 acres of farmable land occurs in the PCC Area.

Of the approximately 4,115 gross acres in the RID Area, the CDC has designated the entire area as agricultural land, with roughly 3,815 acres identified as Prime Farmland and 300 acres as Farmland of Statewide Importance (Exhibit 4.13-2). The CDC mapping is done on a broad scale; therefore, smaller unfarmable features, such as roads, levees, and buildings, are included in the agricultural land designations. In the PCC Area, roughly 670 acres are designated as Prime Farmland, 8 acres are considered Farmland of Statewide Importance, and 22 acres are labeled as Other Land. The Other Land consists of riparian, marsh, and floodplain areas associated with Old River. The entire PCIP Area is included in the Other Land category.

In 2000, it was estimated that 630,990 acres of Important Farmland was available in San Joaquin County: 423,158 acres of Prime Farmland, 93,846 acres of Farmland of Statewide Importance, 57,977 acres of Unique Farmland, and 56,009 acres of Farmland of Local Importance (CDC 2002). Therefore, the RID and PCC Areas comprise less than 1% of the Important Farmland in the County; although they do contain slightly more than 1% of the Prime Farmland. Over the past decade, the availability of Important Farmland in San Joaquin County has been consistently declining by small increments from year to year, primarily because of conversions to urban and other developed uses. Table 4.13-2 identifies the acreages of important farmland in San Joaquin County calculated by the CDC from 1992 through 2000. It should be noted that declines have been greatest for Prime Farmland and Farmland of Statewide Importance. Designation of new areas as Unique Farmland and Farmland of Local Importance has resulted in net increases for these categories between 1992 and 2000.

Table 4.13-1
Acres by Crop Grown in 2001 on the RID and PCC Areas

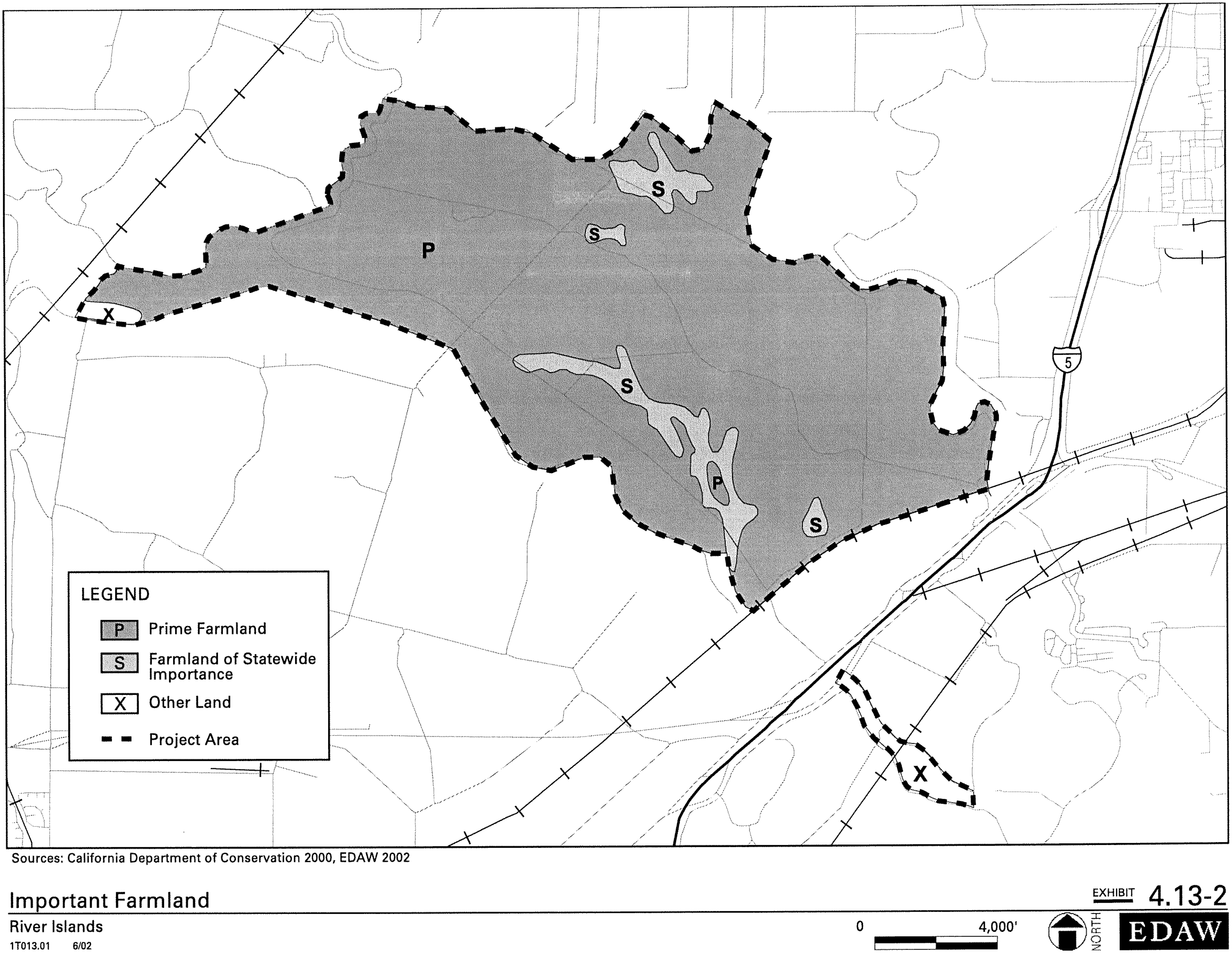
Crop	Acreage in RID and PCC Areas
Alfalfa	1,454
Melons	1,099
Tomatoes	508
Safflower	251
Walnuts	216
Wheat	179
Cornnuts	125
Pumpkins	90
Corn	88
White corn	86
Total	**4,096**

Source: Dell 'Osso, pers. comm., 2002

Table 4.13-2
Acreages of Important Farmland in San Joaquin County

Land Use Category	1992	1994	1996	1998	2000
Prime Farmland	436,003	434,328	433,130	429,173	423,158
Farmland of Statewide Importance	99,548	99,132	98,162	96,800	93,846
Unique Farmland	47,084	47,202	48,760	52,719	57,977
Farmland of Local Importance	53,020	54,252	53,481	53,677	56,009
Total	635,655	634,914	633,533	632,369	630,990

Sources: CDC 1994, 1996, 1998, 2000, 2002



Sources: California Department of Conservation 2000, EDAW 2002

EXHIBIT 4.13-2

Important Farmland

River Islands

1T013.01 6/02

EDAW

WILLIAMSON ACT CONTRACTS

Most of the RID Area and the entire PCC Area are under Williamson Act contracts. In the RID Area, 26 parcels totaling approximately 3,395 acres are under Williamson Act contracts for which notices of nonrenewal were filed on February 28, 2001, and contracts will expire in 2011 (Exhibit 4.13-3). Two parcels in the southwestern portion of the RID Area totaling 399 acres and one 29-acre parcel in the middle of the RID Area are under Williamson Act contracts that have not yet been submitted for nonrenewal. One 102-acre parcel and an adjacent 1-acre parcel on the far eastern portion of the RID Area adjacent to the Union Pacific Railroad (UPRR) tracks are not under a Williamson Act contract. None of the lands in the PCC Area have been submitted for nonrenewal of the existing contracts, and there are no plans to do so.

HOMESTEADS AND AGRICULTURAL FACILITIES

Lands in the Phase 1a portion of the RID Area contain a total of four homesteads, one farm equipment maintenance and repair shop, and one office. The remaining locations in the Phase 1 area contain three additional homesteads, two farm equipment maintenance and repair shops, and an equipment yard. Lands in the Phase 2 boundaries contain three homesteads, two hay barns, two trailer sites, and a horse boarding area. With the exception of three homes, the remainder of the home sites are temporary field worker residences in various stages of disrepair. Some homes are unoccupied and some shops are abandoned.

4.13.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

The examination of agricultural resources in this section of the SEIR is based on information obtained from reviews of:

- plans for the proposed project;
- existing literature, including documents published by city, county, state, and federal agencies, including USDA-NRCS, CDC, and the San Joaquin Agriculture Commissioner's office;
- various texts dealing with agriculture in the Central Valley area; and
- applicable elements from the San Joaquin County and City of Lathrop General Plans and the West Lathrop Specific Plan.

A project-level analysis of agricultural resources was conducted for both Phase 1 and Phase 2 rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. The less specifically defined Phase 2 elements do not preclude a project-level analysis of agricultural resources because the conversion of farmland associated with any development, rather than the type or density of development, typically determines impacts. In addition, mitigation measures would be the same for impacts under both Phase 1 and Phase 2 of the project.

PRIOR WLSP EIR ANALYSIS

The WLSP EIR found that development of the Stewart Tract Planning Area would result in a significant and unavoidable impact due to an incremental annual loss of productive agricultural land. Much of this land is designated as Prime Farmland under CDC's Farmland Mapping and Monitoring Program, and its loss was identified as an irreversible consequence of the urbanization of the WLSP area. The WLSP EIR found that although the total annual value of the loss of field crops is minor as compared to the total losses that can be expected over the same period from such conversion, the cumulative impact would be significant over time. The City recognized that this impact was significant and unavoidable and could not be mitigated to less than significant, and the City adopted a statement of overriding considerations when it approved the WLSP.

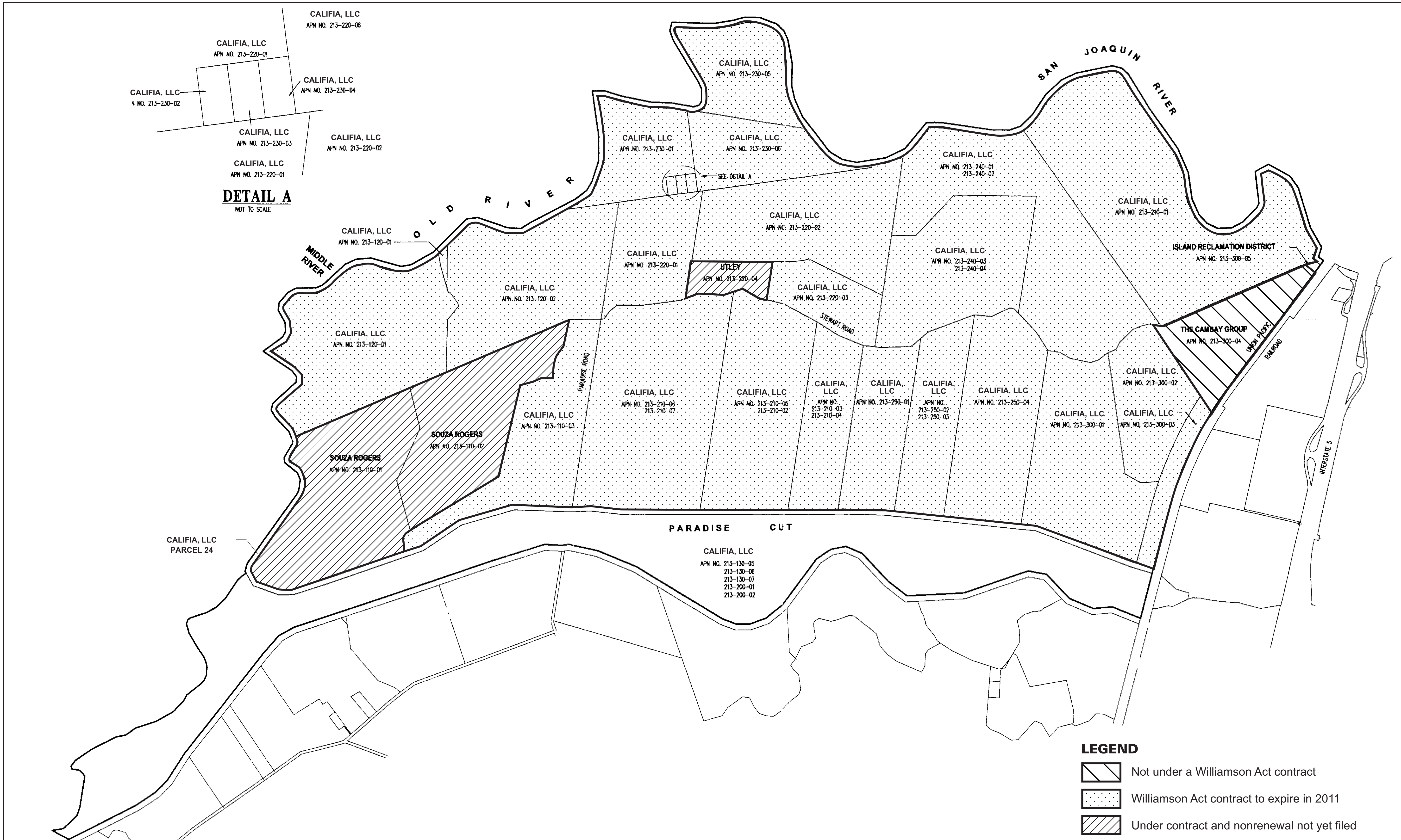
In addition, the WLSP EIR found that the urbanization of the Stewart Tract Planning Area could unnecessarily convert agricultural land to urban use or create urban-agricultural conflicts (Grunwald & Associates 1995). Mitigation measures were adopted for phasing development of agricultural lands to avoid fracturing or fragmentation and to ensure a gradual conversion of agricultural lands. In addition, urban-agricultural conflicts would be minimized by maintaining temporary open space corridors between the advancing urbanization and the receding agricultural lands.

The approach used to evaluate impacts on agricultural resources in this SEIR is very similar to the approach described here for the WLSP. However, an independent analysis was conducted for the SEIR because various conditions have changed in San Joaquin County since preparation of the WLSP, updated data on conversion of agricultural lands are available, and the SJMSCP provides a new mechanism for conserving agricultural land in the .

THRESHOLDS OF SIGNIFICANCE

The River Islands project would cause a significant impact on agricultural resources if it would:

- result in a conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the CDC, to nonagricultural use;
- cause substantial impairment of the agricultural productivity of Important Farmland;
- cause a conflict with existing zoning for agricultural use;
- cause a conflict with a Williamson Act contract (this threshold is not clarified in the California Environmental Quality Act [CEQA] guidelines but is interpreted in this document to mean any action on the land that would not be allowed under an existing Williamson Act contract);
- involve other changes in the existing environment that due to their location or nature, could result in conversion of farmland to nonagricultural use; or
- result in a conflict between existing agricultural lands and adjacent land uses.



Source: Carlson, Barbee & Gibson 2002

EXHIBIT 4.13-3

Status of Williamson Act Contracts

River Islands at Lathrop
CITY OF LATHROP
G 1T013.01 10/02

0 1000 2000 4000 FEET NORTH

EDAW

IMPACT ANALYSIS

The proposed project site does not contain lands in a Farmland Security Zone; therefore no impacts would occur relative to this issue. In addition, the River Islands project is not considered to cause a conflict with existing zoning for agricultural use because the WLSP previously redesignated the zoning of the project site for development.

Impact
4.13-a

<u>Agricultural Resources - Conversion of Important Farmland.</u> *Implementation of the proposed project would result in the permanent conversion of approximately 4,115 gross acres and 3,620 net acres of Prime Farmland and Farmland of Statewide Importance, as designated by the NRCS FPP and CDC's Important Farmland Inventory System and Mapping and Monitoring Program. This impact is considered* ***significant****.*

The implementation of the River Islands at Lathrop project and completion of all phases of development would result in the permanent conversion of approximately 3,620 acres of Prime Farmland and Farmland of Statewide Importance. Approximately 43% of the conversion (1,555 acres) would be associated with Phase 1, and the remaining 57% (approximately 2,065 acres) would be converted during implementation of Phase 2. Impacts associated with conversions of Prime Farmland and Farmland of Statewide Importance, as proposed under Phase 1, Phase 2, or full project buildout, are considered significant.

Impact
4.13-b

<u>Agricultural Resources - Williamson Act Contract Cancellations.</u> *Implementation of the River Islands project would result in the cancellation of Williamson Act contracts for approximately 415 acres for Phase 1a and an undetermined amount of acreage (no more than 1,355 acres) for the completion of Phase 1. The total acreage lost to the cancellation of Williamson Act contracts would be up to 1,770 acres. This impact is considered* ***significant****.*

Implementation of Phase 1a would require the cancellation of approximately 415 acres of Williamson Act lands. Remaining lands in Phase 1 occur over parcels that have Williamson Act contracts that would expire in 2011 (Exhibit 4.13-3). As construction of Phase 1 proceeds from 2007 (initiation) to full buildout (2015) an undetermined amount of acreage would be developed between 2007 and 2011 (when Williamson Act contracts expire). Williamson Act cancellations required for Phase 1 therefore cannot be determined exactly; however, they would total no more than 1,355 acres, which is the full buildout acreage to complete Phase 1. Cancellations for Phase 1 would be completed on an as-needed basis as development proceeds.

The Williamson Act contracts on the remainder of the parcels for Phase 2 would expire before construction, which is anticipated to be in 2015. Therefore, no cancellations are anticipated for Phase 2. An exception could be the two parcels in the western corner of the RID Area and the single parcel in the middle of the RID Area for which nonrenewals have not yet been submitted. However, construction of Phase 2 is not planned to begin before 2015; therefore, if nonrenewal notices are submitted by 2005 (which is highly likely), the Williamson Act contracts would expire before construction begins.

Before initiating any construction on Williamson Act lands in the project area, the City of Lathrop would make findings to support the cancellation of all Williamson Act contracts in the Phase 1a and Phase 1 areas. The actual cancellation of each contract would become effective only after satisfaction of all cancellation conditions (i.e., payment of the cancellation fee). If the cancellation fee for a particular contract is made more than 1 year after the conditional cancellation finding, the fee must be recalculated based on the fair market value of the land at the time.

The total acreage of Williamson Act contracts cancellations would be at least 415 acres and no more than 1,770 acres. The cancellations are needed because land uses are proposed that would not be permitted under the existing Williamson Act contracts. Therefore, this impact is considered significant.

Impact
4.13-c

Agricultural Resources - Adjacent Landowner/User Conflicts. *Long-term impacts on adjacent offsite landowners and conflicts associated with noise, odor, and dust are expected to be minimal due the natural buffers of the Old River, San Joaquin River, and Paradise Cut. Potential conflicts between onsite agricultural operations and development are considered* ***potentially significant****.*

Agricultural-urban interfaces generally result in the potential for conflicts between agricultural practices and adjacent landowners. Pesticide application, generation of dust and noise from farm equipment, and shared roadways with farm trucks and tractors are common sources of these conflicts. Farmland owners may also suffer increased incidents of trespass, vandalism, and theft. Potential long-term conflicts between River Islands residents and adjacent agricultural operators are expected to be minimal due to the natural buffers of Old River, the San Joaquin River, and the Paradise Cut canal, which separate the proposed development from continuing agricultural operations. The distance between homes on the high-ground corridors and agricultural activities would range from 150 feet to several hundred feet, given the width of the rivers and the Paradise Cut canal and the levees on the opposite side of the rivers. Also, agricultural activities closest to the project perimeter would be directly buffered by the adjacent levees. This impact is considered less than significant.

As development proceeds through the different phases of the proposed River Islands project, there is potential for conflicts when the development edge is adjacent to ongoing agricultural operations on undeveloped portions of the RID Area, including lands owned by the project applicant, Souza, and Utley (Exhibit 4.13-3). If appropriate buffers cannot be maintained between development and agricultural operations, conflicts between these two land uses would be severe enough to constitute a significant impact.

4.13.4 Mitigation Measures

The following mitigation measures are provided for significant and potentially significant impacts.

4.13-a **Conversion of Important Farmland.** The City of Lathrop would participate in the SJMSCP. Fees would be paid to the SJCOG on a per-acre basis for lost agricultural land during development of both Phase 1 and Phase 2 of the proposed project. The SJCOG uses these funds to purchase conservation easements on agricultural and habitat lands in the project vicinity (in the Central Index Zone identified in the SJMSCP). The preservation in perpetuity of agricultural lands through the SJMSCP, a portion of which would consist of Prime Farmland and Farmland of Statewide Importance, would ensure the continued protection of farmland in the project vicinity, partially offsetting project impacts. However, because easements are purchased for land exhibiting benefits to wildlife, including a combination of habitat, open space, and agricultural lands, the overall compensation provided by the fee contribution for the proposed project would result in less than a 1:1 ratio of compensation specifically for agricultural land. In addition, no new farmland would be made available, and the productivity of existing farmland would not be improved as a result of SJMSCP implementation. Therefore, full compensation for losses of Important Farmland could not be achieved.

Implementation of Mitigation Measure 4.13-a would reduce overall impacts associated with the conversion of Important Farmland, but not sufficiently to reduce the impact to a less-than-significant level. Impact 4.13-a is still considered a significant impact after mitigation.

4.13-b **Williamson Act Contract Cancellations**. Potential Williamson Act cancellations are limited to Phase 1a and Phase 1 of the River Islands project. The project applicant shall continue to allow/promote farming operations as long as possible on Phase 1a and Phase 1 as development proceeds. These actions would minimize the level of contract cancellations required.

The River Islands at Lathrop project applicant would participate in the SJMSCP. Fees would be paid to the SJCOG on a per-acre basis for lost agricultural lands. The SJCOG uses these funds to purchase conservation easements on agricultural and habitat lands in the project vicinity (within the Central Zone identified in the SJMSCP). Participation in the SJMSCP would assist in compensating for Williamson Act contract cancellations by placing farmlands in conservation easements, requiring conservation of agricultural lands in perpetuity. These easements provide much more stringent and longer lasting protections than Williamson Act contracts.

Implementation of Mitigation Measure 4.13-b would reduce overall impacts associated with Williamson Act contract cancellations; however, not sufficiently to reduce the impact to a less-than-significant level. Impact 4.13b is still considered significant after mitigation.

4.13-c **Adjacent Landowner/User Conflicts.** The following actions are consistent with those included in the WLSP EIR to address this impact. The project applicant would phase the development of agricultural lands in the RID Area (during both Phase 1 and Phase 2) to avoid the fracturing or fragmentation of continuing agricultural operations. As development occurs in the RID Area, fencing, walls, or other suitable barriers such as watercourses shall be established at the interface between development and adjacent agricultural lands. In addition, a buffer zone of at least 150 feet shall be provided between the edge of residential or commercial development and the adjacent agricultural land. The City shall include the buffer as a condition of development approval, with the buffer being maintained until the next phase of development over the adjacent agricultural land is approved. Growers cultivating lands near or adjacent to urban development in the RID and PCC Areas shall comply with all necessary federal, state, and local restrictions regarding buffers between pesticide/herbicide applications and sensitive areas, such as schools, residences, and parks. Required buffer distances may vary depending on the type of chemicals used and the method of application. Residents and other individuals purchasing property near agricultural lands shall be provided information on the types of conflicts that may occur and appropriate means to address these conflicts, consistent with the City of Lathrop's Right-to-Farm Ordinance.

Implementation of Mitigation Measure 4.13-c would reduce impacts associated with potential conflicts at the agriculture/urban interface to less-than-significant levels.

4.13.5 RESIDUAL SIGNIFICANT IMPACTS

The conversion of Important Farmland and the cancellation of Williamson Act contracts are identified as significant impacts. Because there are no feasible mitigation measures to reduce these impacts to a less-than-significant level, these impacts would be significant and unavoidable.

4.14 TERRESTRIAL BIOLOGY

4.14 TERRESTRIAL BIOLOGY

Common and sensitive terrestrial biological resources that occur or potentially occur in the project area are discussed in this section, along with potential impacts on these resources. Fisheries resources are discussed separately in section 4.15, "Fisheries." The terrestrial biology evaluation is based on data collected during reconnaissance field surveys, supplemented by reviews of aerial photographs and information from previously completed studies/analysis that addressed biological resources in the project area. Reconnaissance-level field surveys were conducted by EDAW biologists Anne King and Sean Bechta on August 3, 2001, and April 17, 2002, to characterize general biological resources present in the project area and document areas that could support special-status species and sensitive habitats. The project site has also been visited on numerous occasions by Sean Bechta to collect information related to other aspects of this SEIR analysis.

Documents that were reviewed during preparation of this section include (1) Biological Assessment for the San Joaquin Kit Fox, West Lathrop Specific Plan (Sycamore Environmental Consultants 1994); (2) Comprehensive General Plan and Environmental Impact Report for the City of Lathrop, California (City of Lathrop 1991); (3) Draft Environmental Impact Report for the Lathrop Water, Wastewater, and Recycled Water Master Plan (EDAW 2001); (4) Habitat Management Plan and Section 2081 Management Agreement for Swainson's Hawk, West Lathrop Specific Plan (Sycamore Environmental Consultants 1995); (5) Riparian Brush Rabbit and Riparian Woodrat Trapping Survey, Stewart Tract (Harland Bartholomew & Associates 1994); (6) Riparian Brush Rabbit Survey: Paradise Cut along Stewart Tract, San Joaquin County, California (Williams and Hamilton 2002); (7) San Joaquin Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) (San Joaquin County 2000); (8) Supplement to the Environmental Impact Report for the Crossroads Industrial Park relative to Amendment of Development Agreement and Revised Sewage Disposal System (Water Recycling Plant No. 1 Remediation) (Insite Environmental 2001); (9) West Lathrop Specific Plan Draft Environmental Impact Report (Grunwald & Associates 1995); and (10) Wetland Delineation Report for Gold Rush City Project (Sycamore Environmental Consultants 1993).

Sufficient detail is provided in this section to analyze issues related to terrestrial biology at a project level of detail for both Phase 1 and Phase 2 of the proposed project.

4.14.1 REGULATORY BACKGROUND

Many biological resources in California are protected and/or regulated by a variety of laws and policies. It is necessary for the proposed project to be in compliance with these regulations. In addition, in many parts of California, there are local or regional habitat and species conservation planning efforts that a project may participate in. Key regulatory and conservation planning issues applicable to the proposed project are discussed below.

FEDERAL REGULATIONS

Federal Endangered Species Act

Pursuant to the federal Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have authority over projects that may result in take of a federally listed species. Under the ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." USFWS has also interpreted the definition of "harm" to include significant habitat modification that could result in take. If a project has a likelihood that it would result in take of a federally listed species, either an incidental take permit, under Section 10(a) of the ESA, or a federal interagency consultation, under Section 7 of the ESA, is required.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA), first enacted in 1918, implements domestically a series of treaties between the United States and Great Britain (on behalf of Canada), Mexico, Japan, and the former U.S.S.R., which provide for international migratory bird protection, and authorizes the Secretary of the Interior to regulate the taking of migratory birds. The MBTA provides that it shall be unlawful, except as permitted by regulations, "to pursue, take, or kill...any migratory bird, or any part, nest or egg of any such bird, included in the terms of conventions" with certain other countries (16 U.S. Code [USC] 703). The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds. Section 3513 of the California Fish and Game Code provides for adoption of the MBTA's provisions. Although neither the MBTA nor this state code offers statutory or regulatory mechanisms for obtaining an incidental take permit for the loss of nongame migratory birds, a Section 10(a) permit issued under the ESA may constitute a special purpose permit for the take of covered species also listed under the MBTA.

Section 404 of the Clean Water Act

Section 404 of the Clean Water Act (CWA) establishes a requirement to obtain a permit before any activity that involves any discharge of dredged or fill material into "waters of the United States," including wetlands. Waters of the United States include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Wetlands are defined as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Jurisdictional wetlands must meet three wetland delineation criteria: hydrophytic vegetation, hydric soil types, and wetland hydrology. Many surface waters and wetlands in California meet the criteria for waters of the United States, including intermittent streams and seasonal lakes and wetlands.

Pursuant to Section 404 of the CWA, the U.S. Army Corps of Engineers (USACE) regulates and issues permits for activities that involve the discharge of dredged or fill materials into waters of the United States. Fills of less than ½ acre of nontidal waters of the United States for residential, commercial, or institutional development projects can generally be authorized under the USACE's nationwide permit (NWP) program, provided the project satisfies the terms and conditions of the particular NWP. Fills that do not qualify for a NWP require an individual permit.

STATE REGULATIONS

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA) and Section 2081 of the Fish and Game Code, a permit from the California Department of Fish and Game (CDFG) is required for projects that could result in the take of a state-listed Threatened or Endangered species. Under CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include "harm" or "harass," as the federal act does. As a result, the threshold for a take under the CESA is higher than that under the ESA.

California Fish and Game Code §3503.5 - Protection of Raptors

Section 3503.5 of the Fish and Game Code states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations include destruction of active raptor nests as a result of tree removal and failure of nesting attempts, resulting in loss of eggs and/or young, due to disturbance of nesting pairs by nearby human activity.

Section 1600 et seq. of the California Fish and Game Code

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake in California that supports wildlife resources is subject to regulation by CDFG, pursuant to §1600 through §1603 of the California Fish and Game Code. Under §1603, it is unlawful for any person to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by CDFG, or use any material from the streambeds, without first notifying CDFG of such activity. "Stream" is defined as a body of water that flows at least periodically or intermittently through a bed or channel having banks and that supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. CDFG's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A CDFG Streambed Alteration Agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

REGIONAL AND LOCAL CONSERVATION PLANNING

Natural Community Conservation Planning Act

The Natural Community Conservation Planning Act (NCCPA) authorizes and encourages conservation planning on a regional scale in California through preparation of Natural Community Conservation Plans (NCCPs). NCCPs address the conservation of natural communities as well as individual species. The NCCPA's focus on regional conservation rather than individual project mitigation is appropriate for complex and extensive programs. However, no NCCPs currently cover the project area.

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan

The San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) provides a strategy for balancing the desires to conserve open space in San Joaquin County, maintain the agricultural economy, and allow development. It was developed to avoid, minimize, and mitigate impacts on plant and wildlife habitat, projected to occur in San Joaquin County between 2001 and 2051, resulting from conversion of up to 109,302 acres of open space land to non-open space uses (San Joaquin County 2000). Ninety-seven species are covered by the SJMSCP, which is intended to provide comprehensive mitigation, pursuant to local, state, and federal regulations, for impacts on these species from SJMSCP-permitted activities. USFWS and CDFG participated in development of the SJMSCP, approved the mitigation, and agreed to issue incidental take permits for species and activities covered by the SJMSCP. Therefore, participation in the SJMSCP permits activities that result in or may result in incidental take of covered state-listed or federally listed species, as well as other covered nonlisted sensitive species, that may otherwise require a federal or state incidental take authorization. The SJMSCP also allows for take under the MBTA of those migratory birds covered by the SJMSCP that are federally listed under the ESA, with the exception of bald and golden eagles. The SJMSCP relies on minimization of potential take through implementation of take avoidance and minimization measures and compensation for incidental take and loss of habitat through payment of fees (or in-lieu land dedication) for conversion of open space lands. These fees shall be used for preservation and creation of natural habitats to be managed in perpetuity through the establishment of habitat preserves. Participation in the SJMSCP is voluntary for local jurisdictions and project proponents. The City of Lathrop adopted the SJMSCP on January 16, 2001, and has signed the implementation agreement. A Section 10(a)(1)(B) permit was issued by USFWS to the City of Lathrop in 2002. This Section 10 permit also constitutes a special purpose permit for MBTA-covered species. A Section 2081 permit was issued by CDFG to the City also in 2002. As a result of the City's participation in the SJMSCP and issuance of these permits, project proponents within the City's jurisdiction have the opportunity to seek coverage under the SJMSCP.

West Lathrop Specific Plan Habitat Management Plan for Swainson's Hawk

The West Lathrop Specific Plan Habitat Management Plan and Section 2081 Management Agreement for Swainson's Hawk (Sycamore Environmental Consultants 1995) (HMP) was developed to minimize and compensate for impacts on Swainson's hawk from implementation of the West Lathrop Specific Plan (WLSP). Objective 5C in the WLSP, "Retain and enhance existing habitat in West Lathrop, wherever feasible, phasing the provision of habitat preservation areas with overall development phases," references the need to implement the HMP to protect biological resources.

HMP mitigation measures include preservation of foraging habitat at a 0.5:1 preservation-to-impact ratio, preconstruction nest surveys, and establishment of buffer areas around active nests. The HMP and Section 2081 Management Agreement provide CDFG authorization under the California Endangered Species Act for removal of Swainson's hawk foraging and nesting habitat in the WLSP area. The SJMSCP was not complete when the HMP was authorized. It is anticipated that either the SJMSCP or the HMP could be used to mitigate impacts on Swainson's hawk in the project area.

4.14.2 EXISTING CONDITIONS

The following sections contain a summary of the existing terrestrial biological resources in the three project component areas: River Islands Development Area (RID Area), Upper Paradise Cut Improvement Project Area (PCIP Area), and the Paradise Cut Conservation Area (PCC Area). Each section contains two summaries, the first pertaining to the general vegetation and wildlife resources in the area and the second detailing sensitive biological resources that are known, or have potential to occur, in the area. Biological resources associated with many of the offsite facilities (e.g., electrical transmission line corridor, pipeline corridors, Golden Valley Parkway extension to Interstate 205 [I-205] interchange improvements) are not described here because the precise disturbance area for these offsite facilities cannot be determined at this time and access to many of these areas for field surveys is not available. However, a review of aerial photographs and multiple "windshield surveys" in the project vicinity indicate that biological resources surrounding the project area are consistent with those described here for the RID, PCIP, and PCC Areas.

Sensitive biological resources addressed in the following sections include those that are afforded special protection through the California Environmental Quality Act (CEQA), California Fish and Game Code (including but not limited to CESA), ESA, CWA, and SJMSCP. Special-status species addressed in this section include plants and animals that are legally protected or that are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. These include species that are state and/or federally listed as Rare, Threatened, or Endangered; those considered as candidates or proposed for listing; species identified by CDFG and/or USFWS as species of concern; plants considered by the California Native Plant Society (CNPS) to be rare, threatened, or endangered; and species covered in the SJMSCP.

Table 4.14-1 provides a complete list of special-status species potentially occurring on the project site. This list was developed through a review of biological studies previously conducted on the project site and vicinity and observations made during field surveys conducted for this project. The CDFG California Natural Diversity Database (CNDDB 2002) and California Native Plant Society database (CNPS 2002) were also reviewed for specific information on documented observations of special-status species in the Lathrop and Union Island U.S. Geological Survey quadrangles. A list of special-status species with potential to occur in the project area was also requested from USFWS and is provided in Appendix L. Several of the species listed in Table 4.14-1 do not have any formal state or federal designation as special-status species, but they are addressed in this document because they are covered by the SJMSCP. CNDDB occurrences of special-status species and riparian vegetation resources in the project vicinity are depicted in Exhibit 4.14-1.

Table 4.14-1
Special-Status Species Potentially Occurring in the River Islands Project Area

Species	Status[1]			Habitat	Potential for Occurrence[2]
	USFWS	CDFG	CNPS		
PLANTS					
Suisun marsh aster *Aster lentus*	--	--	1B	Edge of brackish waters with some tidal influence	Could occur; potentially suitable habitat present
Slough thistle *Cirsium crassicaule*	--	--	1B	Freshwater marshes, sloughs, and slow-moving water	Could occur; potentially suitable habitat present; not observed during focused surveys
Delta button-celery *Eryngium racemosum*	--	E	1B	Seasonally flooded clay depressions in riparian scrub	Could occur; potentially suitable habitat present, but considered by CNPS and CDFG to be extirpated from San Joaquin County; not observed during focused surveys
Rose mallow *Hibiscus lasiocarpus*	--	--	1B	Freshwater marshes and swamps	Could occur; potentially suitable habitat present
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	--	--	1B	Edge of brackish and fresh waters	Could occur; potentially suitable habitat present; not observed during focused surveys
Mason's lilaeopsis *Lilaeopsis masonii*	--	R	1B	Freshwater and brackish marshes and riparian	Could occur; potentially suitable habitat present; not observed during focused surveys
Sanford's arrowhead *Sagittaria sanfordii*	--	--	1B	Shallow freshwater marshes and swamps	Could occur; potentially suitable habitat present; not observed during focused surveys
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	--	--	2	Meadows, seeps, marshes, swamps, riparian scrub, and vernal pools	Could occur; potentially suitable habitat present
INVERTEBRATES					
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T	--	--	Riparian habitat with elderberry shrubs present	Could occur; elderberry shrubs present

Table 4.14-1
Special-Status Species Potentially Occurring in the River Islands Project Area

Species	Status[1] USFWS	CDFG	CNPS	Habitat	Potential for Occurrence[2]
REPTILES					
Giant garter snake *Thamnophis gigas*	T	T	--	Streams and sloughs	Could occur; potentially suitable aquatic and upland habitat present
Western pond turtle *Clemmys marmorata*	FSC	CSC	--	Ponds, marshes, rivers, streams, sloughs	Known to occur in San Joaquin River and Paradise Cut; suitable aquatic habitat also present at the pond in the RID Area; potential nesting habitat is restricted to relatively undisturbed areas in Paradise Cut
BIRDS					
American white pelican *Pelecanus erthrorhynchos*	--	CSC	--	Marshes and other aquatic habitats	Could occur; suitable foraging habitat present but not in breeding range
Double-crested cormorant *Phalacrocorax auritus*	--	CSC	--	Isolated islets or tall lakeside trees near fish-bearing waters	Known to occur; suitable foraging habitat present, but not expected to nest
Great blue heron[3] *Ardea herodias*	--	--	--	Forage in shallow waters and flooded fields; nest in trees or shrubs near water	Known to occur; suitable foraging habitat present, but no nesting colonies known or expected to occur
Great egret[3] *Ardea albus*	--	--	--	Forage in shallow waters and flooded fields; nest in trees or shrubs near water	Known to occur; suitable foraging habitat present, but no nesting colonies known or expected to occur
Snowy egret *Egretta thula*	FSC	--	--	Forage in shallow waters and flooded fields; nest in trees or shrubs near water	Known to occur; suitable foraging habitat present, but no nesting colonies known or expected to occur
Black-crowned night-heron[3] *Nycticorax nycticorax*	--	--	--	Forage in shallow waters and flooded fields; nest in trees or shrubs near water	Known to occur; suitable foraging habitat present, but no nesting colonies known or expected to occur

Table 4.14-1 Special-Status Species Potentially Occurring in the River Islands Project Area					
Species	Status[1]			Habitat	Potential for Occurrence[2]
	USFWS	CDFG	CNPS		
White-faced ibis *Plegadis chihi*	FSC	CSC	--	Forage and roost in shallow water and flooded fields	Could occur; suitable foraging habitat present but not in breeding range
Aleutian Canada goose *Branta canadensis leucopareia*	FSC	--	--	Forage in agricultural fields and roost in aquatic habitats	Could occur; suitable foraging habitat present, but not in breeding range
White-tailed kite *Elanus leucurus*	FSC	FP	--	Forage in grasslands and agricultural fields; nest in isolated trees or small woodland patches	Known to occur; suitable foraging and known to nest onsite
Northern harrier *Circus cyanus*	--	CSC	--	Grasslands and freshwater marsh	Known to occur; suitable foraging habitat and marginally suitable nesting habitat present
Cooper's hawk *Accipiter cooperi*	--	CSC	--	Open woodlands and woodland margins	Known to occur; marginally suitable nesting and foraging habitat present
Swainson's hawk *Buteo swainsoni*	FSC	T	--	Nest in riparian forest and scattered trees; forage in grasslands and agricultural fields	Known to nest and forage in project area
Ferruginous hawk *Buteo regalis*	FSC	CSC	--	Forage in grasslands, agricultural fields, and other open habitats	Could occur; suitable foraging habitat present but not in breeding range
Merlin *Falco columbarius*	--	CSC	--	Forages in grasslands, agricultural fields, marshes, and other open habitats	Could occur; suitable foraging habitat present but not in breeding range
Greater sandhill crane *Grus canadensis tabida*	--	T	--	Forage in grain fields and roost in nearby areas with shallow standing water	Could occur; suitable foraging habitat present but not in breeding range
Mountain plover *Charadrius montanus*	PT	--	--	Short grasslands and barren fields	Could occur; suitable foraging habitat present but not in breeding range
Long-billed curlew *Numenius americanus*	FSC	CSC	--	Marshes, grasslands, irrigated, pastures, alfalfa, and fallow fields	Known to occur; suitable foraging habitat present but not in breeding range
Burrowing owl *Athene cunicularia*	FSC	CSC	--	Grasslands and agricultural fields	Known to occur; suitable foraging and nesting habitat present

Table 4.14-1 Special-Status Species Potentially Occurring in the River Islands Project Area					
Species	Status[1]			Habitat	Potential for Occurrence[2]
	USFWS	CDFG	CNPS		
Loggerhead shrike *Lanius ludovicianus*	FSC	CSC	--	Woodland shrubs for nesting, grasslands for foraging	Known to occur; suitable foraging and nesting habitat present
Yellow warbler *Dendroica petechia*	--	CSC	--	Riparian, particularly willow thickets	Likely to occur during migration; suitable foraging habitat present, but not expected to nest due to marginally suitable habitat and rarity of breeding pairs in San Joaquin County
Yellow-breasted chat *Icteria virens*	--	CSC	--	Riparian woodland with dense shrub cover	Could occur; suitable foraging habitat present, but not expected to nest due to marginally suitable habitat and rarity of breeding pairs in San Joaquin County
Tricolored blackbird *Agelaius tricolor*	FSC	CSC	--	Freshwater marsh with dense cattails and tules, riparian scrub, and other dense shrubs and herbs for nesting, grasslands and agricultural fields for foraging	Could occur; suitable foraging habitat present, but no nesting colonies known or expected to occur
MAMMALS					
Greater western mastiff bat *Antrozous pallidus*	FSC	CSC	--	Wide variety of habitats; roosts primarily in cliff faces and boulders but occasionally in buildings	Could occur; suitable foraging habitat present, but no potential roost sites
Red bat *Lasiurus blossevillii*	--	CSC	--	Wooded areas at lower elevations; typically roosts in snags and trees with moderately dense canopies	Could occur; suitable foraging and roosting habitat present
Yuma myotis *Myotis yumanensis*	FSC	--	--	Variety of habitats at low to mid elevations; roosts in buildings, trees, mines, caves, bridges, and rock crevices	Could occur; suitable foraging and roosting habitat present

Table 4.14-1
Special-Status Species Potentially Occurring in the River Islands Project Area

Species	Status[1]			Habitat	Potential for Occurrence[2]
	USFWS	CDFG	CNPS		
Townsend's big-eared bat *Corynorhinus townsendii*	FSC	CSC	--	Variety of habitats, including oak savanna, riparian, and grassland; roosts in mines, caves, and buildings.	Could occur; suitable foraging habitat present, but no potential roost sites
Riparian brush rabbit *Sylvilagus bachmani riparius*	E	E	--	Riparian forest with dense understory	Known to occur in Paradise Cut and along Union Pacific Railroad tracks west of I-5

[1] **Legal Status Definitions**

U.S. Fish and Wildlife Service Federal Listing Categories
- E Endangered (legally protected)
- T Threatened (legally protected)
- PT Proposed for Threatened Status (legally protected as a threatened species by federal agencies)
- FSC Federal Species of Concern (no formal protection)

California Department of Fish and Game State Listing Categories
- E Endangered (legally protected)
- T Threatened (legally protected)
- R Rare (legally protected)
- FP Fully Protected (legally protected, no take allowed)
- CSC California Species of Concern (no formal protection)

California Native Plant Society Categories
- 1B Plant species considered rare or endangered in California and elsewhere (but not legally protected under ESA or CESA)
- 2 Plant species considered rare or endangered in California but more common elsewhere (but not legally protected under ESA or CESA)

[2] **Potential for Occurrence Definitions**

Could occur: Suitable habitat is available at the project site; however, there are little to no other indicators that the species might be present.

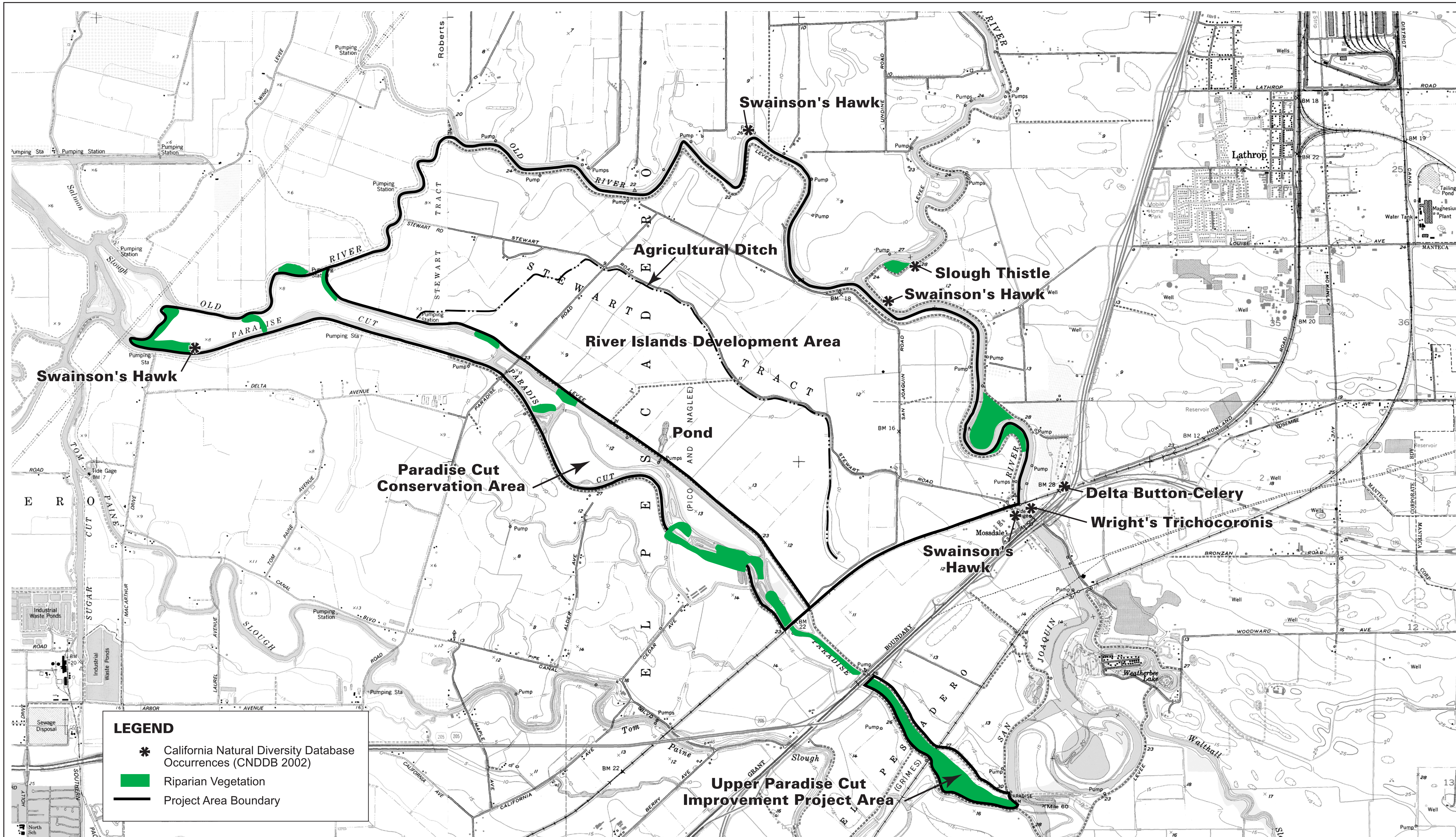
Likely to occur: Habitat conditions, behavior of the species, known occurrences in the project vicinity, or other factors indicate a relatively high likelihood that the species would occur at the project site.

Known to occur: The species, or evidence of its presence, was observed at the project site during reconnaissance surveys, or was reported by others.

[3] These species, which have no formal designation as special-status species are included because they are discussed in the SJMSCP.

CDFG = California Department of Fish and Game
CNPS = California Native Plant Society

Source: EDAW 2002



Source: Lathrop Quad 1952 (photorevised 1987 - minor revisions 1994) – Contour Interval 5 Feet
Union Island Quad 1978 – Contour Interval 5 Feet

EXHIBIT 4.14-1

Sensitive Biological Resources

River Islands at Lathrop
CITY OF LATHROP
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EDAW

Focused surveys for special-status species were not conducted for this project. Such surveys were conducted in support of the WLSP EIR, and their results are summarized in this section. In addition, reconnaissance-level surveys conducted for this project included a habitat evaluation for all potentially occurring special-status species. Because the project proponent is proposing to seek coverage under the SJMSCP, comprehensive habitat evaluations and focused surveys, when necessary, would be conducted for all the special-status species as part of the SJMSCP process. After submittal of the application for coverage under the SJMSCP, the Joint Powers Authority would conduct surveys of the project area to verify vegetation types present and determine whether SJMSCP-covered species could be present.

A number of special-status species have been documented elsewhere in San Joaquin County but are not addressed in this document (see Appendix L, "Letter from U.S. Fish and Wildlife Service"). These include species that occurred historically but are considered to be extirpated from San Joaquin County, species that are restricted to foothill areas of the County, and species that are restricted to habitats that are not present in the project area, such as vernal pools, saltbush scrub, and mudflats.

A number of special-status species were addressed in the WLSP EIR but dismissed as not being expected to occur based on lack of suitable habitat and/or lack of detections during focused surveys. Several of these species are reevaluated in this document (see discussion below under "Prior WLSP EIR Analysis"); however, western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), California black rail (*Laterallus jamaicensis coturniculus*), riparian woodrat (*Neotoma fuscipes riparia*), and San Joaquin kit fox (*Vulpes macrotis mutica*) are not addressed in this document, based on lack of potential for them to occur or confirmation of absence through survey efforts, as described in the WLSP EIR.

River Islands Development Area

Vegetation and Wildlife

Nearly all the RID Area is currently in agricultural production. Cultivated areas are dominated by crops such as alfalfa, watermelon, safflower, tomatoes, and corn. A small walnut orchard is present at the eastern edge of the area, north of Stewart Road. Ruderal vegetation is present along agricultural field boundaries, at roadsides, and banks and levees along the San Joaquin River and Old River. Most plants found in these ruderal areas are nonnative species, including Italian thistle (*Carduus pycnocephalus*), yellow star-thistle (*Centaurea solstitialis*), horseweed (*Conyza canadensis*), milk thistle (*Silybum marianum*), Russian thistle (*Salsola tragus*), knotweed (*Polygonum arenastrum*), ripgut brome (*Bromus diandrus*), and foxtail barley (*Hordeum murinum* ssp. *leporinum*). Agricultural habitats such as those present in the RID Area generally provide limited value for wildlife species. However, alfalfa fields and orchards can be used by a number of species. Alfalfa often supports small mammals, such as Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), and California meadow vole (*Microtus californicus*). These small mammals are prey for a variety of raptor species known to occur in the RID Area, including American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), and Swainson's hawk (*Buteo swainsonii*). Orchards in the RID Area provide nesting sites and food for other common birds, such as yellow-billed magpie (*Pica nuttalli*), American crow (*Corvus brachyrhynchos*), and house finch (*Carpodacus mexicanus*).

As with agricultural habitats, the high levels of disturbance and low vegetation diversity in ruderal habitats limit their value to wildlife. However, ruderal habitats in the RID Area are expected to support common mammals, such as western harvest mouse and California meadow vole, black-tailed hare (*Lepus californicus*), and desert cottontail (*Sylvilagus audubonii*). They also provide habitat for birds, such as white-crowned sparrow (*Zonotrichia leucophrys*), house finch, and American goldfinch (*Carduelis tristis*).

Vegetative communities that support a predominance of native species in the RID Area are limited to those in agricultural ditches, on the banks of the San Joaquin River, along the UPPR tracks west of I-5, and at the pond located several hundred feet north of the southern boundary of the RID Area (Exhibit 4.14-1). Vegetation in the agricultural ditches is regularly cleared to improve water flow, but there are areas that support broad-leaved cattail (*Typha latifolia*) and bulrush (*Scirpus* sp.). A patch of approximately 5 acres of riparian habitat is present along the San Joaquin River in the eastern corner of the RID Area. However, the understory vegetation in this area is very limited due to regular burning and other vegetation management along the levees. Dominant riparian plant species in this area, and scattered elsewhere along the river, include valley oak (*Quercus lobata*), California black walnut (*Juglans californica* var. *hindsii*), box elder (*Acer negundo*), Goodding's black willow (*Salix gooddingii*), narrow-leaved willow (*Salix exigua*), and Fremont cottonwood (*Populus fremontii*). The bank of Old River is sparsely vegetated with ruderal species. A small number of scattered riparian shrubs are also present, primarily near the confluence with Middle River. A narrow strip of riparian vegetation also borders the pond located several hundred feet north of the southern boundary of the RID Area, between the UPPR tracks and Paradise Road. Vegetation at the pond includes cattail, Goodding's black willow, narrow-leaved willow, and Fremont cottonwood. The UPPR tracks west of I-5 are bordered by a dense corridor of shrubby vegetation, dominated by California wild rose (*Rosa californica*), narrow-leaved willow, and broad-leaved peppergrass (*Lepidium latifolium*), with scattered valley oaks. However, most of this vegetation is within the right-of-way owned by UPRR and therefore outside the project site.

Wildlife diversity in agricultural ditches is limited due to the regular disturbance and absence of natural vegetation in uplands adjacent to the ditches (e.g., agricultural lands). Marsh wrens (*Cistothorus palustris*) and song sparrows (*Melospiza melodia*) were observed in ditches during field surveys; western aquatic garter snake (*Thamnophis couchii*) and Pacific tree frog (*Hyla regilla*) also could occur in ditches with some vegetation. Riparian habitat provides nesting habitat for a variety of bird species, including black phoebe (*Sayornis nigricans*), western kingbird (*Tyrannus verticalis*), western scrub-jay (*Aphelocoma californica*), oak titmouse (*Baeolophus inornatus*), Bewick's wren (*Thryomanes bewickii*), and spotted towhee (*Pipilo maculatus*). They also provide nest sites for raptors, such as Swainson's hawk, red-tailed hawk, white-tailed kite (*Elanus leucurus*), and red-shouldered hawk (*Buteo lineatus*). Other wildlife observed during field surveys or expected to occur in riparian habitat in the RID Area include western fence lizard (*Sceloporus occidentalis*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), and opossum (*Didelphis viginiana*). Vegetation along the UPPR tracks are known to support a population of riparian brush rabbits (*Sylvilagus bachmani riparius*), a state-listed and federally listed Endangered species.

Sensitive Biological Resources

Special-Status Plant Species

A total of eight special-status plant species have potential to occur in the RID Area: Suisun marsh aster (*Aster lentus*), slough thistle (*Cirsium crassicaule*), Delta button-celery (*Eryngium racemosum*), rose mallow (California hibiscus) (*Hibiscus lasiocarpus*), Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), Mason's lilaeopsis (*Lilaeopsis masonii*), Sanford's arrowhead (*Sagittaria sanfordii*), and Wright's trichocoronis (*Trichocoronis wrightii* var. *wrightii*). Delta button-celery is a state-listed Endangered species, and Mason's lilaeopsis is state listed as Rare. In addition, all of these special-status plants are on the CNPS 1B List (considered rare or endangered in California and elsewhere), except for Wright's trichocoronis, which is on the CNPS 2 List (considered rare or endangered in California, but more common elsewhere).

All the special-status plant species occur in aquatic habitats associated with rivers, streams, ponds, and/or marshes. Potentially suitable habitat in the RID Area is restricted to the San Joaquin River, agricultural ditches, and the pond. Although the agricultural ditches are regularly cleared of vegetation, patches of cattails and tules persist in some locations that could also support special-status plants. Old River does not provide suitable habitat, because it generally lacks wetland vegetation and riparian vegetation is limited to a few scattered shrubs. Slough thistle, Wright's trichocoronis, and Delta-button celery have been recorded within 1 mile of the RID Area (Exhibit 4.14-1). The slough thistle occurrence is from 1933, and no plants were observed when the location was revisited in 1974. The Wright's trichocoronis occurrence is from 1914, but the site has not been resurveyed. The Delta button-celery occurrence is from 1974, but the area was resurveyed in 1984 and the habitat had been destroyed; this species is considered by the CNPS and CDFG to be extirpated from San Joaquin County. Focused surveys for slough thistle, Delta button-celery, Delta tule pea, Mason's lilaeopsis, and Wright's trichocoronis were conducted in areas of suitable habitat in the RID Area in 1993 in support of the development of the WLSP, but no occurrences of any of these species were documented (Grunwald & Associates 1995).

Special-Status Wildlife Species

Twenty-six special-status wildlife species are known to occur or have the potential to occur in the RID Area. These are all discussed below. Five of these species are state-listed or federally listed Threatened or Endangered species: valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), giant garter snake (*Thamnophis gigas*), Swainson's hawk, greater sandhill crane (*Grus canadensis tabida*), and riparian brush rabbit. Mountain plover (*Charadrius montanus*) is proposed for federal listing as a Threatened species.

The valley elderberry longhorn beetle is federally listed as threatened. This beetle requires blue elderberry shrubs for reproduction and survival. Several blue elderberry shrubs have been documented at the pond in the RID Area (Grunwald & Associates 1995). Sycamore Environmental Consultants conducted elderberry shrub surveys along the San Joaquin River, Old River, and the Paradise Cut levee in 2001. Five shrubs and two patches of shrubs were mapped along Old River, near the confluence with Middle River (Sycamore Environmental Consultants 2001). Shrubs mapped in Paradise Cut are discussed later in this section. Elderberry shrubs could also be present along the UPPR tracks. Therefore, the valley elderberry longhorn beetle could occur in the RID Area.

The giant garter snake is federally and state listed as a Threatened species. Giant garter snakes inhabit a variety of aquatic habitats, such as agricultural canals, marshes, sloughs, and ponds. They also require adjacent upland habitat for basking and rodent burrows for wintering sites. Wintering burrows must provide sufficient cover and be at high enough elevations to function as refuges from floodwaters during the snake's inactive season. Giant garter snakes typically are absent from larger rivers and from wetlands with sand, gravel, or rock substrates (USFWS 1999). No giant garter snakes were observed during focused surveys conducted in the WLSP Area in 1993 (Grunwald & Associates 1995). Known occupied giant garter snake habitat is limited to four sites in San Joaquin County (San Joaquin County 2000). Potential habitat is present in a number of areas elsewhere in the County. The RID Area is not in or immediately adjacent to known occupied habitat, but it is in an area of potential habitat (San Joaquin County 2000). Therefore, marginally suitable aquatic habitat provided by agricultural ditches and the pond in the RID Area are considered potential giant garter snake habitat. Maintenance of the surrounding agricultural fields greatly limits the potential for suitable wintering sites to be present in the vicinity of the ditches and pond. The San Joaquin River and Old River are not expected to provide suitable aquatic habitat.

The western pond turtle (*Clemmys marmorata*) is a federal Species of Concern and a California Species of Special Concern. Pond turtles generally occur in streams, ponds, freshwater marshes, and lakes. They require still or slow-moving water with instream emergent woody debris, rocks, or other similar features for basking sites. Nests are typically located on unshaded upland slopes in dry substrates with clay or silt soils. Paradise Cut, the San Joaquin River, and the pond provide suitable aquatic habitat, and individuals have been observed in the San Joaquin River and Paradise Cut (Grunwald & Associates 1995). Suitable nesting habitat is not present in the vicinity of the pond, because it is entirely surrounded by actively cultivated agricultural fields. Levees along the San Joaquin River and Paradise Cut could provide suitable nesting sites, but regular disturbance from vegetation removal activities, such as burning, mowing, and herbicide spraying, makes it very unlikely that pond turtles nest in the levees. Therefore, potential nesting habitat for pond turtles is considered restricted to other, less disturbed upland areas in Paradise Cut.

The Swainson's hawk is state listed as a Threatened species and is a federal Species of Concern. This species prefers to nest in riparian forest or scattered trees adjacent to grasslands and/or agricultural fields that provide suitable foraging habitat. Agricultural fields in the RID Area, particularly alfalfa, provide suitable foraging habitat for Swainson's hawk, and Swainson's hawk nests have been documented along the San Joaquin River, on and adjacent to the project site (Exhibit 4.14-1) (Sycamore Environmental Consultants 1995).

Other special-status raptors that could occur in the RID Area include white-tailed kite and Cooper's hawk (*Accipiter cooperi*). The white-tailed kite is a federal Species of Concern and is fully protected under §3511 of the California Fish and Game Code. Fully protected birds may not be "taken" or possessed at any time. Cooper's hawk is a California Species of Special Concern. Both of these raptors are also protected under §3503.5 of the California Fish and Game Code, which prohibits the destruction of raptors and their nests. White-tailed kites prefer scattered trees for breeding and open grasslands and marshes for foraging. Cooper's hawks prefer open woodland habitats for foraging and nesting. Suitable nesting habitat for white-tailed kite is present along the San Joaquin River and at the pond. Two nests were documented in 1993, one along the UPPR tracks and the other along the San Joaquin River (Grunwald & Associates 1995). No nesting Cooper's hawks have been documented in the RID Area, but marginally suitable nesting habitat is provided by the 5-acre riparian patch along the San Joaquin River.

The burrowing owl (*Athene cunicularia*) is a federal Species of Concern and a California Species of Special Concern. This species is also protected under §3503.5 of the California Fish and Game Code, which prohibits the destruction of raptors and their nests. Burrowing owls prefer dry grasslands and other dry, open habitats. They typically nest and roost in burrow systems created by medium-sized mammals (e.g., ground squirrels), artificial sites (e.g., drain pipes and culverts), or self-dug burrows where soil conditions are appropriate. No nesting pairs are known to occur in the RID Area, although focused surveys have not been conducted and evidence of a burrowing owl was documented along the land side of the San Joaquin River levee. During the August 2001 field survey, EDAW biologists found a pellet determined to be that of a burrowing owl, based on size, content, and consistency with known burrowing owl pellets. Agricultural fields provide suitable foraging habitat, but field margins and levees along the San Joaquin River, Old River, and Paradise Cut have limited potential to provide suitable burrow sites because of levee maintenance and agricultural activities.

The loggerhead shrike (*Lanius ludovicianus*) is a federal Species of Concern and a California Species of Special Concern. Loggerhead shrikes inhabit lowland and foothill areas with scattered shrubs and trees. They nest in shrubs and small trees and typically forage in grasslands and agricultural fields. Suitable foraging habitat is present throughout the RID Area, but suitable nesting habitat is limited to vegetation along the San Joaquin River, at the pond, and along the Union Pacific Railroad (UPRR) tracks west of I-5.

The yellow warbler (*Dendroica petechia*) and yellow-breasted chat (*Icteria virens*) are California Species of Special Concern. Both species nest in riparian habitats. Yellow warblers typically nest in willow thickets, and yellow-breasted chats typically nest in riparian habitats with a dense shrub layer. The 5-acre patch of riparian habitat on the San Joaquin River does not provide suitable nesting habitat, because it is dominated by mature trees with very little shrubby understory vegetation. In addition, breeding pairs of yellow warbler and yellow-breasted chat are very rare in San Joaquin County. Therefore, neither species is expected to nest in the RID Area.

The tricolored blackbird (*Agelaius tricolor*) is a federal Species of Concern and a California Species of Special Concern. Tricolored blackbirds nest colonially and prefer dense cattail patches, but they also use blackberry (*Rubus* spp.) and other patches of dense vegetation. They forage in grasslands and agricultural fields. Suitable foraging habitat is present throughout the RID Area. Freshwater marsh patches in agricultural ditches and at the pond are unlikely to provide suitable nesting habitat because they are surrounded by agricultural fields and subject to high levels of disturbance. In addition, no tricolored blackbird colonies are currently present, and there are no CNDDB records of past colonies in the RID Area. There are records from the 1970s of a historic colony approximately 5 miles to the east, but it was extirpated as a result of development. Therefore, tricolored blackbirds are not expected to nest in the RID Area.

Several colonially nesting waterbirds could forage in aquatic habitats and/or agricultural fields in the RID Area: great egret (*Ardea albus*), great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), black-crowned night-heron (*Nycticorax nycticorax*), and double-crested cormorant (*Phalacrocorax auritus*). The double-crested cormorant is a California Species of Special Concern, and the snowy egret is a federal Species of Concern. The remaining three species have no legal status but are addressed in the SJMSCP. No waterbird colonies are present in the RID Area, and there are no CNDDB records of past colonies in or near the RID Area. Therefore, none of these species are expected to nest there.

A variety of additional special-status birds could use the RID Area as foraging and roosting habitat. These include one species proposed for federal listing as a Threatened species (mountain plover) and one species state listed as Threatened (greater sandhill crane). In addition, the following nonlisted federal Species of Concern, California Species of Special Concern, and species with no legal status but that are addressed in the SJMSCP could use the project area: American white pelican (*Pelecanus erthrorhynchos*), white-faced ibis (*Plegadis chihi*), Aleutian Canada goose (*Branta canadensis leucopareia*), ferruginous hawk (*Buteo regalis*), merlin (*Falco columbarius*), and long-billed curlew (*Numenius americanus*). All of these species except American white pelican typically forage in grasslands and agricultural fields and could forage in fields present in the project area. Pelicans could use the San Joaquin River and Old River for foraging. However, none of these species is expected to nest in the RID Area because the area is not in their known nesting range.

Several bat species that are federal Species of Concern or California Species of Special Concern could forage in the RID Area, including greater western mastiff bat (*Eumops perotis*), red bat (*Lasiurus blossevillii*), Yuma myotis (*Myotis yumanensis*), and Townsend's big-eared bat (*Corynorhinus townsendii*). The brick silos between the RID Area and I-5 (outside the project site) are known to provide bat roosting habitat, but potential roost sites in the RID Area are very limited. There are no known roost sites in the RID Area, although trees and buildings could provide roosting habitat for small numbers of individuals.

The riparian brush rabbit (*Sylvilagus bachmani riparius*) is federally and state listed as an Endangered species. Riparian brush rabbits inhabit the brushy understory of riparian forest and savanna-like areas with dense vine and shrub cover. They avoid large openings in the understory cover, frequenting only small clearings in the vegetation while foraging (USFWS 1999). Only two known populations of this subspecies exist, one of which is in Paradise Cut and the adjacent UPRR tracks west of I-5. The other population is in Caswell Memorial State Park in Stanislaus County, approximately 10 miles southeast of the project site.

Sensitive Habitats

A jurisdictional delineation of wetlands and waters of the United States has been conducted in the RID Area (Sycamore Environmental Consultants 1993). This delineation was verified by USACE, but the verification expired on January 3, 1997. Recent field visits were conducted in 2002 to confirm that the results of the delineation are still valid, and a reverification of this delineation from the USACE is pending.

The northern and western boundaries of the RID Area are formed by the San Joaquin River and Old River, which are waters of the United States. Other jurisdictional habitats in the RID Area include small wetlands in the approximately 5-acre patch of riparian habitat along the San Joaquin River, the approximately 2.5-acre pond, and the approximately 8-acre agricultural ditch (roughly 22,000 linear feet) that transects much of the RID Area (Exhibit 4.14-1)

Riparian communities as well as jurisdictional waters are considered sensitive habitats in this SEIR. The only riparian habitat in the RID Area is the 5 acres along the San Joaquin River.

The SJMSCP designates a San Joaquin River Wildlife Corridor from Stewart Tract to the Stanislaus/San Joaquin County border. This corridor includes the portion of the RID Area that borders the San Joaquin River and extends from the river to the top of the levee. SJMSCP-covered development in this corridor would require consultation with the permitting agencies (e.g., CDFG and USFWS) and could require some level of modification to the SJMSCP.

PARADISE CUT IMPROVEMENT PLAN AREA

Nearly all the biological resources discussed in the following sections regarding the PCIP Area are the same as those discussed in the previous section regarding the RID Area. Please refer to the RID Area section for a more specific discussion (e.g., regulatory status and habitat requirements) of these resources.

Vegetation and Wildlife

The PCIP Area is dominated by riparian vegetation and open water (Exhibit 4.14-1). Vegetation in the eastern portion of this area includes a large clump of narrow-leaved willow on the northern bank and a large area of open herbaceous vegetation between the willows and the levee. Vegetation between I-5 and the UPPR tracks east of I-5 occurs in a narrower corridor but has higher diversity, including Fremont cottonwood, valley oak, box elder, and Goodding's black willow. The PCIP Area is expected to support a similar suite of wildlife species as riparian habitat in the RID Area.

Sensitive Biological Resources

Special-Status Plant Species

The same special-status plant species that could occur in the RID Area also have potential to occur in the PCIP Area: Suisun marsh aster, slough thistle, Delta button-celery, rose mallow, Delta tule pea, Mason's lilaeopsis, Sanford's arrowhead, and Wright's trichocoronis. However, habitat conditions are considered better in the PCIP Area because of the reduced levels of disturbance in this portion of the Paradise Cut channel.

Special-Status Wildlife Species

The valley elderberry longhorn beetle could use blue elderberry shrubs, if present, in the PCIP Area. No elderberry shrubs were observed during reconnaissance-level field surveys, but a focused survey was not conducted. Therefore, a small number of elderberry shrubs could be present in this area.

Suitable aquatic habitat for giant garter snake and western pond turtle is present in the PCIP Area. Suitability of adjacent uplands is somewhat limited, because levees are highly maintained, and rodent poison stations are maintained along the northern levee. Therefore, rodent burrows suitable for giant garter snake wintering sites are expected to be rare. The levees are not expected to provide suitable nesting habitat for pond turtles because of maintenance activities, although nesting habitat may be available in this segment of Paradise Cut between the levees.

Two Swainson's hawk nests were documented in the PCIP Area in 1994 (Sycamore Environmental Consultants 1995). Trees in the area could also provide nest sites for white-tailed kite and Cooper's hawk. Swainson's hawk and white-tailed kite are also likely to forage in adjacent agricultural fields.

The northern harrier is a California Species of Special Concern and, like other raptors, is protected under §3503.5 of the California Fish and Game Code. Northern harriers nest on the ground in dense, low-lying vegetation, typically in grassland or marsh habitats. The large patch of herbaceous vegetation in the eastern portion of the area could provide suitable nesting habitat, and they are likely to forage in agricultural fields adjacent to the PCIP Area.

Burrowing owls could forage in fields adjacent to the PCIP Area, and there is limited potential for the levees to provide suitable burrow sites. However, as mentioned above, rodent poisoning in the area limits the potential for suitable burrow sites to be present.

Loggerhead shrikes are likely to forage in the PCIP area and adjacent fields, and suitable nesting habitat is present. Suitable nesting habitat also is present for yellow warbler and yellow-breasted chat, but as discussed above, breeding pairs of both species are very rare in San Joaquin County, and they are unlikely to nest in the PCIP Area.

The tricolored blackbird, great egret, great blue heron, snowy egret, black-crowned night-heron, double-crested cormorant, American white pelican, ferruginous hawk and merlin could all use habitat in the PCIP Area. However, as in the RID Area, none of these species is expected to nest in the PCIP Area because no nesting colonies are known to be present, because there are no CNDDB records of past colonies in the area, and because the project site is not in the species' known nesting range.

The greater western mastiff bat, red bat, Yuma myotis, and Townsend's big-eared bat could forage in the PCIP Area, and trees could provide roosting habitat for a limited number of individuals. However, there are no known colonies in the PCIP Area.

The PCIP Area is considered occupied riparian brush rabbit habitat (Williams, pers. comm., 2002). Although no trapping has occurred in this area, evidence of riparian brush rabbits has been observed on the bench near Paradise Weir.

Sensitive Habitats

Based on the previous wetland delineation pending reverification, approximately 13 acres of jurisdictional areas are present in the PCIP Area. Open water habitat in this portion of Paradise Cut also qualifies as waters of the United States. Sensitive habitats include riparian forest, riparian scrub, and emergent marsh.

PARADISE CUT CONSERVATION AREA

The biological resources discussed in the following sections regarding the PCC Area are the same as those discussed in the previous section regarding the RID Area. Please refer to the RID Area section for a more specific discussion (e.g., regulatory status and habitat requirements) of these resources.

Vegetation and Wildlife

Most of the PCC Area is actively cultivated with walnut orchards and row crops. These cultivated areas are surrounded by channels, much of which is bordered by narrow strips of riparian vegetation. Some larger patches of riparian habitat and freshwater marsh are also present in several locations (Exhibit 4.14-1). Marsh vegetation includes cattail and bulrush, and riparian species include Goodding's black willow, Fremont cottonwood, valley oak, box elder, and California wild rose. Field margins and levees are dominated by nonnative ruderal herbaceous species. The PCC Area is expected to support a similar suite of wildlife species associated with the corresponding habitats in the RID and PCIP Areas.

Sensitive Biological Resources

Special-Status Plant Species

The same special-status plant species that could occur in the RID and PCIP Areas also have potential to occur in aquatic and riparian habitats in the PCC Area: Suisun marsh aster, slough thistle, Delta button-celery, rose mallow, Delta tule pea, Mason's lilaeopsis, Sanford's arrowhead, and Wright's trichocoronis. The channels in the PCC Area are considered the locations where these species are most likely to occur.

Special-Status Wildlife Species

The valley elderberry longhorn beetle could use blue elderberry shrubs in the PCC Area. Focused surveys in the western half of the PCC Area documented three small elderberry patches (Sycamore Environmental Consultants 2001). The eastern half of the PCC Area has not been surveyed, but additional elderberry shrubs could be present in this portion.

Suitable aquatic habitat for the giant garter snake and western pond turtle is present in the PCC Area. Western pond turtles were observed in Paradise Cut during surveys conducted in 1993, but no giant garter snakes were documented during focused surveys in the same year (Grunwald & Associates 1995). Levees surrounding the PCC Area are highly maintained and expected to provide few rodent burrows suitable for garter snake wintering sites. Levees are not expected to be suitable for nesting pond turtles due to maintenance activities.

Swainson's hawks are known to nest in the PCC Area (Exhibit 4.14-1) (Sycamore Environmental Consultants 1995), and suitable nesting habitat for white-tailed kites and Cooper's hawks is present. Potential nesting habitat for northern harrier is very limited due to the scarcity of uncultivated herbaceous areas, but small amounts of suitable habitat are likely present. There is limited potential for the levees and field margins to provide suitable burrow sites for burrowing owls. The PCC Area also provides suitable foraging habitat for all of these raptor species.

Loggerhead shrikes are likely to forage in PCC Area, and suitable nesting habitat is present. Marginally suitable nesting habitat is present for yellow warbler and yellow-breasted chat, but as discussed previously, breeding pairs of both species are very rare in San Joaquin County, and they are unlikely to nest in the PCC Area.

The tricolored blackbird, great egret, great blue heron, snowy egret, black-crowned night-heron, double-crested cormorant, Aleutian Canada goose, mountain plover, sandhill crane, American white pelican, white-faced ibis, ferruginous hawk, merlin, and long-billed curlew could all use habitat in the PCC Area. However, as in the RID and PCIP Areas, none of these species is expected to nest in the PCC Area because no nesting colonies are known to be present, because there are no CNDDB records of past colonies in the area, and because the project site is not in the species' known nesting range.

The greater western mastiff bat, red bat, Yuma myotis, and Townsend's big-eared bat could forage in the PCC Area, and trees could provide roosting habitat for a limited number of individuals. However, there are no known colonies in the PCC Area.

Riparian brush rabbits are known to occur in the PCC Area, and Paradise Cut is considered occupied habitat for riparian brush rabbit (San Joaquin County 2000). A trapping study conducted in 2001 (Williams and Hamilton 2002) resulted in capture of 21 individuals, primarily in the area immediately west of the UPPR tracks west of I-5. It is not known how many individuals are present in this population but it was thought to support several hundred individuals in 2001.

Sensitive Habitats

Based on the previous wetland delineation pending reverification, approximately 87 acres of jurisdictional habitats are present in the PCC Area. The canals that are present throughout the PCC Area qualify as waters of the United States. Sensitive habitats in the area also include riparian forest, riparian scrub, and emergent marsh. Most of the riparian vegetation occurs in narrow strips on the boundary of the open water areas, but several larger patches of habitat are scattered over the area, primarily in the southern and western segments.

4.14.3 Environmental Impacts

Analysis Methodology

Information obtained from biological studies previously conducted in the vicinity of the project site (see list of documents at the beginning of this section), field and reconnaissance surveys conducted for this project, reviews of aerial photographs, CNDDB records, and CNPS database records were used to assess impacts on biological resources from the proposed project. A project-level analysis of terrestrial biological resources was conducted for both Phase 1 and Phase 2 rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. The less specifically defined Phase 2 elements do not preclude a project-level analysis of terrestrial biological resources because the change in habitat conditions associated with any development, rather than the type or density of development, typically determines impacts. Biological data available for the entire RID Area, PCC Area, and PCIP Area are sufficient to support a project-level analysis across all these locations.

Prior WLSP EIR Analysis

The WLSP EIR concluded that impacts on the valley elderberry longhorn beetle, Swainson's hawk, white-tailed kite, other tree-nesting raptors, and jurisdictional wetlands would be potentially significant and that impacts on the San Joaquin kit fox, Aleutian Canada goose, western yellow-billed cuckoo, California black rail, and San Joaquin (riparian) woodrat would be less then significant. These conclusions are still applicable to the River Islands project. However, impacts on some of these species are specifically addressed in this SEIR to allow for descriptions of the level of impact or impact mechanisms that may have changed because of differences between the project analyzed in the WLSP EIR and the River Islands project and the availability of updated biological resources data. The WLSP EIR also concluded that impacts on special-status plants, giant garter snake, western pond turtle, northern harrier, and riparian brush rabbit would be less than significant either because it was concluded that these species were not present on the project site or because the level of effect was not great enough to be considered significant. Because an extended period of time has passed and the River Islands project differs from the WLSP in several respects, circumstances regarding these species have changed since the WLSP EIR was issued. Therefore, the significance of impacts on these species has been reevaluated. For example, the PCIP Area was not covered during focused surveys for the WLSP EIR. Also, since the WLSP EIR was issued, a population of riparian brush rabbits was discovered in the WLSP Area that was previously not known to occur in the area. In addition, the SJMSCP is now available as an alternative mitigation option, which could affect postmitigation impact conclusions.

Thresholds of Significance

The proposed project would result in significant impacts on terrestrial biological resources if it would:

- have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in any local or regional plans, policies, or regulations, or by CDFG or USFWS;

- have a substantial adverse effect on any species identified as a Threatened, Endangered, candidate, sensitive, or special-status species by CDFG, USFWS, or NMFS or in any local or regional plans, policies, or regulations designed to protect biological resources, including the SJMSCP;

- have a substantial adverse effect on federally protected waters of the United States, including wetlands, as defined by Section 404 of the CWA through direct removal, filling, hydrological interruption or other means;

- substantially reduce the habitat of a wildlife species, cause a wildlife population to drop below self-sustaining levels, or threaten to eliminate a plant or animal community;

- interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites; or

- conflict with the provisions of the SJMSCP.

IMPACT ANALYSIS

The project proponent is proposing to seek coverage under the SJMSCP. Therefore, the following impact statements are presented in a manner consistent with species groupings used in the SJMSCP.

The impact analysis evaluates all the onsite project elements, including proposed development in the RID Area, flood control improvement activities in the PCIP and PCC Areas, and bridge crossings over the San Joaquin River and Paradise Cut. To the extent possible, offsite infrastructure improvements such as the construction of electrical transmission lines, pipelines, highway interchange improvements, and the extension of Golden Valley Parkway to I-205 are evaluated.

Impact 4.14-a

Terrestrial Biology - General Biological Resources. *Implementation of the proposed project would result in development or conversion of approximately 3,925 acres of agricultural, ruderal, and developed areas that provide habitat for a limited number of common plant and wildlife species. This impact is considered* ***less than significant***.

Approximately 3,925 acres of agricultural, ruderal, and developed areas would be lost during development of the RID Area. This development would reduce the local populations of several common plant and wildlife species. Approximately 415 acres would be lost during Phase 1a, approximately 1,355 additional acres would be lost during Phase 1, and approximately 2,155 acres would be lost during Phase 2. An additional 190 acres would be converted to open water during expansion of the Paradise Cut canal in Phase 2. However, agricultural and ruderal lands are locally and regionally abundant habitats, and neither habitat is considered a sensitive natural plant community. Common plant and wildlife species associated with these habitats are also locally and regionally abundant. Therefore, the proposed project would not substantially adversely affect common plant and wildlife species and impacts would be less than significant.

Impact 4.14-b

Terrestrial Biology - Special-Status Plants*. Loss and disturbance of aquatic and riparian habitats associated with project activities during all three phases could result in loss of special-status plants. This impact is considered* ***potentially significant****.*

The Suisun marsh aster, slough thistle, Delta button-celery, rose mallow, Delta tule pea, Mason's lilaeopsis, Sanford's arrowhead, and Wright's trichocoronis could be present in aquatic and riparian habitats in the RID Area, PCIP Area, and PCC Area. Previous focused surveys did not document any of these species, but surveys were not conducted in the PCIP Area. Furthermore, surveys were conducted in 1993, and species could have become established in the interim in areas that were previously unoccupied. Special-status plants could be lost during Phase 1a as a result of levee breaching during construction of back bays on the San Joaquin River. During Phase 1, loss of special-status plants in the RID Area could result from fill of approximately 3 acres of the main agricultural ditch where it crosses the Employment Center and Lake Harbor district, fill of the approximately 2.5-acre pond during widening of Paradise Cut, and construction of the two bridges over the San Joaquin River; loss in the PCIP Area could result from excavation of the bench near Paradise Weir; and loss in the PCC Area could result from breaching the Paradise Cut levee. During Phase 2, loss of special-status plants could result from fill of the remaining 5 acres of the agricultural ditch in the West Village and Woodlands districts and construction of the Golden Valley Parkway bridge over Paradise Cut. Loss of special-status plants would be a significant impact. However, because special-status plants are not known to occur on the project site, this impact is considered potentially significant.

Impact 4.14-c

Terrestrial Biology - Valley Elderberry Longhorn Beetle*. Loss and disturbance of areas supporting natural vegetation during Phases 1 and 2 could result in loss of blue elderberry shrubs, which provide habitat for the valley elderberry longhorn beetle. Loss of elderberry shrubs is considered a* ***significant*** *impact.*

Elderberry shrubs are known to occur in the RID and PCC Areas, and they could be present in the PCIP Area. However, focused surveys for elderberry shrubs have not been conducted throughout the project site, so it is not known how many are present in these areas. Elderberry shrubs would not be affected during Phase 1a because there are none present in the area proposed for development. During Phase 1, loss of elderberry shrubs in the RID Area would result from vegetation removal at the pond and could result from construction of the two bridges over the San Joaquin River, loss in the PCIP Area could result from excavation of the bench near Paradise Weir, and loss in the PCC Area could result from breaching the Paradise Cut levee. No shrubs were observed in the PCIP Area during reconnaissance surveys, but their presence cannot be ruled out, due to the lack of focused surveys. During Phase 2, loss of elderberry shrubs would result from levee breaching during construction of back bays along Old River and could result from construction of the Golden Valley Parkway bridge over Paradise Cut. Loss of elderberry shrubs would be considered a significant impact on valley elderberry longhorn beetle.

Impact 4.14-d

Terrestrial Biology - Giant Garter Snake*. Potential habitat for giant garter snake would be lost and/or disturbed as a result of project activities during Phases 1 and 2. Loss of giant garter snakes or their habitat is considered a* ***significant*** *impact.*

Giant garter snakes are not known to occur in the vicinity of the project area and were not documented during focused surveys in 1993, but suitable aquatic habitat is present in agricultural ditches and the pond in the RID Area and in aquatic areas in the PCIP and PCC Areas. No giant garter snake habitat would be affected during Phase 1a. During Phase 1, loss of potential habitat in the RID Area would result from fill of approximately 3 acres of the main agricultural ditch where it crosses the Employment Center and Lake Harbor district and fill of the approximately 2.5-acre pond during widening of Paradise Cut; disturbance of potential habitat in the PCC Area would result from breaching the existing levee after setback levees are constructed. During Phase 2, loss of potential habitat would result from fill of the remaining 5 acres of the agricultural ditch in the West Village and Woodland districts and could result from construction of the Golden Valley Parkway bridge over Paradise Cut. Loss of potential giant garter snake habitat would be a significant impact.

Impact 4.14-e

<u>Terrestrial Biology - Western Pond Turtle</u>. *Suitable aquatic habitat for western pond turtle would be lost or disturbed as a result of project activities during Phases 1 and 2. This impact is considered* ***potentially significant****.*

Western pond turtles are known to occur in Paradise Cut and the San Joaquin River. During Phase 1, loss of approximately 2.5 acres of suitable aquatic habitat in the RID Area would result from filling of the pond, and disturbance of aquatic habitat in the San Joaquin River would result from construction of the two bridges; disturbance of aquatic habitat in the PCC Area would result from breaching the existing levee. During Phase 2, disturbance of suitable aquatic habitat would result from construction of Golden Valley Parkway bridge over Paradise Cut. Levees along the San Joaquin River and Paradise Cut could provide suitable nesting sites, but regular management activities make it very unlikely for pond turtles to nest in the levees. Therefore, potential nesting is restricted to less disturbed upland areas in Paradise Cut that would not be affected by the proposed project. If pond turtles are present in the vicinity of in-water project activities in the San Joaquin River and Paradise Cut, they could move to adjacent, less disturbed aquatic habitat. However, due to the isolation of the pond, if turtles are present, they would be lost as a result of its fill. This loss, if turtles are present in the pond, would be a significant impact.

Impact 4.14-f

<u>Terrestrial Biology - Swainson's Hawk</u>. *Suitable Swainson's hawk foraging habitat would be lost, and loss of active nests could occur as a result of project activities during all three phases. This impact is considered* ***significant****.*

Agricultural and fallow fields in the RID Area and PCC Area provide suitable Swainson's hawk foraging habitat. Suitable foraging habitat in the RID Area would be lost during all three project phases. Approximately 415 acres of foraging habitat would be lost during Phase 1a, approximately 1,355 additional acres would be lost during Phase 1, and approximately 2,155 acres would be lost during Phase 2. An additional 190 acres would be converted to open water during expansion of the Paradise Cut canal in Phase 2. Swainson's hawks are currently known to nest in the RID Area, PCIP Area, and PCC Area. Nine Swainson's hawk nests were documented in, or within 2 miles of, these areas in 1994 (Sycamore Environmental Consultants 1995). Removal of suitable nest trees would be limited to those few present at the pond and other scattered locations in the RID Area. Direct nest loss could result from tree removal, and nesting pairs in the vicinity of any construction activities during all three phases could be disturbed, potentially resulting in nest abandonment and mortality of chicks and eggs. The loss of active Swainson's Hawk nests and the loss of suitable foraging habitat would be significant impacts.

Impact **4.14-g**

Terrestrial Biology - Aleutian Canada Goose and Greater Sandhill Crane. *Winter foraging habitat for Aleutian Canada goose and greater sandhill crane would be lost during all three project phases, but suitable foraging habitat for these species is locally and regionally abundant. This impact is considered* ***less than significant****.*

Agricultural fields in the RID Area and PCC Area provide suitable foraging habitat for Aleutian Canada goose and sandhill crane. This habitat would be lost in the RID Area during all three project phases. Approximately 415 acres of foraging habitat would be lost during Phase 1a, approximately 1,355 additional acres would be lost during Phase 1, and approximately 2,155 acres would be lost during Phase 2. An additional 190 acres would be converted to open water during expansion of the Paradise Cut canal in Phase 2. However, similar agricultural fields are abundant in the immediate vicinity, and these species could easily relocate foraging efforts to such fields. Therefore, loss of foraging habitat for Aleutian Canada goose and greater sandhill crane would be a less-than-significant impact.

Impact **4.14-h**

Terrestrial Biology - Burrowing Owl. *Suitable burrowing owl foraging habitat would be lost and potential and active burrows could be removed as a result of project activities during all three phases. This impact is considered* ***significant****.*

Burrowing owls are not known to nest on the project site, but evidence of their presence has been observed in the RID Area. At present, potential burrow habitat on the project site is limited to agricultural field edges and levees along the San Joaquin River, Old River, and Paradise Cut. If present, suitable burrows are expected to be very limited in number, due to intensive agricultural activity and low numbers of California ground squirrels. Occupied burrows could be destroyed and nesting owls could be disturbed by nearby project activities during all three phases, potentially resulting in nest abandonment and mortality of chicks and eggs. In addition, agricultural fields, fallow fields, and other areas of herbaceous vegetation in the RID Area and PCC Area provide suitable foraging habitat. This potential foraging habitat would be lost in the RID Area during all three project phases. Approximately 415 acres of foraging habitat would be lost during Phase 1a, approximately 1,355 additional acres would be lost during Phase 1, and approximately 2,155 acres would be lost during Phase 2. An additional 190 acres would be converted to open water during expansion of the Paradise Cut canal in Phase 2. Loss of active burrows, individual owls, or substantial amounts of used foraging habitat would be significant impacts.

Impact **4.14-i**

Terrestrial Biology - Colonial Nesting Birds. *Suitable foraging habitat for the tricolored blackbird, black-crowned night-heron, and great blue heron would be lost during all three project phases, but no nesting colonies of these species are known or expected to occur on the project site, and suitable foraging habitat is locally and regionally abundant. This impact is considered* ***less than significant****.*

Agricultural and fallow fields in the RID Area and PCC Area could be used as foraging habitat by the tricolored blackbird, black-crowned night-heron, and great blue heron. Potential foraging habitat in the RID Area would be lost during all three project phases. Approximately 415 acres would be removed during Phase 1a, approximately 1,355 additional acres would be removed during Phase 1, and approximately 2,155 acres would be removed during Phase 2. An additional 190 acres would be converted to open water during expansion of the Paradise Cut canal in Phase 2. However this would likely provide new foraging opportunities for black-crowned night heron and great blue heron. Foraging habitat for these species is locally and regionally abundant and they are not expected to nest on the project site. Habitat in the PCC Area and the PCIP Area and agricultural ditches in the RID Area provide very marginal nesting habitat, but there are no documented nesting colonies of tricolored blackbird in the project area, and the nearest historic colony has been extirpated. Similarly, there are no documented black-crowned night heron or great blue heron nest colonies in the vicinity of the project area, and potential nesting habitat is of marginal quality. As a result, no nesting colonies of these species are expected to occur or are anticipated to be affected by project activities. Therefore, impacts are associated only with the loss of potential foraging habitat. These impacts are considered less than significant.

Impact
4.14-j

***Terrestrial Biology - Ground-Nesting or Streamside/Lakeside-Nesting Birds**. Suitable nesting habitat for northern harrier would be disturbed during Phase 1 and could result in loss of active nests. This impact is considered **potentially significant**.*

Approximately 40 acres of potential northern harrier nesting habitat in the PCIP Area would be temporarily removed during excavation of the bench near Paradise Weir in Phase 1. If present, active nests could be directly destroyed by project activities, and harriers nesting in the vicinity of any construction activities could be disturbed, potentially resulting in nest abandonment and mortality of chicks and eggs. If northern harriers nest on the project site, loss of an active northern harrier nest would be considered a significant impact. However, because it is not known whether northern harriers nest on the project site, this impact is considered potentially significant.

Impact
4.14-k

***Terrestrial Biology - Birds Nesting in Isolated Trees or Shrubs Outside of Riparian Habitat**. Yellow warblers are not expected to nest on the project site and are unlikely to be affected by the proposed project, but loggerhead shrike nests could be lost as a result of project construction during Phase 1. This impact is considered **potentially significant**.*

Patches of riparian habitat on the project site provide very marginal quality nesting habitat for the yellow warbler, and breeding yellow warblers are very rare in San Joaquin County. In addition, disturbance of potentially suitable nesting habitat would be limited to the willow patch near the Paradise Weir. Therefore, they are unlikely to be adversely affected by the proposed project. Loggerhead shrikes are regularly observed foraging throughout the project site and they could nest in various areas with small trees and/or shrubs. During Phase 1, shrike nesting habitat would be affected and active nests could be destroyed by vegetation removal and excavation of the bench near Paradise Weir, and by vegetation removal and fill of the pond during the widening of Paradise Cut. In addition, shrikes nesting along the UPPR tracks in the RID Area and in Paradise Cut could be disturbed by nearby project construction, potentially resulting in nest abandonment and mortality of chicks and eggs. However, because it is not known whether loggerhead shrikes nest on the project site, this impact is considered potentially significant.

Because yellow warblers are not expected to nest in the project area and disturbance of potentially suitable habitat would be minimal, impacts on this species would be less than significant. Loss of active loggerhead shrike nests, if they occur, would be a significant impact.

Impact
4.14-l

Terrestrial Biology - Birds Nesting along Riparian Corridors. *Yellow-breasted chats are not expected to nest in the project area and are unlikely to be affected by the proposed project, but Cooper's hawk and white-tailed kite nests could be lost as a result of project construction during all three phases. This impact is considered* ***significant****.*

The few patches of dense riparian shrubs along the San Joaquin River and in Paradise Cut provide very marginal quality nesting habitat for yellow-breasted chat, and vegetation in these areas would not be removed during project construction. In addition, breeding chats are very rare in San Joaquin County. Therefore, they are not expected to be affected by the proposed project. Suitable nesting habitat for white-tailed kite and Cooper's hawk is present in riparian habitat in all of the project component areas, and kite nests have been documented along the San Joaquin River and the UPPR tracks in the RID Area (Grunwald & Associates 1995). Active nests could be lost during all three project phases as a result of construction in or near riparian habitat throughout the project site. Direct nest loss could result from tree removal, and nesting pairs could be disturbed by nearby project activity, potentially resulting in nest abandonment and mortality of chicks and eggs. Because yellow-breasted chats are not expected to nest in the project area, impacts on this species would be less than significant. Loss of an active white-tailed kite or Cooper's hawk nest would be a significant impact.

Impact
4.14-m

Terrestrial Biology - Snowy Egret, American White Pelican, Double-Crested Cormorant, and White-Faced Ibis. *Suitable foraging habitat for these species would be lost or disturbed during all three project phases; however, these species are not expected to nest in the project area, and similar foraging habitat is locally and regionally abundant. This impact is considered* ***less than significant****.*

Agricultural and fallow fields in the RID Area and PCC Area could be used as foraging habitat by the white-faced ibis, and aquatic habitat in all three project component areas could be used by the ibis, snowy egret, American white pelican, and double-crested cormorant. Agricultural habitat in the RID Area would be lost during all three project phases. Approximately 415 acres of habitat would be lost during Phase 1a, approximately 1,355 additional acres would be lost during Phase 1, and approximately 2,155 acres would be lost during Phase 2. Aquatic habitat in the RID and PCC Areas would be disturbed during Phases 1 and 2. Approximately 190 acres of agricultural land would be converted to open water during expansion of the Paradise Cut canal in Phase 2. However, this probably would provide new foraging opportunities for these species.

Suitable agricultural and aquatic foraging habitat is available and abundant in the project region. In addition, none of these species are known or expected to nest in the vicinity of the project area, due to lack of suitable habitat. Therefore, impacts on snowy egret, American white pelican, double-crested cormorant, and white-faced ibis would be less than significant.

Impact 4.14-n

Terrestrial Biology - Ferruginous Hawk, Mountain Plover, Merlin, and Long-Billed Curlew*. Suitable foraging habitat for these wintering species would be lost during all three project phases, but similar foraging habitat is locally and regionally abundant. This impact is considered* ***less than significant****.*

The ferruginous hawk, mountain plover, merlin, and long-billed curlew could forage in agricultural and fallow fields in the RID Area and PCC Area. Potential foraging habitat in the RID Area would be lost during all three project phases. Approximately 415 acres of habitat would be lost during Phase 1a, approximately 1,355 additional acres would be lost during Phase 1, and approximately 2,155 acres would be lost during Phase 2. An additional 190 acres would be converted to open water during expansion of the Paradise Cut canal in Phase 2. However, shallow water in the canal would likely provide new foraging opportunities for the long-billed curlew. Suitable foraging habitat is locally and regionally abundant, and the project site is not in the breeding range of these species. Therefore, impacts on the ferruginous hawk, mountain plover, merlin, and long-billed curlew would be less than significant.

Impact 4.14-o

Terrestrial Biology - Common Tree-Nesting Raptors*. Red-tailed hawk, red-shouldered hawk, and great-horned owl nests could be lost as a result of project activities during all three project phases. Loss of an active raptor nest is considered a* ***significant*** *impact.*

The red-tailed hawk, red-shouldered hawk, and great-horned owl are known to nest in the RID and PCC Areas, and suitable nest trees are also present in the PCIP Area. In 1994, one red-tailed hawk nest was documented in the RID Area, along the UPPR tracks, and one red-tailed hawk and one great-horned owl nest were documented on the opposite bank of the Old River, immediately adjacent to the RID Area. In the same year, four red-tailed hawk nests, one red-shouldered hawk nest, and two great-horned owl nests were documented in the PCC Area (Sycamore Environmental Consultants 1995). Although these raptor species are not considered special-status species, and they are not covered by the SJMSCP, they are protected under §3503.5 of the California Fish and Game Code, which prohibits the destruction of raptors and their nests. Active nests could be lost during all three project phases as a result of construction in or near areas with suitable nest trees. Removal of suitable nest trees would be limited to those present in the RID Area. However, nesting pairs in other areas could be disturbed by nearby project activity, potentially resulting in nest abandonment and mortality of chicks and eggs. Loss of an active raptor nest would be a significant impact.

Impact 4.14-p

Terrestrial Biology - Special-Status Bats*. Construction throughout the project site during all three project phases could remove foraging habitat for special-status bats, but the project site is not expected to contain important roost sites that would be affected. This impact is considered* ***less than significant****.*

The greater western mastiff bat, red bat, Yuma myotis, and Townsend's big-eared bat could forage on the project site. However, bat foraging habitat is locally and regionally abundant. The brick silos just east of the UPRR tracks west of I-5 are known to provide bat roosting habitat; however, the silos would not be affected by project activities. There is potential for buildings in the RID Area and trees throughout the project site to provide roost sites for a small number of bats, but these are not expected to support large numbers of individuals or to provide important maternity roost sites. Because no important roosting sites would be affected, potential impacts on special-status bats would be less than significant.

Impact
4.14-q

Terrestrial Biology - Riparian Brush Rabbit*. Project activities during construction Phases 1 and 2 would result in temporary and limited permanent loss and disturbance of suitable riparian brush rabbit habitat and could result in direct impacts on brush rabbits. This impact is considered* ***significant****.*

Paradise Cut is considered occupied habitat for riparian brush rabbit (San Joaquin County 2000). A trapping study conducted in 2001 (Williams and Hamilton 2002) resulted in capture of 21 individuals, primarily in the area immediately west of the UPPR tracks west of I-5. Vegetation along the UPPR right-of-way is also known to support brush rabbits. No attempt has been made to estimate population density, but the population was believed to consist of a few hundred individuals at the time of the 2001 study. Approximately 40 acres of occupied habitat in the PCIP Area would be removed during Phase 1 excavation of the bench near Paradise Weir. Vegetation on the bench would be restored after excavation, but there would be a temporary loss of habitat before it becomes reestablished. Loss of habitat could also result from construction of Golden Valley Parkway bridge over Paradise Cut during Phase 2. Activities such as breaching the Paradise Cut levee and constructing the cross levee in Phase 1 would occur in the vicinity of suitable habitat and could result in disturbance of brush rabbits. Indirect impacts on brush rabbits could occur as a result of project development, including increased mortality from domestic pets, particularly feral cats. However, methods to reduce the potential for increased mortality have been integrated into the project design. The cross levee would be set back from the existing railroad right-of-way and would have a fence, wall, or other barrier to prevent people and animals from entering the railroad right-of-way. This would preserve the existing habitat in the right-of-way and help protect it from intrusion by brush rabbit predators. The widened Paradise Cut canal would also act as a barrier to domestic pets entering Paradise Cut. Direct and indirect impacts on riparian brush rabbits, including loss of habitat and disturbance during construction, are considered significant.

Impact
4.14-r

Terrestrial Biology - Jurisdictional Waters of the United States and Riparian Habitat*. Project construction during all three phases would result in loss, disturbance, and/or alteration of jurisdictional waters and riparian habitat. This impact is considered* ***significant****.*

Jurisdictional wetlands in the RID Area would be lost as a result of fill of the approximately 8-acre agricultural ditch (roughly 22,000 linear feet) that transects the area and the approximately 2.5-acre pond. The pond and approximately 3 acres of the agricultural ditch would be lost during Phase 1, and the remaining approximately 5 acres of the ditch would be lost during Phase 2. Construction of the Bradshaw's Crossing bridge over the San Joaquin River during Phase 1 and the Golden Valley Parkway bridges over the San Joaquin River and Paradise Cut during Phase 2 would result in fill of waters of the United States from placement of in-water pillars. Minor alteration of waters of the United States could result from construction of docks and back bays on the San Joaquin River and Old River during all three project phases, and waters of the United States in Paradise Cut could be altered slightly by breaching of the existing levee during Phase 1. Removal of riparian vegetation is expected to be limited to temporary removal of scrub on the approximately 40-acre bench near Paradise Weir. Fill of jurisdictional wetlands, alteration of waters of the United States, and temporary loss of approximately 40 acres of riparian scrub would be considered significant impacts.

Impact 4.14-s

***Terrestrial Biology - Wildlife Corridors**. Construction of the Lathrop Landing back bay on the San Joaquin River would conflict with the SJMSCP prohibition against development in the San Joaquin River Wildlife Corridor. This impact is considered **significant**.*

The San Joaquin River Wildlife Corridor outlined in the SJMSCP (Section 5.5.2.3) encompasses approximately 19 miles of the San Joaquin River, from the San Joaquin/Stanislaus County line to the convergence of Old River and the San Joaquin River. This area includes approximately 38 miles of combined shoreline on both sides of the river. The RID Area accounts for approximately 5 miles of western shoreline in this corridor. Project development along the southern 3 miles of shoreline would be restricted to walkways and docks. These structures are not expected to have a significant adverse effect on wildlife movement. In addition, existing habitat along this portion of the river would be retained and enhanced as part of the proposed project.

However, the Lathrop Landing back bay and adjacent commercial development to the north and west could act as a barrier to wildlife movement, excluding terrestrial wildlife from approximately 2 miles at the end of the wildlife corridor between Lathrop Landing and Old River. This is equivalent to approximately 5.3% of the total shoreline in the SJMSCP wildlife corridor. Providing a barrier to terrestrial wildlife access of this 2 miles of river shoreline is not likely to interfere substantially with the movement of terrestrial wildlife species or with established wildlife corridors, because the portion between Lathrop Landing and Old River supports very little vegetation and provides little value as wildlife habitat. In addition, Old River acts as a barrier to the movement of terrestrial wildlife along the western bank of the San Joaquin River beyond this 2-mile area. Also, habitat improvements in Paradise Cut would enhance its function as a wildlife corridor connecting the San Joaquin River south of Lathrop Landing to the Old River system. Although from a biological standpoint, separating this 2-mile segment of shoreline from wildlife corridor is not considered significant, development of Lathrop Landing in the San Joaquin River Wildlife Corridor would conflict with the SJMSCP restriction on development in this area. Therefore, it would be considered a significant impact.

Impact 4.14-t

***Terrestrial Biology - Biological Resources Associated with Offsite Facilities.** Construction of offsite facilities could adversely affect special-status species and sensitive habitats if they occur in or near the facility footprint. This impact is considered **potentially significant**.*

Although general corridors and footprints have been identified for various offsite project features (e.g., electrical transmission line, pipelines, extension of Golden Valley Parkway to I-205, interchange improvements), centerlines and potential disturbance areas have not been confirmed sufficiently to allow efficient surveys. In addition, property access for surveys is unavailable in some areas. However, a review of aerial photographs and multiple "windshield surveys" in the project vicinity indicate that biological resources surrounding the project area are consistent with those found in the RID, PCIP, and PCC Areas. The final routes for offsite facilities may contain habitat or individuals of special-status plant and wildlife species. Sensitive habitats such as wetlands or riparian communities also may occur in these areas. If these resources occur in or near the facility footprints, they could be adversely affected. This could be considered a significant impact depending on the exact nature and extent of the adverse effect. If impacts do occur, they would be consistent with those already described in this section.

4.14.4 MITIGATION MEASURES

No mitigation measures are necessary for the following less-than-significant impacts.

4.14-a	General Biological Resources
4.14-g	Aleutian Canada Goose and Greater Sandhill Crane
4.14-i	Colonial Nesting Birds
4.14-m	Snowy Egret, American White Pelican, Double-Crested Cormorant, and White-Faced Ibis
4.14-n	Ferruginous Hawk, Mountain Plover, Merlin, and Long-Billed Curlew
4.14-p	Special-Status Bats

The following mitigation measures are provided for significant and potentially significant impacts.

The project proponent would seek coverage under the SJMSCP to mitigate for project impacts and obtain incidental take authorization for SJMSCP-covered species under the City's Section 10(a) and Section 2081 permits. The Section 10(a) permit also serves as a special purpose permit for the incidental take of those species that are also covered under the MBTA.

Coverage under the SJMSCP would fully mitigate all impacts on special-status wildlife species addressed in this section, with the exception of riparian brush rabbit and possibly special-status plants and giant garter snake (see discussions below). Impacts on waters of the United States, including wetlands, would be mitigated through a separate USACE permitting process (see discussion below). Impacts and mitigation measures for fisheries resources are described separately in section 4.15, "Fisheries."

Compensation for unavoidable impacts on all SJMSCP-covered species would be accomplished through payment of development fees for conversion of open space lands that may provide habitat for these species. These fees would be used to preserve and/or create habitat in preserves to be managed in perpetuity. In addition, incidental take avoidance and minimization measures for species that could be significantly affected as a result of the proposed project would be implemented in accordance with requirements of the SJMSCP. Mitigation Measures 4.14-b through 4.14-i are consistent with those set forth in the SJMSCP. The remaining mitigation measures address impacts not specifically covered by the SJMSCP.

4.14-b **Special-Status Plants**. The following is a summary and clarification of SJMSCP incidental take avoidance and minimization measures for special-status plants:

- Before project implementation, surveys for the special-status plants listed in Table 4.14-1 shall be conducted by a qualified botanist at the appropriate time of year when the target species would be in flower or otherwise clearly identifiable. Because all of the target special-status plants are associated with wetland and riparian habitats, the survey can focus on these habitats.

- If no special-status plants are found during focused surveys, the findings shall be documented in a letter report to the regulatory agencies, and no further mitigation will be required.

- If special-status plants are found, the following measures shall be implemented:

  Sanford's arrowhead, Delta button-celery, and Slough thistle: The SJMSCP requires complete avoidance for these species; therefore, potential impacts on these species could not be covered through participation in the plan. If these species are present in the project area and cannot be avoided, a separate consultation with the regulatory agencies would be required. This consultation shall determine appropriate mitigation measures for any populations affected by the project, such as creation of offsite populations through seed collection or transplanting, preserving and enhancing existing populations, or restoring or creating suitable habitat in sufficient quantities to compensate for the impact. All mitigation measures determined necessary during this consultation shall be implemented by the project proponent.

  Mason's lilaeopsis, rose mallow, Suisun marsh aster and Delta tule pea: These species are considered widely distributed species by the SJMSCP, and dedication of conservation easements is the preferred option for mitigation. If these species are found in the project area and a conservation easement is not an option, payment of SJMSCP development fees may be used to mitigate impacts on these species.

  Wright's trichocoronis: This species is considered a narrowly distributed species by the SJMSCP, and dedication of conservation easements is the preferred option of mitigation. If this species is found in the project area and the dedication of a conservation easement is not an option, the SJMSCP requires a consultation with the permitting agency representatives on the Technical Advisory Committee to determine the appropriate mitigation measures. These may include seed collection or other measures and would be determined on a population basis, taking into account the species type, relative health, and abundance. After the appropriate mitigation has been determined, it shall be implemented by the project proponent.

Implementation of Mitigation Measure 4.14-b and compensation requirements of the SJMSCP (if applicable) would reduce impacts on special-status plants to a less-than-significant level.

4.14-c **Terrestrial Biology - Valley Elderberry Longhorn Beetle.** The following is a summary and clarification of SJMSCP incidental take avoidance and minimization measures for the valley elderberry longhorn beetle (VELB):

- Before project construction, a survey for elderberry shrubs shall be conducted where elderberries could occur within 50 feet of construction areas, including the banks of the San Joaquin River, the PCIP Area and the PCC Area.
- For all shrubs that are to be retained on the project site, a setback of 20 feet from the dripline of each elderberry bush found during the survey shall be established.
- Brightly colored flags or fencing shall be used to demarcate the 20-foot setback area and shall be maintained until project construction in the vicinity is complete.
- For all shrubs without evidence of VELB exit holes that cannot be retained on the project site, all stems of 1 inch or greater in diameter at ground level shall be counted. Compensation for removal of these stems shall be provided in SJMSCP preserves as provided in SJMSCP Section 5.5.4(B).
- All shrubs with evidence of VELB exit holes or other evidence of VELB occupation that cannot be retained in the project area shall be transplanted to VELB mitigation sites during the dormant period for elderberry shrubs (November 1 to February 15). For elderberry shrubs displaying evidence of VELB occupation that cannot be transplanted, compensation for removal of shrubs shall be as provided, in accordance with SJMSCP Section 5.5.4(C).

Implementation of Mitigation Measure 4.14-c and compensation requirements of the SJMSCP would reduce impacts on the valley elderberry longhorn beetle to a less-than-significant level.

4.14-d **Terrestrial Biology - Giant Garter Snake.** The SJMSCP requires full avoidance of known occupied giant garter snake habitat. Based on the lack of evidence during previous focused surveys, the giant garter snake is not expected to be present on the project site. However, if the giant garter snake is discovered on the project site, a separate consultation with USFWS under the ESA and CDFG under the CESA may be required. The following is a summary of SJMSCP and USFWS incidental take avoidance and minimization measures for the giant garter snake:

- Preconstruction surveys for the giant garter snake shall occur within 24 hours of ground disturbance.
- Construction within 200 feet of suitable aquatic habitat for giant garter snake shall occur during the active period for the snake, between May 1 and October 1. Between October 2 and April 30, the Joint Powers Authority, with the concurrence of the Permitting Agencies' representatives on the Technical Advisory Committee, shall determine whether additional measures (e.g., daily presence/absence surveys, exclusion fencing) are necessary to minimize and avoid take.

- Limit vegetation clearing within 200 feet of the banks of potential giant garter snake aquatic habitat to the minimal area necessary.
- Confine the movement of heavy equipment within 200 feet of the banks of potential giant garter snake aquatic habitat to existing roadways to minimize habitat disturbance.
- Before ground disturbance, all onsite construction personnel shall be given instruction regarding the presence of the giant garter snake and the importance of avoiding impacts on this species and its habitats.
- In areas where wetlands, irrigation ditches, or other potential giant garter snake habitats are being retained on the site and are within 200 feet of an active construction area:
  a. install temporary fencing around potential garter snake habitat;
  b. restrict working areas, spoils and equipment storage, and other project activities to areas outside of potential garter snake habitat; and
  c. maintain water quality and limit construction runoff into wetland areas through the use of hay bales, filter fences, vegetative buffer strips, or other accepted equivalents.
- Other provisions of the USFWS Standard Avoidance and Minimization Measures during Construction Activities in Giant Garter Snake Habitat shall be implemented (excluding programmatic mitigation ratios, which are superceded by the SJMSCP's mitigation ratios).

Implementation of Mitigation Measure 4.14-d and compensation requirements of the SJMSCP would reduce impacts on the giant garter snake to a less-than-significant level.

4.14-e **Terrestrial Biology - Western Pond Turtle.** The following measures are designed to minimize potential loss of western pond turtles:

- During dewatering and fill of the pond in the RID Area, a qualified biologist shall be present onsite to search for western pond turtles. If no pond turtles are observed, no further mitigation is necessary.
- If pond turtles are found, they shall be relocated by the biologist to the nearest suitable aquatic habitat in Paradise Cut.

Implementation of Mitigation Measure 4.14-e and compensation requirements of the SJMSCP would reduce impacts on the western pond turtle to a less-than-significant level.

4.14-f **Terrestrial Biology - Swainson's Hawk.** The City of Lathrop has obtained a California Endangered Species Act Management Authorization from CDFG for the WLSP (1996) to offset the impacts on the Swainson's hawk from development of West Lathrop. The management authorization is dependent on implementation of the WLSP habitat management agreement for

Swainson's hawk (Sycamore Environmental Consultants 1995). However, because the project proponent would seek coverage under the SJMSCP, it is anticipated that the SJMSCP would be the mechanism used to mitigate impacts on the Swainson's hawk from the proposed project. As an alternative, the existing management authorization could be used. A summary of both mitigation alternatives is provided below.

The following minimization measures are a summary and clarification of those set forth in the SJMSCP. These would be implemented in addition to payment of development fees required by the SJMSCP for funding of the establishment of habitat conservation areas.

- If project activity would occur during the Swainson's hawk nesting season (March 1 to August 15), preconstruction surveys shall be conducted during the nesting season in areas with suitable nest trees in and immediately adjacent to the construction area. The survey shall be conducted within 1 week before the beginning of construction.
- If an active nest is found, all construction activities shall remain a distance of two times the dripline of the tree, measured from the nest. A setback of this distance shall be established and maintained during the nesting season for the period encompassing nest building and continuing until fledglings leave the nest. This setback applies whenever construction or other ground-disturbing activities must begin during the nesting season in the presence of nests which are known to be occupied. Setbacks shall be marked by brightly colored temporary fencing.
- If the project proponent elects to remove a nest tree, then nest trees shall be removed between September 1 and February 15, when the nests are unoccupied.

The following measures are a summary of those set forth in the California Endangered Species Act Management Authorization from CDFG for the WLSP:

- Mitigation for the loss of suitable Swainson's hawk foraging habitat shall be provided at a ratio of 0.5 acre of dedicated habitat to 1 acre of foraging habitat to be lost.
- Before project construction that would occur during the nesting season (March 1 through August 15), surveys shall be conducted for active Swainson's hawk nests in areas with suitable nest trees within 0.25 mile of the proposed construction area. Large trees throughout the project site provide suitable habitat. Surveys shall be conducted at the beginning of the nesting season (April 15 through April 30). A visible exclusion zone shall be established around the portion of the construction area that occurs within 0.25 mile of the nest tree, and no project construction activity shall commence in the exclusion zone between March 1 and August 15. Nests shall be revisited during the posthatching stage (June 1 through June 30) and during the fledging period (July 1 through July 31) to determine the number of juveniles that have fledged.
- All active and historic (those used during the previous 5 years) Swainson's hawk nest trees in the project area shall be preserved during implementation of the proposed project. No construction shall occur within 100 feet of a historic nest tree. A visible

100-foot exclusion zone shall be established around any historic nest tree located within 150 feet of a designated construction area.

Implementation of Mitigation Measure 4.14-g and compensation requirements of the SJMSCP (if applicable) would reduce impacts on the Swainson's hawk to a less-than-significant level.

4.14-h **Terrestrial Biology - Burrowing Owl.** The following is a summary and clarification of SJMSCP incidental take avoidance and minimization measures for burrowing owl:

- Burrowing owls may be discouraged from entering or occupying construction areas by discouraging the presence of ground squirrels. To accomplish this, the project proponent could prevent ground squirrels from occupying the project site by employing one of several methods outlined in Section 5.2.4.15 of the SJMSCP. These include retention of tall vegetation, regular disking of the site, or use of chemicals or traps to kill ground squirrels.
- Preconstruction surveys for burrowing owls shall be conducted within 75 meters of areas of project activity in locations with potential burrow habitat, including field edges, roadsides, levees, and fallow fields. Actively farmed agricultural fields and regularly disked or graded fields do not provide suitable burrow sites and need not be surveyed. The survey shall be conducted within 1 week before the beginning of construction. If burrowing owls are found, the following measures shall be implemented:

  During the nonbreeding season (September 1 through January 31), burrowing owls occupying the project site shall be evicted from the project site by passive relocation as described in the CDFG's Staff Report on Burrowing Owls (CDFG 1995).

  During the breeding season (February 1 through August 31), occupied burrows shall not be disturbed and shall be provided with a 75-meter protective buffer until and unless the Technical Advisory Committee, with the concurrence of the permitting agencies' representatives on the Technical Advisory Committee, or a qualified biologist approved by the permitting agencies, verifies through noninvasive means that either (1) the birds have not begun egg laying or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival. After the fledglings are capable of independent survival, the burrow can be destroyed.

Implementation of Mitigation Measure 4.14-h and compensation requirements of the SJMSCP would reduce impacts on burrowing owl to a less-than-significant level.

4.14-j **Terrestrial Biology - Ground-Nesting or Streamside/Lakeside-Nesting Birds.** The following is a summary and clarification of SJMSCP incidental take avoidance and minimization measures for the northern harrier:

- If project activity would occur during the northern harrier nesting season (March 15 through September 15), preconstruction surveys shall be conducted during the nesting season in suitable nesting habitat within 500 feet of areas of project activity. Suitable habitat is currently limited to the bench in the PCIP Area but also could include fallow fields if they are allowed to develop herbaceous cover. The survey shall be conducted within 1 week before the beginning of construction.

- A setback of 500 feet from nesting areas shall be established and maintained during the nesting season for the period encompassing nest building and continuing until fledglings leave nests. This setback applies whenever construction or other ground-disturbing activities must begin during the nesting season in the presence of nests which are known to be occupied. Setbacks shall be marked by brightly colored temporary fencing.

Implementation of Mitigation Measure 4.14-j and compensation requirements of the SJMSCP would reduce impacts on the northern harrier to a less-than-significant level.

4.14-k **Terrestrial Biology - Birds Nesting in Isolated Trees or Shrubs Outside of Riparian Habitat.** The following is a summary and clarification of SJMSCP incidental take avoidance and minimization measures for the loggerhead shrike:

- If project activity would occur during the loggerhead shrike nesting season (March 1 through August 31), preconstruction surveys shall be conducted during the nesting season in suitable nesting habitat within 100 feet of areas of project activity. Suitable nesting habitat includes areas with natural vegetation of shrubs and small trees, including the UPRR tracks west of I-5, the PCIP Area, and the PCC Area. The survey shall be conducted within 1 week before the beginning of construction.
- A setback of 100 feet from nesting areas shall be established and maintained during the nesting season for the period encompassing nest building and continuing until fledglings leave nests. This setback applies whenever construction or other ground-disturbing activities must begin during the nesting season in the presence of nests that are known to be occupied. Setbacks shall be marked by brightly colored temporary fencing.

Implementation of Mitigation Measure 4.14-k and compensation requirements of the SJMSCP would reduce impacts on the loggerhead shrike to a less-than-significant level.

4.14-l **Terrestrial Biology - Birds Nesting along Riparian Corridors.** The following is a summary and clarification of SJMSCP incidental take avoidance and minimization measures for the white-tailed kite and Cooper's hawk:

- If project activity would occur during the raptor nesting season (February 15 through September 15), preconstruction surveys shall be conducted during the nesting season in suitable nesting habitat within 100 feet of areas of project activity. Suitable nesting habitat for both species is present in the PCIP Area and in riparian patches adjacent to the San Joaquin River and in the PCC Area. The survey shall be conducted within 1 week before the beginning of construction or tree removal.

- A setback of 100 feet from nesting areas shall be established and maintained during the nesting season for the period encompassing nest building and continuing until fledglings leave nests. This setback applies whenever construction or other ground-disturbing activities must begin during the nesting season in the presence of nests that are known to be occupied. Setbacks shall be marked by brightly colored temporary fencing.

Implementation of Mitigation Measure 4.14-l and compensation requirements of the SJMSCP would reduce impacts on the white-tailed kite and Cooper's hawk to a less-than-significant level.

4.14-o **Terrestrial Biology - Common Tree-Nesting Raptors.** The following measures are designed to avoid loss of common tree-nesting raptors:

- If project activity would occur during the raptor nesting season (February 15 through September 15), preconstruction surveys shall be conducted during the nesting season in suitable nesting habitat within 100 feet of areas of project activity. Large trees throughout the project area provide suitable habitat. The survey shall be conducted within 1 week before the beginning of construction or tree removal.
- A setback of 100 feet from nesting areas shall be established and maintained during the nesting season for the period encompassing nest building and continuing until fledglings leave nests. This setback applies whenever construction or other ground-disturbing activities must begin during the nesting season in the presence of nests that are known to be occupied. Setbacks shall be marked by brightly colored temporary fencing.

Implementation of Mitigation Measure 4.14-o would reduce impacts on other tree-nesting raptors to a less-than-significant level.

4.14-q **Terrestrial Biology - Riparian Brush Rabbit**. The SJMSCP requires full avoidance of riparian brush rabbit habitat in Paradise Cut and along the former SPRR right-of-way, because it is known occupied habitat. No conversion of occupied habitat or mortality to individual riparian brush rabbits is allowed under the SJMSCP. For the proposed project to qualify for coverage under the SJMSCP for riparian brush rabbit, a permanent setback of 300 feet from the outer edge of the dripline of riparian vegetation would be required. Because maintenance of such setbacks is not feasible, a separate consultation with USFWS under the ESA and CDFG under CESA would be conducted, and an Incidental Take Permit would be required. Specific mitigation measures would be developed during the consultation process. Potential take avoidance measures may include, but would not be limited to, conducting preconstruction surveys, conducting daily surveys of construction areas, installing exclusion fencing to prevent brush rabbits from entering construction areas, minimizing vegetation removal, and supporting the existing USFWS captive breeding program to establish new populations in appropriate habitat. Compensation for loss of habitat and other potential impacts is expected to include enhancement of existing habitat and creation of additional habitat in Paradise Cut. New high-ground areas would be created in the PCIP Area, and the existing Paradise Cut levee would provide new high ground after construction of the setback levee. Suitable vegetation would be planted in the areas.

Implementation of Mitigation Measure 4.14-q would reduce impacts on the riparian brush rabbit to a less-than-significant level.

4.14-r **Terrestrial Biology - Jurisdictional Waters of the United States and Riparian Habitat.** The following measures are designed to minimize and mitigate impacts on jurisdictional waters of the United States and riparian habitat:

- Before project implementation, a determination of waters of the United States, including jurisdictional wetlands and riparian habitat, that would be affected by the proposed project shall be made by qualified biologists through the formal Section 404 wetland delineation process. This is expected to be completed through reverification of the existing wetland delineation.
- Authorization for fill of the agricultural ditch and pond, alteration of waters of the United States, and disturbance of riparian habitat shall be secured from USACE via the Section 404 permitting process.
- A CDFG Streambed Alteration Agreement is also expected to be required for work within existing levees along the San Joaquin River, Old River, and Paradise Cut.
- The acreage of jurisdictional habitat removed shall be replaced or restored/enhanced on a "no-net-loss" basis in accordance with USACE and CDFG regulations. Habitat restoration, enhancement, and/or replacement shall be at a location and by methods agreeable to USACE and CDFG. It is anticipated that restoration and enhancement activities in Paradise Cut and creation of the proposed back bays would be sufficient to replace lost habitat.
- Measures to minimize erosion and runoff into drainage channels shall be included in all drainage plans. Appropriate runoff controls such as berms, storm gates, detention basins, overflow collection areas, filtration systems, and sediment traps shall be implemented to control siltation and the potential discharge of pollutants.

Implementation of Mitigation Measure 4.14-r would reduce impacts on jurisdictional waters of the United States, wetlands, and riparian habitat to a less-than-significant level.

4.14-s **Terrestrial Biology - Wildlife Corridors.** The following measures are designed to address inconsistency with the SJMSCP:

- Coordination with the Technical Advisory Committee, Joint Powers Authority, and resource agencies (e.g., USFWS and CDFG) shall be conducted, as appropriate, to obtain a minor revision, minor amendment, or major amendment to the SJMSCP. No amendment to the incidental take permit is anticipated, because development of the shoreline (with implemented mitigation measures) is not expected to result in significant effects on any state-listed or federally listed species.

- During this coordination process, it shall be determined whether any compensation would be required. Compensation may include, but would not necessarily be limited to, onsite or offsite habitat improvements along the San Joaquin River, such as restoration of other areas in the corridor that provide limited habitat for terrestrial wildlife. In addition, habitat improvements in Paradise Cut may serve as compensation because they would enhance its function as a wildlife corridor connecting the San Joaquin River to the Old River system.

Implementation of Mitigation Measure 4.14-s would reduce impacts on wildlife corridors to a less-than-significant level.

4.14-t **Biological Resources Associated with Offsite Facilities.** Biological resources potentially occurring at or near offsite project facilities and potential impact mechanisms would be the same as those identified previously for the RID, PCC, and PCIP Areas. Therefore, the mitigation approach described for the primary project area also would function for offsite facilities. The project applicant would participate in the SJMSCP for the offsite facilities and implement Mitigation Measures 4.14-b, -c, -d, -e, -f, -h, -j, -k, and -l (measures summarizing SJMSCP minimization measures) as appropriate based on the resources present. Mitigation Measures 4.14-o, -q, and -r also would be implemented as appropriate based on the resources present.

A determination of habitat types and resources that might be present in each offsite facility area shall be made by a qualified biologist once the facility footprint is established and access for a reconnaissance-level survey is available. A wetland delineation consistent with USACE methodology also shall be completed. These data, combined with resource identification surveys completed by the SJCOG as part of the SJMSCP, shall be used to determine the appropriate mitigation measures for each site.

Implementation of Mitigation Measure 4.14-t (and applicable previous mitigation measures) would reduce potential impacts on biological resources associated with offsite project facilities to a less-than-significant level.

4.14.5 RESIDUAL SIGNIFICANT IMPACTS

No residual significant impacts would occur as a result of implementation of the mitigation measures recommended in this section.

4.15 FISHERIES

4.15 FISHERIES

This section describes the fisheries resources in the vicinity of the River Islands project and in the greater Sacramento-San Joaquin Delta and evaluates the potential project impacts on these resources. This evaluation uses existing information from several previously completed documents that addressed fishery resources in the Sacramento-San Joaquin Delta, including (1) Environmental Impact Report for the Lathrop Water, Wastewater, and Recycled Water Master Plan (EDAW 2001); (2) Mitigated Negative Declaration and Initial Study, Temporary Barriers Project 2001-2007 (California Department of Water Resources 2000); (3) Future Water Supply Implementation Draft Environmental Impact Report (EDAW 1998); (4) Draft Environmental Impact Report and Environmental Impact Statement: Delta Wetlands Project, Volume 2 (SWRCB and USACE 1995); (5) West Lathrop Specific Plan Fishery Resources Assessment, Technical Appendix for the West Lathrop Specific Plan EIR (A.A. Rich and Associates 1994); and (6) Draft Environmental Impact Report for the Mossdale Landing Urban Design Concept (EDAW 2002).

Sufficient detail is provided in this section to analyze issues related to fisheries resources at a project level of detail for both Phase 1 and Phase 2 of the proposed project.

4.15.1 REGULATORY BACKGROUND

Many biological resources in California are protected and/or regulated by a variety of laws and policies. Before project implementation, the proposed project must comply with these regulations. In addition, in many parts of California, there are local or regional habitat and species conservation planning efforts that a project may participate in. Key regulatory and conservation planning issues applicable to the proposed project are discussed below.

FEDERAL ENDANGERED SPECIES ACT

Pursuant to the federal Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have authority over projects that may result in take of a species federally listed as Threatened or Endangered. Under the ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." USFWS and NMFS have also interpreted the definition of harm to include significant habitat modification that could result in take. If a project has a likelihood that it would result in take of a federally listed species, either an incidental take permit, under Section 10(a) of the ESA, or a federal interagency consultation, under Section 7 of the ESA, is required. Several fish species in the project vicinity are covered under the federal ESA.

CALIFORNIA ENDANGERED SPECIES ACT

Pursuant to the California Endangered Species Act (CESA) and §2081 of the California Fish and Game Code, a permit from the California Department of Fish and Game (CDFG) is required for projects that could result in the take of a state-listed Threatened or Endangered species. Under the CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species but does not include "harm" or "harass" as the federal act does. As a result, the threshold for a take under the CESA is higher than that under the ESA. Several fish species in the project vicinity are covered under CESA.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act requires federal agencies to consult with USFWS, NMFS, and CDFG before they undertake or approve projects that control or modify surface water. The consultation is intended to prevent the loss of or damage to fish and wildlife in connection with water projects and to develop and improve these resources. Compliance with the Fish and Wildlife Coordination Act is incorporated into a project's NEPA process and therefore is relevant to the proposed project only after National Environmental Policy Act (NEPA) compliance has been triggered.

Magnuson-stevens Fishing Conservation and Management Act

The Magnuson-Stevens Act is primarily concerned with sport and commercial harvest of major fisheries. In addition to the effects from fishing activities, however, the act recognizes the adverse effects of habitat alterations and dam and hatchery operations as major contributors to the decline of chinoook salmon in the region. The act mandates a consultation process for federal agencies whose activities may adversely affect Essential Fish Habitat (EFH). This consultation process is intended to provide those agencies with technical assistance in making their activities consistent with conservation of EFH. The purpose of identifying adverse effects and companion conservation measures is to provide general guidance for consultations and to make this information available ahead of time to federal and non-federal entities so that they may proactively include habitat conservation in their planning. NMFS is the primary agency responsible for administering the Magnuson-Stevens Act and EFH requirements.

Natural Community Conservation Planning Act

The Natural Community Conservation Planning Act (NCCPA) authorizes and encourages conservation planning on a regional scale in California through preparation of Natural Community Conservation Plans (NCCPs). NCCPs address the conservation of natural communities as well as individual species. The NCCPA's focus on regional conservation rather than individual project mitigation is appropriate for complex and extensive programs. However, no NCCPs currently cover the project area.

CALFED Multi-Species Conservation Strategy

The CALFED Bay-Delta Program (CALFED) is a cooperative state and federal effort to improve conditions in the Sacramento-San Joaquin River Delta relative to ecosystem quality, water supply reliability, water quality, and levee system integrity. In support of the ecosystem quality element of CALFED, the CALFED Multi-Species Conservation Strategy (MSCS) outlines a comprehensive strategy for conservation of numerous species of fish, wildlife, and plants and their habitats during implementation of CALFED projects. The MSCS provides background information on CALFED's species and habitat goals; prescriptions and conservation measures for achieving species goals; and streamlined regulatory processes for ESA, CESA, and NCCPA compliance. The MSCS is specific to CALFED and cannot be applied to the proposed project. However, MSCS goals, strategies, and conservation measures could potentially affect project activities if they were to alter hydrologic, water quality, or aquatic or terrestrial habitat conditions in the project vicinity.

CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

Each of the nine Regional Water Quality Control Boards (RWQCBs) in California prepares Basin Plans providing goals, policies, and standards for the protection of surface water and groundwater in the plan area. The Central Valley Regional Water Quality Control Board (CVRWQCB) Basin Plan for the region encompassing the proposed project designates the following fisheries-related beneficial uses of basin surface waters: warm and cold freshwater fisheries habitat, migration of warmwater and coldwater fish species, and spawning of warmwater fish species. The RWQCB provides protection to fisheries resources primarily through its regulatory authority for protecting water quality.

SAN JOAQUIN COUNTY MULTI-SPECIES HABITAT CONSERVATION AND OPEN SPACE PLAN

The SJMSCP was developed to minimize and mitigate impacts on plant and wildlife habitat resulting from conversion of open space to non-open space projected to occur in San Joaquin County (San Joaquin County 2000). The SJMSCP is focused almost exclusively on terrestrial animals and plants and therefore has little applicability to fishery resources. A description of the SJMSCP, its function, and its implementation methods is presented in section 4.14, "Terrestrial Biology."

4.15.2 EXISTING CONDITIONS

This section contains a summary of fish habitats in water bodies in and adjacent to the project site, the existing fisheries resources in the Delta, and the key factors that affect those resources.

FISH HABITATS

The San Joaquin River in the vicinity of the proposed project is characterized by a wide (100-150 feet), deep (more than 15 feet) channel with little canopy or overhead vegetation and minimal bank cover. Despite the lack of vegetative cover, the deep water likely provides protection from predators for some fish species.

Old River in the vicinity of the proposed project is characterized by a wide (100-150 feet) fairly deep (more than 5 feet) channel with no canopy and little bank or overhead vegetation. Portions of the Old River bank in this area are riprapped. The channel is very homogeneous with little habitat complexity and generally low fish habitat value.

Paradise Cut is a flood control bypass that was created in the 1950s as part of the USACE flood control projects that constructed many of the levees in the area. The channels in Paradise Cut range from 30 to 90 feet wide, vary in depth, and have abundant aquatic vegetation dispersed throughout. The Paradise Cut channel system functions as a dead-end slough fed by Old River, except when flood flows on the San Joaquin River reach approximately 18,000 cubic feet per second (cfs) and spill over the Paradise Weir into Paradise Cut. Several channels in Paradise Cut contain open water year round; others are dry during summer and fall. In summer, water levels in portions of Paradise Cut are influenced by the amount of water that is pumped into and out of the channels for agricultural irrigation.

All of the water bodies described above are subject to tidal influences.

Of special importance to many Delta species is the presence of shaded riverine aquatic (SRA) habitat. SRA habitat is defined as the nearshore aquatic habitat occurring at the interface between a river and adjacent woody riparian habitat. The principal attributes of this cover type are (1) that the adjacent bank is composed of natural, eroding substrates supporting riparian vegetation that either overhang or protrude into the water and (2) that the water contains variable amounts of woody debris, such as leaves, logs, branches, and roots and has variable depths, velocities, and currents. Often, much of the instream vegetation consists of dead woody debris that has fallen from the overhanging riparian vegetation. These attributes provide high-value feeding areas and escape cover for numerous fish species, particularly anadromous salmonids. Such habitat generally is rare in the local waterways adjacent to the project site, especially in the San Joaquin River and Old River. Small amounts of SRA habitat occur in Paradise Cut.

Shallow-water habitat is also favored by numerous species, including most protected fish species potentially occurring in the project area. Because of the steep banks of the levees along the San Joaquin River and Old River, there is limited shallow-water habitat available in these water bodies in the project area. Some shallow-water habitat is available in the canals of Paradise Cut.

An existing 2.5-acre pond in the River Islands Development Area (RID Area) likely contains a small freshwater fishery. However, this pond is isolated from the surrounding Delta waterways and does not support potential habitat for any of the sensitive fish species mentioned later in this section. Because this pond is not associated with the overall Delta aquatic system and does not support sensitive fish species, it is not considered further in this section.

FISH POPULATIONS

Monitoring Surveys

The lower San Joaquin River and Delta support a diverse fish community composed of both native and introduced exotic species. There have been numerous programs to monitor the status and abundance of various species over time, and substantial amounts of information documenting Delta fishery resources continue to be collected by several resource agencies. These programs are summarized below and include midwater trawl surveys, egg and larval surveys, beach seine surveys, and real-time monitoring data. Each of these monitoring/survey programs was specifically developed to meet specific information needs, and each has its own methods, biases, and uses. None of these surveys was developed specifically to characterize impacts of the proposed project although they provide useful information for that purpose. Monitoring/survey results from these programs are evaluated to describe the potential fish community composition in the project area.

CDFG has conducted midwater trawl surveys in the Delta monthly from September through December since 1967 and from January through April since 1992. These surveys are used to index the abundance and distribution of young-of-year and other age groups of fishes. They are conducted at a number of standard sites throughout the Delta. The midwater trawl location closest to the proposed project is Station 912, on the San Joaquin River near Stockton. Station 912 is approximately 20 miles downstream from the proposed project site (Exhibit 4.15-1) and therefore may have somewhat different species abundance and/or seasonal timing than in the project area. No sampling is conducted between May and September, and species occurrence and relative abundance during summer and fall may be different than indicated by the midwater trawl surveys. Species captured during these midwater trawl surveys and relative abundance of species are biased toward smaller fish in the open water of deeper midchannel areas because these fish have a higher probability of being encountered using this sampling method.

Egg and larval surveys are conducted by DWR and CDFG as part of the Southern Delta Entrainment Monitoring program to estimate annual entrainment losses of targeted species to the State Water Project (SWP) and Central Valley Project (CVP) intakes in the South Delta. The survey measures abundance and distribution of egg and larval fish species in the South Delta and impacts of the SWP/CVP operations and the South Delta Temporary Barriers Project. Samples are collected from early February to mid-July. The egg and larval sample location closest to the proposed project is Station 98, on Salmon Slough near the junction of Old River with the Grant Line Canal (Exhibit 4.15-1).

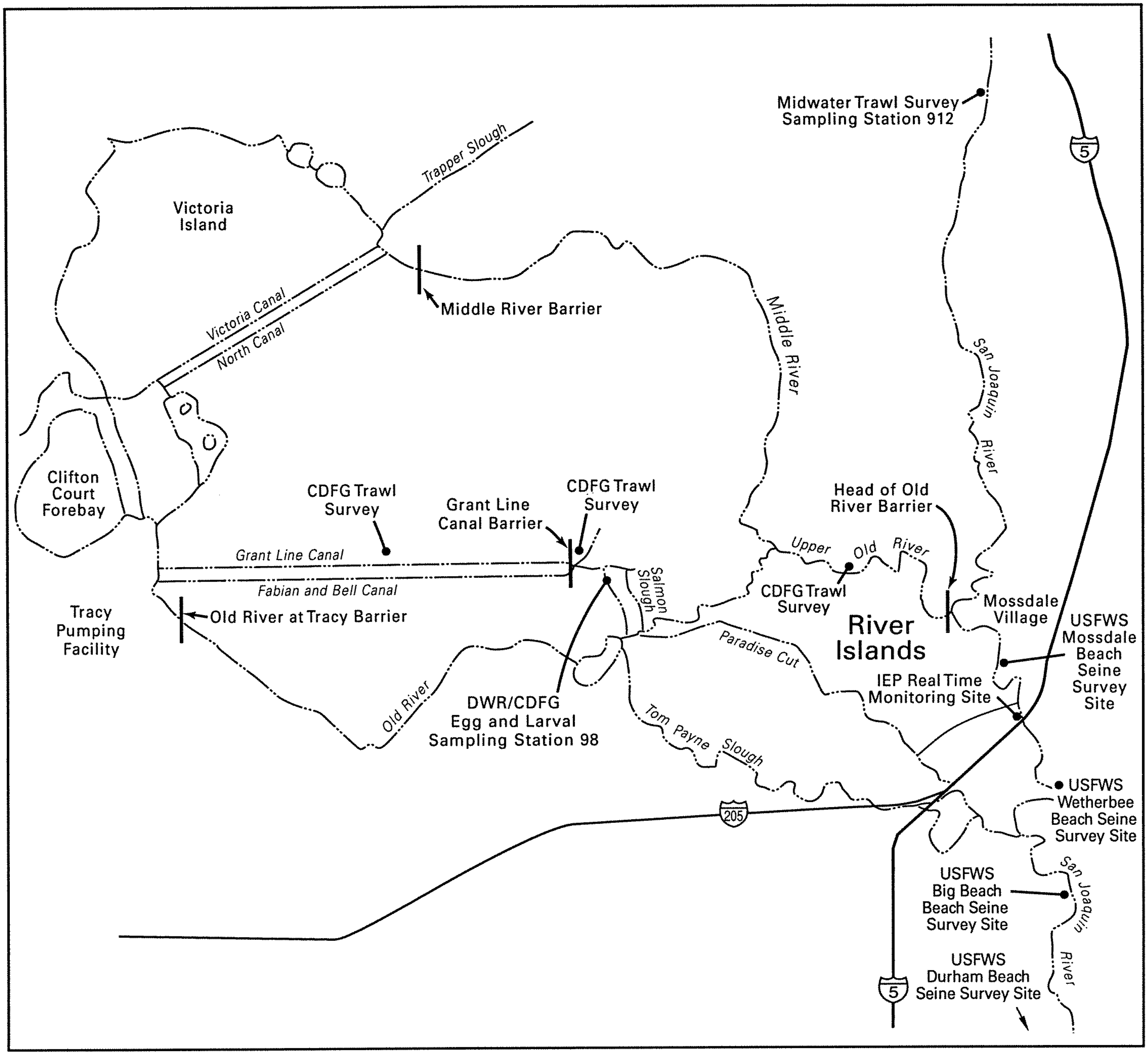
Beach seine surveys are conducted by USFWS in the Lower San Joaquin River, Delta, and Lower Sacramento River from January through June. The primary objective of these surveys is to monitor abundance and distribution of juvenile chinook salmon, but other fishes inhabiting shallow near-shore areas also are sampled. Beach seine surveys are not conducted between July and December and may not be representative of fish species presence and abundance during summer and fall months. There are several beach seine sites in the vicinity of the proposed project on the San Joaquin River. Survey results from these locations are probably the best indicator of fish species occurrence and seasonal abundance in the San Joaquin River near the project site. The Mossdale site is located near river mile 56, immediately downstream of the Interstate 5 (I-5) bridge. The Wetherbee site is located at approximately river mile 58. The Big Beach and Durham sites are approximately 5 miles and 10 miles upstream of the project area, respectively (Exhibit 4.15-1).

Since 1996, the Interagency Ecological Program Real Time Monitoring Project has conducted daily sampling at various sites from April 1 through June 30 using Kodiak trawls. One of these sites is on the San Joaquin River at Mossdale, a location near the project area (Exhibit 4.15-1). Kodiak trawls sample fish in the water column in main channel locations. Species occurrence and relative abundance may be substantially different during the period between July and March when sampling does not occur.

Species Composition

The Sacramento-San Joaquin River system and estuary support approximately 90 species of anadromous, freshwater, estuarine, and marine fish.

Table 4.15-1 lists fish species expected to occur in the immediate vicinity of the proposed project based on the monitoring surveys in the South Delta and Lower San Joaquin River described above. Table 4.15-2 shows the relative abundance of many of these fish species at sampling locations near the



Source: Adapted from City of Lathrop 1996

Location of Temporary Barriers and Selected Fish Sampling Locations

EXHIBIT 4.15-1

River Islands at Lathrop
CITY OF LATHROP
JN 1T013.01 9/02

0 1 2 4 MILES

NORTH

EDAW

Table 4.15-1 Fish Species Reported in the Vicinity of the Proposed River Islands Project					
Common Name	Scientific Name	Midwater Trawl Survey	Egg and Larval Survey	Beach Seine Survey	Real-Time Monitoring
NATIVE SPECIES					
hitch	*Lavinia exilicauda*			X	X
Sacramento blackfish	*Orthodon microlepidotus*			X	
Sacramento splittail	*Pogonichthys macrolepidotus*			X	X
Sacramento pikeminnow	*Ptychocheilus grandis*			X	
Sacramento sucker	*Catostomus occidentalis*		X	X	X
delta smelt	*Hypomesus transpacificus*		X		X
longfin smelt	*Spirinchus thaleichthys*				X
steelhead/rainbow trout	*Oncorhynchus mykiss*				X
chinook salmon	*Oncorhynchus tshawytscha*	X		X	X
threespine stickleback	*Gasterosteus aculeatus*				X
prickly sculpin	*Cottus asper*		X	X	
tule perch	*Hysterocarpus traski*			X	X
INTRODUCED SPECIES					
American shad	*Alosa sapidissima*	X			X
threadfin shad	*Dorosoma petenense*	X	X	X	X
goldfish	*Carassius auratus*			X	
red shiner	*Cyprinella lutrensis*			X	
carp	*Cyprinus carpio*	X		X	
golden shiner	*Notemigonus chrysoleucas*	X		X	X
rosyface shiner	*Notropis rubellus*			X	
fathead minnow	*Pimephales promelas*			X	X
white catfish	*Ameiurus catus*	X			X
black bullhead	*Ameiurus melas*				X
channel catfish	*Ictalurus punctatus*	X		X	X
wakasagi	*Hypomesus nipponensis*				X
western mosquitofish	*Gambusia affinis*			X	
inland silverside	*Menidia beryllina*	X	X	X	X
striped bass	*Morone saxatilis*	X	X	X	X
bluegill	*Lepomis macrochirus*	X		X	X
redear sunfish	*Lepomis microlophus*			X	X
smallmouth bass	*Micropterus dolomieu*			X	
largemouth bass	*Micropterus salmoides*			X	X
white crappie	*Pomoxis annularis*	X		X	X
black crappie	*Pomoxis nigromaculatus*	X		X	X
bigscale logperch	*Percina macrolepida*		X	X	
yellowfin goby	*Acanthogobius flavimanus*	X			
Shimofuri goby	*Tridentiger bifasciatus*	X			X
chameleon goby	*Tridentiger trigonocephalus*		X		
Source: EDAW 2001					

Table 4.15-2 San Joaquin River Fish Species Relative Abundance in Beach Seine Surveys near the Proposed River Islands Project				
Species	**Mossdale**	**Wetherbee**	**Big Beach**	**Durham**
red shiner	56%	51%	68%	86%
inland silverside	33%	39%	2%	1%
threadfin shad	4%	3%	0.1%	0.02%
chinook salmon	3%	1%	0.4%	0.1%
Sacramento splittail	1%	1%	26%	0.3%
western mosquitofish	1%	0.2%	0.1%	0.1%
Sacramento sucker	1%	2%	3%	12%
golden shiner	1%	0%	0%	0%
fathead minnow	0.1%	1%	0.2%	0.1%
Sacramento blackfish	0.1%	0.1%	0.005%	0%
largemouth bass	0.1%	0.1%	0%	0.05%
bluegill	0.1%	0.1%	0.05%	0.1%
redear sunfish	0.1%	0.1%	0.05%	0.02%
Sacramento pikeminnow	0.1%	0.5%	0.1%	0.02%
black crappie	0.1%	0%	0%	0%
bigscale logperch	0.1%	0.2%	0.01%	0%
bass unknown	0.03%	0.1%	0.05%	0%
hitch	0%	0%	0%	0%
striped bass	0.03%	0.05%	0%	0%
prickly sculpin	0.02%	0.2%	0.1%	0%
goldfish	0%	0%	0%	0%
rosyface shiner	0%	0%	0.03%	0%
white crappie	0%	0%	0%	0%
tule perch	0%	0.1%	0.1%	0%
common carp	0%	0.05%	0.005%	0%
channel catfish	0%	0%	0.005%	0%
smallmouth bass	0%	0%	0%	0.05%
Source: Juvenile salmon migration monitoring data provided by USFWS's Stockton, California office.				

proposed project. Most of these species were introduced from the eastern United States or Asia. Striped bass and American shad are anadromous species native to the East Coast of the United States that support popular recreational fisheries. The three goby species have been captured in midwater trawls and the egg and larval surveys downstream of the project site but not in beach seining surveys closer to the project area. They may not occur as far upriver as the proposed project site. Three other introduced species—red shiner, inland silverside, and threadfin shad—make up from 70% to 93% of individuals captured at the four sampling sites.

Chinook salmon is the most common native fish species encountered in the beach seine surveys, followed by Sacramento splittail, Sacramento sucker, Sacramento blackfish, and Sacramento squawfish.

Other native species, including hitch, prickly sculpin, and tule perch, were sampled at low frequencies. Comparison of catch of these species at the Mossdale and Wetherbee sites indicates little difference between these sites closest to the project area.

In the egg and larval surveys conducted by DWR and CDFG, the most common species captured are chameleon goby, prickly sculpin, threadfin shad, and striped bass (Spaar 1992, 1993; Wadsworth 1996). These species made up 99% of the larval catch during monitoring in 1991-1994. Delta smelt have not comprised more than 0.5%, and longfin smelt and splittail have made up less than 0.1% of the total larval catch.

Anadromous and Estuarine Species

Anadromous species that occur in the Delta (i.e., species that spawn in fresh water after migrating as adults from marine habitat) include chinook salmon, steelhead, white sturgeon, green sturgeon, American shad, and striped bass. Most of these anadromous fish species are native to the Sacramento-San Joaquin River system, with the exception of American shad and striped bass, which were introduced from the Atlantic coast in the late 1800s. All these anadromous species spawn in the rivers of the Central Valley. Although American shad and striped bass represent important recreational fisheries, especially striped bass, they are not considered further in this analysis because they are not protected species, they are nonnatives, and impact mechanisms from the proposed project generally affect striped bass and American shad in a manner similar to the way they affect protected species evaluated in detail (i.e., chinook salmon, Sacramento splittail, and delta smelt). Therefore, impacts and mitigation measures described for protected species also would address striped bass and American shad.

Estuarine species that could be considered anadromous because they spawn in fresh water and tolerate or require low to moderate salinity during juvenile and adult life stages include delta smelt, longfin smelt, and Sacramento splittail.

A more detailed discussion of chinook salmon, steelhead, delta smelt, Sacramento splittail, longfin smelt, and green sturgeon is included under "Special-Status Fish Species," below.

Freshwater Species

Introduced freshwater species far outnumber native species in the Delta. White catfish (*Ictalurus catus*), largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieui*) have spread to most freshwater Delta habitats since their introduction from the eastern United States and support important sport fisheries. Smallmouth and largemouth bass, as well as introduced sunfish, are also abundant in reservoirs and Central Valley rivers and streams.

Special-Status Fish Species

Special-status fish species addressed in this section include species that are legally protected or that are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. These include species that are state and/or federally listed as Threatened or Endangered or that are proposed for listing; those considered as candidates for listing as Threatened or Endangered; and species identified by CDFG, USFWS, or NMFS as Species of Concern. In some cases, it is an Evolutionarily Significant Unit (ESU) of a fish species, rather than the entire population, that is listed. Under the ESA, an ESU is considered a population (or group of populations) that is reproductively isolated from other populations of the same species and that contributes substantially to the ecological/genetic diversity of the species (Waples 1991). Different runs of the same salmon species (fall run, spring run) often are considered separate ESUs because the populations are reproductively isolated due to different spawning times.

Special-status fish species potentially occurring in the vicinity of the proposed project include Central Valley fall-/late-fall-run chinook salmon, Central Valley winter-run chinook salmon, Central Valley spring-run chinook salmon, steelhead, delta smelt, Sacramento splittail, longfin smelt, and green sturgeon. Most of these species migrate through the project area. Only splittail may be a resident in the vicinity of the proposed project.

The seasonal timing of significant life history stages for these special-status species is presented in Exhibit 4.15-2. The content of this exhibit does not reflect the relative magnitude of populations in the South Delta or San Joaquin River. Consequently, numerous life stages are rarely present in the study area but still potentially occur there in a particular month.

Chinook Salmon

There are four runs of Central Valley chinook salmon (*Oncorhynchus tshawytscha*) in the Sacramento and San Joaquin River systems: fall, late fall, winter, and spring. These runs have the following special-status designations:

- Central Valley fall-run and late-fall-run chinook salmon - federal Candidate for listing (they are being considered for listing, but have not yet been listed, as Threatened or Endangered under the ESA) and California Species of Special Concern;
- Central Valley winter-run chinook salmon - federally listed and state-listed Endangered species; and
- Central Valley spring-run chinook salmon - federally proposed Endangered species and state listed as Threatened.

All chinook salmon require cold, freshwater streams with suitable gravel for reproduction. Females deposit their eggs in nests, or "redds," which they excavate in the gravel bottom in areas of relatively swift water. Eggs generally hatch in approximately 6-12 weeks, and newly emerged larvae remain in the gravel for another 2-4 weeks until the yolk is absorbed (Moyle 1976). For maximum survival of

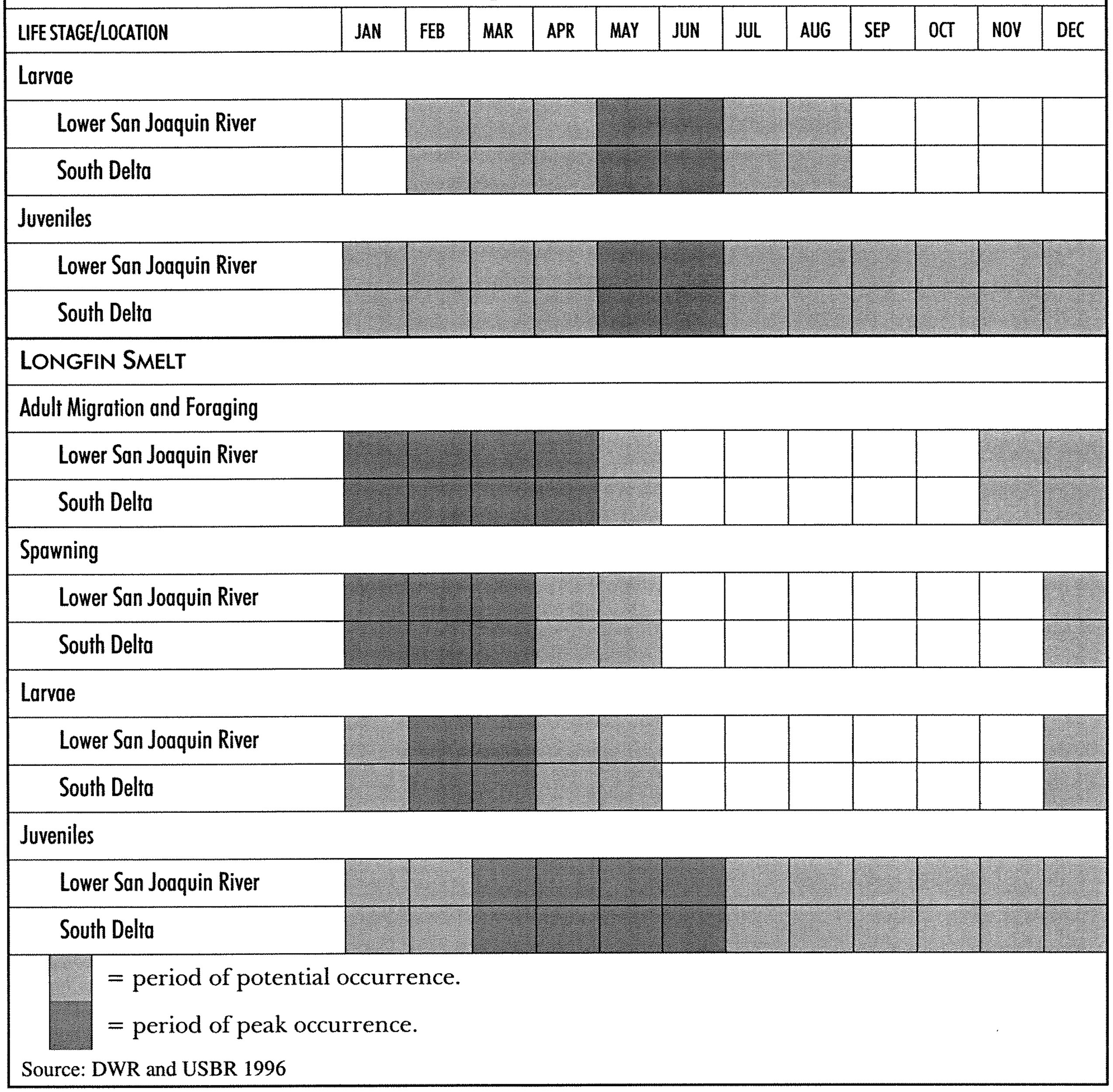
Exhibit 4.15-2
Life History Schedules and Distributions of Evaluation Fish Life Stages in Lower San Joaquin River and South Delta

LIFE STAGE/LOCATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FALL-RUN CHINOOK SALMON												
Adult Migration												
Lower San Joaquin River												
South Delta												
Rearing/Emigration												
Lower San Joaquin River												
South Delta												
Late Fall-Run Chinook Salmon												
Rearing/Emigration												
South Delta												
Winter-Run Chinook Salmon												
Rearing/Emigration												
South Delta												
Spring-Run Chinook Salmon												
Rearing/Emigration												
South Delta												
STEELHEAD TROUT												
Adult Migration												
Lower San Joaquin River												
South Delta												
Rearing/Emigration												
Lower San Joaquin River												
South Delta												
GREEN STURGEON												
Adult Migration and Foraging												
Lower San Joaquin River												
South Delta												

Exhibit 4.15-2
Life History Schedules and Distributions of Evaluation Fish Life Stages in Lower San Joaquin River and South Delta

LIFE STAGE/LOCATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Eggs and Larvae												
Lower San Joaquin River												
South Delta												
Rearing												
Lower San Joaquin River												
South Delta												
DELTA SMELT												
Adult Migration and Foraging												
Lower San Joaquin River												
South Delta												
Spawning												
Lower San Joaquin River												
South Delta												
Larvae												
Lower San Joaquin River												
South Delta												
Juveniles												
Lower San Joaquin River												
South Delta												
SACRAMENTO SPLITTAIL												
Adult Migration and Foraging												
Lower San Joaquin River												
South Delta												
Spawning												
Lower San Joaquin River												
South Delta												

Exhibit 4.15-2
Life History Schedules and Distributions of Evaluation Fish Life Stages in Lower San Joaquin River and South Delta



incubating eggs and larvae, water temperatures must be between 39°F and 57°F. After emerging, chinook salmon fry tend to seek shallow, nearshore habitat with slow water velocities and move to progressively deeper, faster water as they grow. Freshwater rearing habitat extends from upstream spawning reaches to the Delta and Suisun Bay. Although the proportion of annual juveniles moving downstream to rear in lower river reaches and in the Delta is unknown, available information indicates substantial numbers of fry rear in the Delta, especially during wetter years (U.S. Fish and Wildlife Service 1997). Juveniles typically rear in fresh water for up to 5 months before migrating to sea, although spring-run juveniles frequently reside in freshwater habitat for 12-16 months. Chinook salmon spend 2-4 years maturing in the ocean before returning to their natal streams to spawn. All adult chinook salmon die after spawning.

Central Valley Fall-/Late-Fall-Run Chinook Salmon

Fall-run chinook salmon is the most widely distributed run occurring in the Sacramento and San Joaquin rivers and their tributaries. Spawning habitat for fall-run chinook salmon in the San Joaquin River system exists only in three tributary streams: Stanislaus River, Tuolumne River, and Merced River. Annual production of fall-run chinook salmon from these streams over the period 1967-1991 averaged approximately 40,000 fish (11,000 in the Tuolumne, 19,000 in the Stanislaus, and 10,000 in the Merced). Approximately 10% of the Merced River production is from hatcheries; the remainder is from natural production. Production estimates include adult fish returning to spawn and those harvested in both ocean and instream fisheries. Production of fall-run chinook salmon in the San Joaquin River system over the 1967-1991 period accounted for approximately 7% of the total Central Valley fall-run chinook production and approximately 10% of the Central Valley fall-run chinook natural production (AFRPGG 1995).

Adult fall-run chinook salmon migrate from the ocean to upstream spawning areas in the late summer and fall. In the San Joaquin River system, adults migrate somewhat later than those in the Sacramento River system, generally reaching spawning areas between September and December. Eggs incubate until March. Fall-run fry generally emerge from the streambed from December through March and rear in the river for a short period. Some fry may rear as far downstream as the Delta, particularly in wet years. Fall-run juveniles emigrate as smolts from April through June. A small percentage of fall-run juveniles (approximately 5%) may not emigrate until the fall or winter following hatching.

Fall-run chinook salmon would be expected to occur in the vicinity of the project area only during the fall and early winter, when adults are migrating between the ocean and spawning habitat in the three tributary streams (Stanislaus River, Tuolumne River, and Merced River) and during the late winter and early spring, when fry may be rearing in the vicinity. Beach seine samples in the project vicinity indicate the presence of rearing fry between January and March and smolts in April and May (California Department of Water Resources Interagency Ecological Program 2002).

NMFS has determined that abundance of fall-run chinook salmon in the San Joaquin River system is low relative to historic levels because of severe habitat degradation. NMFS attributes habitat degradation to agricultural and municipal water use activities in the Central Valley, which result in point-source and non-point-source pollution, elevated water temperatures, diminished flows, and smolt and adult entrainment into poorly screened or unscreened diversions. High harvest rates in the ocean fisheries also may contribute to reduced abundance. In the San Joaquin basin, many of these factors are being evaluated and addressed in a collaborative effort between water interests and state/federal agencies in a scientifically based adaptive management plan known as the Vernalis Adaptive Management Plan. Initial plan elements involve operational changes at the Delta pumping plants during the peak salmon smolt outmigration period (April 15 to May 15), additional riverflows during the adult fall-run chinook salmon upstream migration in October, and installation and operation of barriers to improve the survival of juvenile chinook emigrating from the Lower San Joaquin River (50 Code of Federal Regulations parts 222, 226, and 227).

Central Valley Winter-Run Chinook Salmon

Although winter-run chinook salmon are not known to migrate up the San Joaquin River to spawn and the project site is not in the range of this chinook salmon ESU, juvenile winter-run chinook have been reported in real-time monitoring surveys at Mossdale based on the length of the juveniles at the time of capture. Most winter-run fry emerge by the end of August, whereas fall-run fry do not begin emerging until December. Therefore, winter-run fry have a longer period to grow between emergence and spring, and larger juveniles captured in the Delta in spring generally would be considered winter-run fish. Peak migration of winter-run smolts through the Delta occurs from February through March.

Central Valley Spring-Run Chinook Salmon

Spring-run chinook salmon juveniles have been reported in real-time monitoring surveys at Mossdale, even though adults are not known to migrate up the San Joaquin River to spawn. Because some spring-run salmon may hatch around the same time as some of the fall-run, there may be little difference in size among juveniles to allow identification of the two runs. Therefore, many of the fish reported as spring-run may in fact be fall-run fish. In addition, many spring-run and fall-run salmon reported in real-time monitoring at Mossdale are likely to be of hatchery origin since large numbers of hatchery fish are released into the Delta.

Some juvenile spring-run chinook may migrate downstream in Sacramento River tributaries soon after emerging, and others may move downstream the following fall as yearlings. The outmigrants may spend time in the Delta to gain additional size before going out to sea, but most have presumably left the system by mid-May (Moyle et al. 1995).

The federal proposal to list Central Valley spring-run chinook as Endangered applies only to naturally spawned, nonintroduced fish. Spring-run salmon occurring at Mossdale that originate from hatcheries would not be considered special-status species.

Steelhead

Steelhead (Central Valley ESU) is federally listed as Threatened. Steelhead have been captured in the vicinity of Mossdale only in the real-time monitoring surveys. There is very limited information available concerning the historical or present abundance and distribution of steelhead in the San Joaquin River and its tributaries. McEwan and Jackson (1996) indicate that a small, remnant run persists in the Stanislaus River, that steelhead were observed in the Tuolumne River in 1983, and that a few large rainbow trout that appear to be steelhead enter the Merced River Hatchery annually. Steelhead in the San Joaquin River drainage are included by NMFS in the Central Valley ESU, and the project site is located in USFWS-designated critical habitat for this ESU.

Adult steelhead migrate upstream to spawning habitat in the upper tributaries during fall, winter, and early spring. Spawning behavior is similar to that of salmon, but spawning occurs in smaller gravels, and steelhead adults do not necessarily die after spawning. Juvenile steelhead can run several years in their natal streams and then migrate downstream in spring. The San Joaquin River in the vicinity of the proposed project would be used by steelhead primarily as a migration corridor between the ocean and coldwater habitat in upstream tributaries.

Habitat degradation has been the main cause for declines in this steelhead population. Major factors are blockage of adult passage to suitable spawning and rearing areas, as well as lethal water temperatures during egg incubation and early rearing. Other factors that continue to adversely affect steelhead trout and that may impede recovery to former levels of abundance include entrainment loss to diversions, in-river sport fishing, increased predation, the presence of toxic mine waste, and diversion off the primary juvenile migration path through the Delta (SWRCB and USACE 1995).

Delta Smelt

Delta smelt is listed as Threatened under both the ESA and CESA. Delta smelt are small (usually less than 3.5 inches long) plankton-feeding fish that usually live for only 1 year. They also feed on small aquatic insect larvae when available. They are endemic to the upper Sacramento-San Joaquin River estuary and occur primarily in open surface waters of Suisun Bay, in the Sacramento River upstream to Isleton, and in the San Joaquin River downstream of the Mossdale sampling station (59 Federal Register [FR] 852, January 6, 1994).

The delta smelt population generally is concentrated in the estuary west of the confluence of the Sacramento and San Joaquin rivers in high-outflow years and in the Delta in low-outflow years (Sweetnan 1998). The proportion of the delta smelt population found in Suisun Bay during summer and fall is correlated with Delta outflow volume. Delta outflow determines the location of the salinity gradient and may strongly influence delta smelt distribution. USFWS data indicate that delta smelt are found in the Bay-Delta estuary where salinity is generally less than 2 parts per thousand (ppt). Smelt are rarely found in estuarine waters with salinity of more than 10-12 ppt. Except when spawning in fresh water, delta smelt are most frequently caught in, or slightly upstream of, the entrapment zone, where salinity is between 0.5 ppt and 5.2 ppt (SWRCB and USACE 1995). The entrapment zone is the area of the estuary where riverine freshwater flow mixes with seawater. Since the early 1980s, delta smelt have been most abundant in the northwestern Delta in the channel of the Sacramento River (59 FR 852, January 6, 1994)

Delta smelt spawn at 1 year of age, and most adults die after spawning. A female delta smelt deposits approximately 1,200–2,600 demersal (sinking) adhesive eggs on substrates such as rock, gravel, tree roots, and submerged vegetation. After the eggs hatch (in approximately 12–14 days), larvae float to the surface and are carried by the currents. Under natural flow conditions, the larvae are carried downstream to near the entrapment zone (SWRCB and USACE 1995).

Delta smelt disperse widely into fresh water in late fall and winter as the spawning period approaches, moving as far upstream as Mossdale on the San Joaquin River and the confluence with the American

River on the Sacramento River (SWRCB and USACE 1995). However, in most years, delta smelt spawn primarily in the upper end of Suisun Bay, in Montezuma Slough, and in the lower and central Delta. In the Delta, delta smelt spawn primarily in the Sacramento River channel and adjacent sloughs (59 FR 852, January 6, 1994) Spawning occurs between February and June and appears to occur in dead-end sloughs and shallow edge-waters of the channels in the upper Delta and in the Sacramento River above Rio Vista (59 FR 852, January 6, 1994) Ideal spawning areas are those with moderate to fast flows (including tidal action) and thriving aquatic vegetation (SWRCB and USACE 1995).

The distribution of delta smelt spawning in the estuary may depend on Delta outflow. Delta smelt spawn primarily in fresh water, and the downstream distribution of fresh water is determined by the amount of flow in the Sacramento and San Joaquin rivers. Fresh water in high-outflow years in the upper Suisun Bay may encourage spawning in Suisun Bay. In low-outflow years, adult smelt must migrate into the Delta to reach fresh water (Wang and Brown 1993). When outflow is low and exports at the CVP and SWP pumps are high, the net flow in the lower San Joaquin River may be toward the pumps rather than downstream. The reverse flow condition, which draws relatively fresh water from the Sacramento River, may encourage upstream migration of delta smelt adults in the south Delta, where they and their larvae are vulnerable to entrainment and other sources of mortality. Although direct evidence is lacking, positive outflow from the central Delta may aid movement of larvae to downstream habitat.

The proposed project is near the upper limit of known distribution of delta smelt in the San Joaquin River. Delta smelt do not generally occur in midwater trawls or beach seining in the vicinity of the proposed project. However, the project area is within USFWS-designated critical habitat for delta smelt. Larval delta smelt have been sampled, generally in low numbers, in southern Delta entrainment monitoring at Salmon Slough. Salmon Slough is near the location where Old River joins the Grant Line Canal and is the egg and larval sampling station closest to the project site (Exhibit 4.15-1).

Delta smelt populations have fluctuated greatly in the past. Their short lives and relatively low fecundity make populations susceptible to depression following periods when conditions are unfavorable, such as during droughts. The delta smelt population fell to very low levels in the early 1980s. The declines have been attributed to reductions in Delta outflow in some years, excessively high outflow in other years, entrainment losses to water diversions, changes in food organisms, toxic substances, loss of genetic integrity, and habitat destruction (particularly loss of shallow-water habitat) (Moyle et al. 1989).

Sacramento Splittail

Sacramento splittail is federally listed as Threatened and is a California Species of Special Concern. Splittail are large (more than 12 inches long) cyprinids (minnow family) and are endemic to the lakes and rivers of the Central Valley. They are a freshwater fish capable of tolerating moderate levels of salinity (10–18 ppt). Their lifespan is approximately 5 years.

Splittail are abundant in Suisun Bay, Grizzly Bay, and the western and northern part of the Delta. In recent years, splittail distribution appears to have shifted to the lower Sacramento River and south Delta (SWRCB and USACE 1995). Since 1985, splittail have been rare in San Pablo Bay, indicating that their range may be continuing a historic decline (Moyle et al. 1995). Overall, the species' distribution has been reduced to less than one-third of its original range.

Fish surveys in the Sacramento-San Joaquin River estuary indicate that splittail abundance has declined by more than 50% from 1980 through 1994, most likely in response to dry years from 1986 to 1992. In 1995, abundance reached a record high, relative to historical conditions. Strong year classes typically follow high-flow years (e.g., 1995) when bypasses are flooded (Baxter, pers. comm., reported in EDAW 1998). Preliminary surveys in 1998 indicated high larvae and juvenile abundance during this very wet year (EDAW 1998). In the project area, beach seine surveys conducted by USFWS indicate that splittail abundance was comparable at the Mossdale site and at the Wetherbee site (Table 4.15-2). Splittail comprised approximately 1% of the total catch at both locations. Catch of splittail at Big Beach, approximately 5 miles upstream of the project site, exceeded catch at both Mossdale and Wetherbee but was dominated by large catches on a few dates during 1995 and 1998, including a catch of more than 3,900 on a single sample date in June 1998. This large catch may represent an unusual concentration of splittail or may be representative of natural variation in local abundance of the species during the reproductive period. In either case, it appears to be transient.

Splittail typically spawn in dead-end sloughs and slow reaches of large rivers over submerged vegetation. Male and female splittail become sexually mature by their second winter. Female splittail are capable of producing more than 100,000 eggs per year. Incidental information indicates that adult spawning migration occurs during winter and spring. The onset of spawning appears to be associated with flooding, increasing water temperatures, and increasing day length. Splittail spawn in late April and May in Suisun Marsh and between early March and May in the upper Delta and lower reaches of the Sacramento and San Joaquin rivers (SWRCB and USACE 1995). Spawning in the tidal freshwater habitats of the Sacramento-San Joaquin River estuary has been observed as early as January and as late as July. Spawning occurs primarily in the lower reaches and flood bypasses of the Sacramento and San Joaquin rivers, upstream of Sacramento and Mossdale, respectively. Shallow, weedy areas inundated during seasonal flooding provide ideal habitat for adult spawning and foraging and subsequent egg development and larval and early juvenile rearing. Paradise Cut does provide suitable, although marginal habitat for Sacramento splittail. Regular dredging and vegetation removal in many of the channels and poor water quality during certain conditions minimize the value of the habitat.

As ephemeral flooded habitat disappears, splittail larvae and juveniles are forced to use habitat along the margins of the main river and Delta channels. Although splittail use deeper, open water as they grow, much of the population continues to use shallow (<10 feet deep) edge habitat as adults. This habitat is very limited along the San Joaquin River and Old River in the project vicinity because of the steep levee banks typical of the area. Juvenile splittail are commonly found in Delta sloughs in late winter and spring and are particularly abundant in the vicinity of Montezuma Slough (Meng and Moyle 1995). As summer progresses, juvenile splittail occupy the deeper, open-water habitats of Suisun and San Pablo bays. In upstream areas, juveniles are found in shallow, flooded areas where higher water temperatures and low water velocities persist.

Splittail abundance has been shown to be strongly associated with high Delta outflows during primary spawning months (March through May). High Delta outflows during late winter and spring correlate with increased total surface area of shallow-water habitats containing submerged vegetation suitable for splittail spawning, both in and, especially, upstream of the Delta. During years of severely reduced Delta outflow, such as the 1986–1992 drought, spawning success may have been greatly reduced, contributing to reduced abundance (Meng and Moyle 1995).

Habitat modification is probably the largest single factor contributing to the long-term decline of Sacramento splittail. Land reclamation, flood control facilities, and agricultural development have eliminated and drastically altered much of the splittail habitat in lowland areas. Dams have restricted access to upstream spawning and rearing habitats. Levee construction, bank stabilization practices (e.g., bank revetment), river channelization, dredging, and diking and filling of historical floodbasins have drastically reduced ephemeral shallow-water habitats available to spawning adults. An estimated 96% of historical wetland habitats are either unavailable to splittail or have been eliminated.

Longfin Smelt

Longfin smelt is a state and federal Species of Concern. This species is a 3- to 6-inch-long silvery fish that lives for 1-2 years. Longfin smelt are euryhaline (i.e., adapted to a wide salinity range) and anadromous. They were the most abundant smelt species in the Bay-Delta estuary before 1984; however, populations have declined significantly since this peak. Longfin abundance was very low from 1987 to 1992, with 1992 having the lowest index on record. Abundance increased somewhat during 1993. Abundance indices recently have been highly variable from year to year (Moyle et al. 1995).

Distribution of longfin smelt is centered in the west Delta, Suisun Bay, and San Pablo Bay. In wet years, longfin smelt are distributed more toward San Pablo Bay and in dry years more toward the west Delta. Peak spawning occurs between February and April in upper Suisun Bay and the lower and middle Delta (Moyle et al. 1995). Spawning rarely occurs upstream of Medford Island in the San Joaquin River and Rio Vista on the Sacramento River. The project area is outside the primary distribution area of longfin smelt in the Sacramento-San Joaquin River Delta.

Longfin smelt spawn in fresh water and usually die after spawning. Spawning occurs primarily from January through April in upper Suisun Bay and in the Delta. The eggs are adhesive and are deposited on rocks or aquatic plants. They hatch in 37–47 days at 45°F. Larval abundance in the Bay-Delta estuary peaks from February to April. Larvae and juveniles generally move downstream and rear in Suisun and San Pablo bays (Moyle et al. 1995)

Larval longfin smelt generally are collected below Medford Island in the San Joaquin River and below Rio Vista on the Sacramento River, indicating that spawning rarely occurs above these locations (Moyle et al. 1995). The project area is located well upstream of Medford Island, and longfin smelt adults, eggs, and larvae are not expected to occur in the vicinity of the proposed project. In addition, longfin smelt have not been collected during sampling in the project vicinity. Therefore, this species is not expected to occur in the project area and is not evaluated further in this SEIR.

Green Sturgeon

Green sturgeon is a state and federal Species of Concern. It is a minor component of the total sturgeon population in the Central Valley; ratios of adult green sturgeon to white sturgeon during tagging studies in the Delta have ranged from 1:39 to 1:164. Limited data suggest that green sturgeon abundance has been reduced throughout its range (Moyle et al. 1995). At present, biologists are unsure of the spawning locations of the green sturgeon, although it is thought that they spawn in the Sacramento River system. The early developmental biology of green sturgeon is essentially unreported, and little is known about the growth and maturation rates of this species. Green sturgeon have not been sampled near the project vicinity. This species is not expected to occur in the project area and is not evaluated further in this SEIR.

INVERTEBRATE POPULATIONS

The abundance and composition of invertebrate populations are critical to the survival of both common and special-status fish species. Most fish species either directly consume invertebrates or prey on fish species that consume invertebrates.

The distribution and abundance of benthic invertebrates (those living on or in the bottom substrates) respond to changes in habitat availability, largely determined by the location of the salinity gradient, which is a function of Delta inflows and outflows. The more stable salinity regime of the interior Delta appears to provide favorable habitat for permanent persistence of a greater density and species diversity of benthic populations. Greater variability of benthic invertebrate densities in the western Delta and Suisun Bay is caused by periodic large freshwater outflows and salinity changes (SWRCB and USACE 1995).

The impacts of Delta outflow, Delta flow patterns, and diversions on planktonic invertebrates (invertebrates living suspended in the water column) are similar to the impacts on planktonic life stages of delta smelt and longfin smelt. *Neomysis*, a mysid shrimp, is probably the single most important zooplankton species in the diet of Delta fish. Some of the annual fluctuations in abundance of this organism and shifts of population distribution between Suisun Bay and the Delta can be attributed to variations in Delta outflow. *Neomysis* is most abundant in years characterized by high spring outflow that locates the entrapment zone downstream of the Delta. Upstream locations of the entrapment zone in the Delta reduce both the habitat area available to *Neomysis* and the density of *Neomysis* prey.

Although invertebrate populations are a critical component in the aquatic ecosystem, they are given only cursory consideration in the remainder of this SEIR. The proposed project would have only very localized impacts on invertebrate populations and habitats, and project-related impacts would be mostly temporary, during construction. In addition, potential impact mechanisms affecting invertebrate populations and habitats are the same as those for special-status fish species. Therefore, impacts and mitigation described for these fish species also would address aquatic invertebrates.

Factors Affecting Abundance and Distribution of Fish Species

Numerous human-induced perturbations and natural events have contributed to changes in habitat conditions, populations, diversity, and distribution of fishery resources in the Delta. Many of the changes began over a hundred years ago, with hydraulic mining in the Sierra and foothills destroying large salmon runs. Other reasons for declining fish stocks include dams and water diversions for domestic agriculture, industrial, and power-generation uses; flood control projects; drought conditions; commercial fishing; and introduction of nonnative species. Flow rates and related impacts on water temperature, salinity, and fish movement are critical variables influencing fish habitat conditions in the Sacramento-San Joaquin River system. The greatest hydrologic change for fish, particularly migratory salmonids, has been the reduction in spring peak flows that enhance the ability of young fish to migrate downstream to and through the Delta. Substantial increases in summer flows since completion of major water storage projects in both the Sacramento and San Joaquin River systems have also altered Delta hydrology and modified habitat conditions for fish species.

Major factors affecting abundance and distribution of fish species in the Delta, estuary, and Sacramento-San Joaquin River systems generally can be classified as habitat conditions (including direct modification and loss, flows, water temperature, dissolved oxygen, and salinity), contaminants, entrainment, species introductions, artificial production, and harvest. Each of these factors is described below.

Habitat Conditions

Direct Modification and Loss

Habitat modification, habitat loss, and limited access to habitat have reduced the distribution and abundance of many aquatic organisms in the Delta. Diking and filling of wetlands, land reclamation, flood control facilities, and agricultural development have altered or removed spawning and rearing habitats. Chinook salmon, steelhead, rainbow trout, sturgeon, Sacramento pikeminnow, and American shad require upstream habitat, much of which is currently inaccessible. Dams have reduced habitat availability by restricting or blocking access to upstream spawning and rearing areas. Loss of habitat attributable to blockage by dams is a primary cause of low chinook salmon and steelhead abundance relative to historical levels.

Historically, much of the Delta consisted of backwater areas, tidal sloughs, and channel networks that supplied and drained highly productive tidal-marsh complexes. Abundant vegetation also slowed the movement of water through the Delta during floods, increasing hydraulic residence times and the opportunity for sediment and nutrients to settle to the bed. Trees and shrubs grew adjacent to many channels, providing shade and cover for fish. Under existing conditions, however, most of the open water is deep-channel habitat that has been dredged, leveed, and riprapped to provide passage for ocean-going vessels and efficient conveyance of fresh water from the Sacramento River through the Delta. Levees typically are kept bare of vegetation, to reduce the probability of levee failure. The amount of shallow-water and SRA habitat throughout the Delta is therefore much lower now than under historical conditions.

Flow

Flood control, water storage facilities, and water diversions have affected flow conditions in streams and in the Delta. Streamflow influences the quantity, quality, and distribution of spawning and rearing habitat for a variety of fish species. Streamflow directly affects the amount of available habitat with appropriate combinations of water depths, velocities, and streambed characteristics (e.g., substrate composition, cover) for spawning. Flow reductions during the incubation period can cause inadequate water circulation, desiccation of eggs and larvae, and interruption of flushing flows needed by some species to maintain habitat diversity, mobilize sediment, and scour algae from spawning gravels.

Facility operations have reduced the incidence and duration of flood flows and subsequent inundation of lowland areas that provide temporary but critical habitat for spawning Sacramento splittail and other shallow-water species. Adequate flow is required to provide necessary conditions for optimal migration, spawning, egg incubation, and rearing of several fish species. Reduced flow can reduce water levels and consequently strand larvae and juveniles and desiccate eggs. Reduced flow can also reduce tidal mixing and nutrient input to the estuary, thereby lowering overall estuarine productivity. Fish populations in the Sacramento and San Joaquin River system generally increase in response to infrequent high-runoff conditions, when reservoir storage capacities are exceeded and natural unimpaired conditions are approximated in the tributaries, in the mainstem river, and throughout the Delta.

Combined with the structural changes imposed by levees, dikes, dredging, and channelization, Delta diversions and exports have reduced Delta outflow and the average residence time of Delta water, nutrients, algae, and other forms of fine particulate organic matter compared to historical Bay-Delta conditions. This reduction has been greatest during the dry season, when most primary and secondary production normally takes place throughout the system. Under low-inflow and high-export conditions, the amount of water, sediment, and nutrients flowing out of the Delta to Suisun Bay is greatly reduced and the direction of net flows in some central- and south-Delta channels is reversed (i.e., net flows are upstream, toward the pumps instead of bayward). The abundance of several species (e.g., longfin smelt, Sacramento splittail, mysids, striped bass) is correlated with, but not necessarily directly dependent on, Delta outflow (Estuarine Ecology Team 1997). Under normal conditions, abundance is higher at high outflows.

Fish movement (e.g., migration, transport) also is closely related to flows in the Sacramento-San Joaquin River system. High flows during the early rearing period increase downstream movement of large numbers of chinook salmon fry. Under low-flow conditions, more fry may remain in upstream rearing areas and emigrate during the normal smolt emigration period. Generally, higher flows improve survival and migration success of juvenile salmonids by increasing migration rates, reducing exposure to diversions (e.g., reducing the proportion of flow diverted), and maintaining favorable water quality conditions.

Flow-survival and flow-abundance relationships are not strongly supported by available data for chinook salmon juveniles in the Delta; however, some data indicate that increased lower Mokelumne River net flow may increase survival of juveniles released in the Delta Cross Channel and the Mokelumne River channels (EDAW 1998). For chinook salmon of both Sacramento River and San Joaquin River origin, mortality during migration through the Delta varies depending on pathway and existing environmental conditions. For San Joaquin River chinook salmon, juveniles that move with flows into Old River at Mossdale may suffer greater mortality attributable to entrainment in diversion pumps than juvenile chinook salmon that continue down the San Joaquin River toward Stockton; however, the relationship is not as clearly supported as the relationship for chinook salmon entering the Delta Cross Channel from the Sacramento River. A temporary barrier is installed at the head of Old River at the San Joaquin River in spring and fall to protect migrating salmon.

Water Temperature and Dissolved Oxygen

Water temperature is primarily a function of meteorology; however, water temperature in river reaches below major reservoirs is also affected by flow and reservoir discharge temperature. Chinook salmon and steelhead trout are the primary species of concern relative to water temperature. Mature female chinook salmon exposed to water temperatures above 60°F for prolonged periods experience poor survival and produce less viable eggs than females subjected to lower water temperature. Water temperatures also limit the geographic range where chinook salmon and steelhead can successfully spawn and rear. Appropriate water temperature for egg incubation and juvenile rearing is a critical factor for survival in the San Joaquin River and its tributaries. For survival of incubating eggs and larvae, water temperature must be between 39°F and 60°F. Juvenile chinook salmon and steelhead may tolerate water temperatures between 32°F and 75°F, but the optimal range for survival and growth, provided an adequate food supply exists, ranges from 50°F to 64°F.

The U.S. Geological Survey has maintained water temperature records for the San Joaquin River at Vernalis since 1951. From October through April, daily average temperature is rarely over 68°F. Daily maximum temperature exceeds 68°F only approximately 10% of the time in April and October. In May, daily average temperature is less than 66°F approximately half the time, but daily maximum temperature exceeds 68°F approximately half the time. Approximately 10% of the time, daily maximum temperature exceeds 75°F in May. By June, daily average temperature is over 70°F half the time and exceeds 77°F 10% of the time. Water temperatures in Old River would likely be similar or slightly warmer than temperatures in the San Joaquin River. Paradise Cut temperatures could be much warmer than the San Joaquin River when flows in the cut are minimal.

Dissolved oxygen is required in the aquatic environment for survival of fish and other aquatic life. Dissolved oxygen can be depleted in highly productive aquatic environments through daily and seasonal cycles of photosynthesis by aquatic plants, respiration of aquatic organisms, and decomposition of organic materials. Coldwater fish such as salmon and steelhead generally require a minimum of 5 milligrams per liter (mg/l) of dissolved oxygen. DWR monitoring on the San Joaquin River at Vernalis and Mossdale and on Old River near Byron indicates that mean ambient dissolved oxygen concentrations in these areas meet or exceed 5 mg/l and on average are adequate for protection of aquatic life with concentrations usually ranging from 7 mg/l to 10 mg/l. However, monitoring data show that dissolved oxygen concentrations in the San Joaquin River near Stockton regularly fall below 5 mg/l. Low or negative streamflow past Stockton because of tidal influences reduces dilution and mixing, which reduces re-aeration of the water. These low dissolved oxygen concentrations are called an "oxygen sag" and may act as a barrier to fish migration. See section 4.8, "Hydrology and Water Quality," for a more detailed discussion of dissolved oxygen conditions int he Delta.

Salinity

Delta outflow substantially affects salinity in the Bay-Delta and therefore influences the habitat area available for species such as delta smelt, striped bass, and longfin smelt. The entrapment zone (the area of the estuary where riverine freshwater flow mixes with seawater) is an important aquatic habitat region associated with high levels of biological productivity that moves seaward in response to increased freshwater discharge. Its location is determined by the salinity gradient in the Bay-Delta.

The distribution of delta smelt is strongly related to the location of the entrapment zone. When the entrapment zone is in Suisun Bay, larvae density is generally greatest in Suisun Bay. When it shifts upstream into the Delta, larval distribution also shifts to the Delta (CDFG 1992a, 1992b). As mentioned previously, abundance of several species (e.g., longfin smelt, splittail) is correlated with, but not necessarily directly dependent on, Delta outflow and consequently salinity (Estuarine Ecology Team 1997). Abundance is generally higher when the entrapment zone is farther downstream (i.e., a response to higher Delta outflow).

Contaminants

Growth and survival of all fish life stages, but especially of larval fish, may be reduced by the toxic impacts of insecticides, herbicides, trace elements, and other toxic materials that have entered the aquatic environment from agricultural runoff, municipal and industrial discharge, stormwater runoff, and other sources. Toxic materials can affect larval fish directly and indirectly, causing mortality within a short period (e.g., days) or adversely affecting growth and development, thereby limiting chances for survival (Brown 1987).

Concentrations of toxic metals (e.g., selenium, copper, cadmium, and chromium) exceeding levels recommended for human consumption have been detected in striped bass (Herbold et al. 1992). The specific impacts of contaminants on estuarine fish are not known, but tissue samples taken from estuarine fish exceeded polychlorinated biphenyl (PCB) screening levels for human consumption in 1994. Pesticide levels in the Sacramento River have at times exceeded levels toxic to striped bass and other fish species (Bailey 1992).

A primary drainage pump currently discharges agricultural drainwater from the RID Area into Paradise Cut (Exhibit 4.8-3). The water quality is typical of agricultural drain water and is more thoroughly described in section 4.8, "Hydrology and Water Quality."

Entrainment

Diversions from rivers, the Delta, and Suisun Bay entrain fish eggs, larvae, juveniles, and adults. Losses to diversions depend on the timing, size, design, and location (geographically and position in the channel) of individual diversions relative to the seasonal and diurnal distribution and abundance of fish. The egg, larval, and juvenile life stages are most susceptible to entrainment. Substantial numbers of chinook salmon, delta smelt, longfin smelt, American shad, Sacramento splittail, white catfish, and striped bass are entrained in Delta diversions.

Substantial entrainment losses occur at the SWP (Banks) and CVP (Tracy) export facilities and Pacific Gas and Electric Company's (PG&E's) Contra Costa and Pittsburg generating facilities. The SWP and CVP export facilities in the South Delta annually entrain thousands and sometimes millions of larval and juvenile striped bass, white catfish, splittail, American shad, delta smelt, longfin smelt, and chinook salmon (CDFG 1987, 1992c). PG&E's power plants located near Antioch and Pittsburg divert cooling water from the Delta during power generation. The power plant intakes are screened to protect most adult and older juvenile fish, but delta smelt and striped bass entrainment losses result from impingement on and passage through the screens (Stevens et al. 1990).

Stewart Tract irrigation intake pumps are shown in Exhibit 4.8-3. These agricultural diversions are currently unscreened. It is unknown how many fish, and what specific species, are entrained through these agricultural diversions from the San Joaquin River, Old River, and Paradise Cut. While some loss may occur, the loss is currently unquantifiable. Any mortality is likely small relative to the fish populations as a whole, but the cumulative loss throughout the Delta could be significant. More than 1,000 agricultural diversions occur from the Delta, contributing to total entrainment losses.

Delta outflow influences entrainment in the Delta. High Delta outflows can carry organisms into Suisun Bay, where they are less vulnerable to entrainment in Delta diversions. Additionally, high outflow can shift the position of the entrapment zone farther downstream toward Suisun Bay. As discussed previously, the location of the entrapment zone determines the distribution of larvae and juveniles of several fish species. An upstream shift in the entrapment zone could increase the presence of larvae and juveniles in the Delta, where exposure to diversions is greater and entrainment vulnerability is increased.

Species Introductions

Introduction of nonnative organisms has substantially altered the biological structure of the Delta. Nonnative organisms may affect other species through competition, predation, and change in trophic dynamics (i.e., the availability of prey). Because introduced fish and invertebrate species currently dominate the Delta fish fauna (i.e., exceed the abundance and biomass of native species), the impact of new introductions on remaining native species is unclear (Brown 1992). Examples of existing introduced species that may affect abundance and distribution of native species include the Asian clam (*Potamocorbula amurensis*), which may reduce food availability for larval fish; striped bass, crappie, white catfish, inland silverside, and chameleon goby, which prey on native species and may compete for food; and wakasagi, which hybridizes with delta smelt and may contribute to loss of genetic integrity.

Artificial Production

Release of hatchery fish could have detrimental effects on natural populations and the trophic foodweb of the Bay-Delta through predation, competition, and hybridization with natural stocks. Currently, chinook salmon, steelhead, rainbow trout, and striped bass populations are augmented by hatchery or pen-rearing programs.

Harvest

Legal and illegal harvest of fish can reduce fish abundance; however, impacts of harvest on species in the Sacramento-San Joaquin River system are not well documented. Striped bass, sturgeon, American shad, steelhead, rainbow trout, largemouth and smallmouth bass, and white catfish are all harvested by sport anglers. Sport and commercial fishing harvests averaged more than 70% of ocean populations of chinook salmon between 1990 and 1997 (Pacific Fishery Management Council 1998).

4.15.3 Environmental Impacts

Analysis Methodology

Information obtained from previous environmental compliance documents (see the list of documents at the beginning of this section), biological studies conducted in the Delta, fish monitoring surveys, and California Natural Diversity Data Base (CNDDB) records were used to assess impacts on fisheries resources from the proposed project.

The proposed project represents a substantial change in the RID Area, transforming the area from agricultural production to mixed-use residential/commercial development. The impacts on the existing fisheries, however, are confined to the changes to the waterways surrounding Stewart Tract (San Joaquin River, Old River, and Paradise Cut). Project-related fisheries impacts generally fall into six primary impact mechanisms:

- changes to sedimentation/water quality from in-river construction,
- project-induced changes to physical habitat in the surrounding waterways,
- changes in water diversions (magnitude and timing) onto the island,
- changes in water discharges (magnitude and timing) from the island,
- changes in water quality of water discharges from the island, and
- changes to flood flows into Paradise Cut from the San Joaquin River.

The analysis methodology is generally based on evaluating hydrologic and water quality model output developed for the proposed project (see section 4.8, "Hydrology and Water Quality") and determining whether the changes result in significant impacts on key fisheries resources. Delta or CVP- and SWP-wide operations modeling were unnecessary because the proposed project is very localized, does not affect CVP or SWP operations, and does not affect available water supplies.

Potential impacts associated with management of the internal lake (water intakes from the Delta, discharges to the Delta) were evaluated under full project buildout to provide an analysis of the "worst-case condition." During Phase 1, when the lake is approximately 180 acres (almost half the total buildout size) and agricultural production is continuing on undeveloped portions of Stewart Tract, the overall characteristics of intakes and discharges would be between the existing condition and full project buildout condition because the lake volume and project-related impervious surface area are smaller and less water would need to be moved into and out of the lake to maintain desired levels.

A large number of fish species can occur in the project area. Many of these species have the same or similar ecological requirements; therefore, a representative sample of key species was selected for evaluation that would adequately reflect potential impacts for all species. Species were selected if they have been identified by state or federal agencies as special-status species and/or have experienced substantial population declines/changes in recent years. Impacts on the following key and representative species were considered when evaluating project effects:

- Central Valley fall-/late-fall-run chinook salmon, Central Valley winter-run chinook salmon, and Central Valley spring-run chinook salmon;
- steelhead trout;
- delta smelt;
- Sacramento splittail;
- longfin smelt; and
- green sturgeon.

A project-level analysis of fisheries resources was conducted for both Phase 1 and Phase 2 rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. The less specifically defined Phase 2 does not preclude a project-level analysis of fisheries resources because Phase 2 elements that might affect fisheries (e.g., back bays, bridges, water intakes and discharges) and associated mitigation measures are the same as those for Phase 1.

PRIOR WLSP EIR ANALYSIS

The WLSP EIR concluded that there are potentially significant impacts on fisheries resources that would be mitigated to a less-than-significant level by mitigation measures outlined in the WLSP EIR. Special-status fish species addressed in the impact section of the WLSP EIR included chinook salmon, delta smelt, longfin smelt, and Sacramento splittail. Since the WLSP EIR was completed, an extended period has passed and new fisheries monitoring data from the Delta have become available. In addition, the River Islands project has several elements not included in the WLSP that could have a direct impact on fisheries, such as the back bays and habitat restoration activities. Therefore, a new analysis of fisheries resources was conducted for this SEIR.

THRESHOLDS OF SIGNIFICANCE

The proposed project would cause a significant impact on fisheries resources if it would result in one or more of the following:

- have a substantial direct adverse impact on any species identified as a Threatened, Endangered, candidate, sensitive, or special-status species by CDFG, USFWS, or NMFS;
- substantially reduce the habitat of a fish species;
- cause a fish population to drop below self-sustaining levels;

- threaten to eliminate a fisheries/aquatic community;
- substantially reduce the number or restrict the range of an aquatic species;
- substantially alter the abundance, diversity, or fish species composition such that it reduces the viability of a special-status, native, or sport fish species; or
- substantially interfere with the movement of any resident or migratory special-status, native, or sport fish population.

IMPACT ANALYSIS

Impact 4.15-a

<u>Fisheries - RID Area Construction Sediment</u>. *General construction activities in the RID Area could potentially release sediment and other water quality constituents into the San Joaquin River, Old River, and Paradise Cut, which could adversely affect fish species locally. However, given the location of construction activities relative to the surrounding levees and the requirements for erosion control during construction, limited to no sediment releases would occur. This impact is considered* ***less than significant****.*

General construction activities within the RID Area would be extensive, with approximately 400 acres of soil surface area disturbed during Phase 1a, 1,355 additional acres disturbed to complete Phase 1, and approximately 3,060 acres affected during construction of Phase 2. These activities could potentially cause sediment to enter and become temporarily suspended in adjacent water bodies. Therefore, temporary impacts on aquatic biota and special-status species in the immediate vicinity of the construction zone could occur. These temporary, construction-related impacts could include, but would not be limited to, reduced visibility and subsequent impairment of feeding success, gill abrasion, respiratory distress, habitat modification through the introduction of fines, and smothering of benthic organisms. Any species in the area during the construction activities could be adversely affected, including chinook salmon, delta smelt, and Sacramento splittail.

A key consideration in evaluating this potential impact is that these construction activities would occur solely on the landward side of the levees. (Potential impacts associated with levee breaching are presented in the discussion of Impact 4.15-b, below.) Therefore, opportunities for release of sediments and other harmful water quality constituents into the surrounding waters by passing over the levees would be minimal to nonexistent. The existing levees create a closed system, preventing sediment and other water quality constituents from reaching the surrounding waters. Sediment entering the central drainage canal in the RID Area could ultimately be pumped into Paradise Cut. However, the construction contractors would be required to comply with a Storm Water Pollution Prevention Plan (SWPPP) during project construction and implement best management practices (BMPs) included in the SWPPP to minimize potential erosion and sedimentation and meet the requirements for the California General Permit for construction projects regulated under the National Pollutant Discharge Elimination System (see Mitigation Measure 4.8-a in section 4.8, "Hydrology and Water Quality"). Given the sediment containment function provided by the levees surrounding the RID Area and the additional sediment controls provided by SWPPP and associated BMP implementation, this impact is considered less than significant.

Impact
4.15-b

Fisheries - Levee Breeching. *Levee breaching activities along the San Joaquin River, Old River, and Paradise Cut could result in streambed and riverbank disturbance, sediment input, and contaminant input, all of which could substantially adversely affect fish species in the immediate area. This impact is considered* ***significant****.*

Levees would be breached at specific locations on the San Joaquin River and Old River to facilitate creation of back bays. Up to three back bays would be created on the San Joaquin River as part of Phase 1a, up to two additional back bays would be created along Old River as part of Phase 1, and up to four back bays would be constructed along Old River as part of Phase 2. After the levees are breached and as the back bays fill with water, some backwash of water contaminated with sediment would flow back into the rivers. Along Paradise Cut, no back bays would be created, but the existing levee would be breached at approximately six locations during Phase 1 to increase hydraulic capacity and create islands for habitat restoration. Earthwork associated with levee breaching could release sediment into the adjacent Paradise Cut canal. The same is true during construction of the slurry wall/removable levee segment along Paradise Cut near I-5.

Levee breaching activities would likely cause sediment to enter and become temporarily suspended in the water along the west side of the San Joaquin River, the south side of Old River, and Paradise Cut. Contaminants such as fuel oils, grease, and other petroleum products used in construction activities could be introduced into the system directly or through surface runoff. Contaminants may be toxic to fish or adversely affect their respiration and feeding. Additional impacts from sediment and contaminants could include, but would not be limited to, reduced visibility and subsequent impairment of feeding success, gill abrasion, respiratory distress, habitat modification through the introduction of fines, and smothering of benthic organisms. All fish species in the localized affected area could be subject to substantial adverse effects, including chinook salmon, delta smelt, and Sacramento splittail.

Levee breaching activities also could temporarily inhibit Sacramento splittail spawning and recruitment in the immediate vicinity of the construction area by disrupting benthic vegetation that splittail eggs adhere to and smothering benthic organisms that are small prey for early larval stages of splittail. Juvenile splittail also would be subjected to the same general stressors from sediment and contaminants mentioned above. Construction activities could also impede or delay fish migrations, particularly those of chinook salmon, if turbidity increases substantially during the migration period.

Although impacts from levee-breaching activities would be localized and temporary, they could substantially adversely affect a number of different special-status fish species. Therefore, this impact is considered significant.

Impact
4.15-c

Fisheries - Bridge and Utility Crossings. *Bridge and utility crossing construction activities on the San Joaquin River could result in streambed and riverbank disturbance, sediment input, and contaminant input, all of which could substantially adversely affect fish species in the immediate area. This impact is considered* ***significant****.*

Construction of the Bradshaw's Crossing Bridge during Phase 1 and the Golden Valley Parkway Bridge across the San Joaquin River during Phase 2 would involve in-water construction activities. Disturbance from such construction activities could harass and displace special-status fish species during construction, particularly chinook salmon, and delta smelt. Construction activities and subsequent disturbance of the streambed and riverbank could cause sediment input into the San Joaquin River, temporarily reducing water quality for special-status fish species. During the proposed directional boring of the 4-inch natural gas pipeline under the San Joaquin River during Phase 1a, drilling slurry (i.e., bentonite) could be released into the river if a "frac-out" occurred under the river. (A "frac-out" occurs when drilling slurry reaches the soil surface through a fracture or fissure in the soil.) Water quality could be adversely affected, depending on the quantity of drilling slurry released. Contaminants such as fuel oils, grease, and other petroleum products used in construction activities could be introduced into the system directly or through surface runoff. Contaminants may be toxic to fish or adversely affect their respiration and feeding. Construction activities within the river channel could delay or impede both upstream and downstream migration of fall-run chinook salmon if construction activities occurred during their migration periods.

Although potential impacts from bridge and utility crossings would be localized and temporary, they could result in substantial adverse effects on a number of special-status fish species. Therefore, this impact is considered significant.

Impact
4.15-d

Fisheries - Paradise Cut Bridge. *Bridge construction activities on Paradise Cut could result in short-term degradation of fish habitat through streambed and riverbank disturbance, sediment input, and contaminant input that could substantailly affect special-status fish species. This impact is considered* ***significant.***

Although Paradise Cut may support juvenile chinook salmon and Sacramento splittail during the winter and spring season, it is typically cut off from the San Joaquin River except during high flows (18,000 cfs and higher) that occur on average once every 4 years. There are no fisheries data available for Paradise Cut; therefore, there are no reports of special-status species inhabiting Paradise Cut. Nonetheless, fall-run juvenile chinook salmon and Sacramento splittail could inhabit Paradise Cut temporarily because it has potentially suitable (albeit marginal) habitat for both species and both fish species have been present in beach seine samples in the project vicinity.

Construction of the Golden Valley Parkway Bridge over Paradise Cut during Phase 2 of the proposed project could involve in-water construction activities. Soil disturbance would occur near the Paradise Cut canal and in the area inundated by floodwaters when the San Joaquin River overtops the Paradise Weir. Sediment released from construction activities and associated soil disturbance could cause reduced visibility for fish and subsequent impairment of feeding success, gill abrasion, respiratory distress, habitat modification through the introduction of fines, and smothering of benthic organisms. Contaminants such as fuel oils, grease, and other petroleum products used in construction activities could be introduced into the system directly or through surface runoff. Contaminants may be toxic to fish or adversely affect their respiration and feeding. All fish species in the localized affected area could be adversely affected, including chinook salmon and Sacramento splittail (if they occur).

Construction activities also could temporarily inhibit Sacramento splittail spawning and recruitment in the immediate vicinity of the construction area by disrupting the benthic vegetation that splittail eggs adhere to and smothering benthic organisms that are prey for early larval stages of splittail. Juvenile splittail also would be subjected to the same general stressors from sediment and contaminants mentioned above.

Construction activities also could impede or delay fish migrations, particularly those of chinook salmon, if turbidity increases substantially. However, unlike the San Joaquin River, Paradise Cut is not a typical fish migration corridor and only rarely connects to the San Joaquin River.

Although the probability is low, because potential sediment and contaminant releases associated with construction of the Golden Valley Parkway Bridge over Paradise Cut could result in substantial adverse effects on fall-run chinook salmon and Sacramento splittail (special-status fish species), this impact is considered significant.

Impact
4.15-e

<u>Fisheries - Dock Construction</u>. *Dock construction activities along the San Joaquin River, Old River, and Paradise Cut could result in degradation of fish habitat through riverbank and benthic habitat disturbance and could adversely affect special-status species through sediment and contaminant input. However, construction activities for docks would be small in scale and temporary, and much of the activity would be limited to back bays. Disruption to fish and their habitat would be minimal. Therefore, this impact is considered* ***less than significant****.*

Individual (single-berth) docks along the rivers and the Paradise Cut canal would consist of floating platforms running parallel to the bank and would be attached to the banks by cables. During Phase 1a, 134 individual docks would be installed along the edge of the San Joaquin River and Old River. An additional 155 docks would be installed along Old River to complete Phase 1. Up to 206 individual docks would be installed on the shore of Old River and Paradise Cut during Phase 2. Four group docks, with 10-70 berths each, would also be installed along Paradise Cut (Exhibit 3-8). Construction activities to install the floating platforms to the bank during each project phase could cause temporary sediment loading into the San Joaquin River, Old River, and Paradise Cut, but the amount of sedimentation would be minimal because in-water construction activities for each dock would be very limited. Group and individual docks in the back bays (356 berths) would be installed before breaching of the levee and filling of the water bodies; thus, there would be no disturbance of water bodies during construction of these docks. If for some reason in-water work is required, disturbance would be minimal and isolated in the back bays. BMPs that would be used for major construction activities (e.g., bridges) on the project would also be implemented when installing the docks.

Given these circumstances, potential impacts on fisheries from installation of the docks are considered less than significant.

Impact
4.15-f

<u>Fisheries - Structural Habitat Features</u>. *New bridges, docks, back bays, and habitat enhancements associated with the proposed project are long-term structural features located in or near the adjacent waterways that could affect fish habitats and populations. Impacts on special-status fish species from these features range from* ***less than significant*** *to* ***beneficial****.*

The presence of natural or artificial cover in water bodies is well known to attract relatively high concentrations of fish (SWRCB and USACE 2000). Pilings associated with bridges and shade from bridges and docks may be used as cover by both predator and prey fish. However, these structurally simple forms of cover attract fish species much less than more complex forms such as brush piles or aquatic plants; therefore, relatively low numbers of fish would be affected.

The presence of an estimated eight bridge pilings within the San Joaquin River, four bridge pilings within Paradise Cut, and floating docks along the San Joaquin River and Old River is not expected to cause any significant habitat loss or degradation of habitat quality. Habitat loss from the pilings would be approximately 310 square feet (assuming 7-foot-diameter bridge pilings and pilings in Paradise Cut would be located outside the channels). Since structure and habitat complexity is currently limited in the affected waterways, the pilings provide small but beneficial attributes to habitat complexity that serve to offset the direct loss of habitat from the bridge piling footprints. The creation of back bays and shallow-water habitat in Paradise Cut also more than compensates for the small habitat losses associated with the bridge piling footprints. The four back bays associated with Phase 1 of project development would be completed before any bridge.

In-water project features are not expected to increase the vulnerability of juvenile chinook salmon or any other species to increased predation because these features provide cover for prey species as well as predators. Comprehensive data about predator-prey interactions involving juvenile chinook salmon and other Delta fish species are generally unavailable (U.S. Bureau of Reclamation 1983, Interagency Ecological Program 1995). However, juvenile chinook salmon and other species are known to be vulnerable to predators at locations such as Red Bluff Diversion Dam, Clifton Court Forebay, and release sites for fish salvaged from the SWP and CVP facilities (SWRCB and USACE 2000). These facilities and release sites contain relatively high concentrations of juvenile salmonids and other fish species that may be substantially disoriented by turbulence and handling associated with diversion, flow constriction, bypasses, and trucking. The high concentration of disoriented fish could create exceptional predator habitat by increasing prey availability. The bridge pilings and docks developed as part of the proposed project, however, would not divert water, constrict flows, or substantially increase turbulence and would not cause any conditions expected to disorient fish. Therefore, they would not cause conditions that make special-status species more susceptible to predation.

The creation of the nine back bays would provide additional aquatic habitat (approximately 85 acres of water surface area) and habitat diversity in the San Joaquin River and Old River. It is unknown whether the fish species composition in the back bays would differ significantly from the main channel fisheries, but it is expected that fish would generally use these new habitats in proportion to their availability in the main channels. It is expected that these additional habitats would be beneficial to special-status species by providing shallow-water habitat and general habitat diversity in reaches that do not currently have such features.

In various locations along the banks of the San Joaquin River, Old River, and Paradise Cut, riparian vegetation would be retained, enhanced, or created as part of the project design. Most of the landscaping elements would consist of native trees, shrubs, and grasses planted in a manner to mimic natural vegetation and enhance habitat along the water edge while remaining consistent with the hydraulic function of the waterways. In many areas, the vegetation would be planted in a manner that provides

SRA habitat, an important habitat feature to many special-status fish species. The levee remnants created when the back bays are constructed would also be planted with native trees and shrubs. Some portions of the back bays may be contoured to provide seasonal wetland or shallow-water habitat along the shoreline where existing habitats are generally riprapped, steep levees. Overall, project-related habitat enhancements along the levees surrounding the RID Area would provide benefits to special-status species populations and habitats.

Given these circumstances, impacts on the availability of fish habitat and special-status fish species associated with in-water project features and various habitat enhancements would be less than significant or beneficial.

Impact
4.15-g

<u>Fisheries - Entrainment in Project Pumps</u>. *Surface water would be pumped from Old River into the central project lake (River Islands lake) to manage lake levels. Special-status and other fish species could be adversely affected if they are drawn into the pumps. The amount and timing of existing agricultural diversions would be modified by the proposed project in a manner that reduces the amount of water diverted and reduces seasonal impacts on fisheries. Existing nonscreened agricultural pumps also would be replaced with screened pumps. This impact is considered* ***beneficial****.*

Various special-status and other fish species are adversely affected by being drawn into numerous agricultural and water supply pumps in the Delta (entrainment). Under existing conditions, agricultural water is pumped to the project site year-round from intakes on the San Joaquin River, Old River, and Paradise Cut (Exhibit 4.8-3). None of the diversions is screened. Pumped water volumes typically range from roughly 600 to 3,000 acre-feet per month from March through September. There is the potential for some unknown level of fish loss associated with the pumping under existing conditions. After project implementation, diversions from the intakes would be used exclusively for management of River Islands lake levels. There are three primary variables that must be evaluated when comparing preproject and postproject conditions to determine potential impacts from diversions: the volume of water pumped, the timing of water pumping, and the presence or absence of fish screens at the intakes.

Exhibit 4.8-15 presents a comparison of historic water volume currently pumped into and out of the Delta at the project site with the projected pumping and discharges anticipated for management of the River Islands lake. It can be seen that substantial reductions in water diversions would occur with the proposed project compared to existing conditions. The majority of water would also be pumped in October, which is one of the most "fish-friendly" months for Delta water diversions. Consequently, the volume and timing of diversions from the Delta under the proposed project provide a substantial benefit to special-status fish species.

In addition, there would be no intakes in Paradise Cut under the proposed project, and the existing unscreened intakes would be replaced with screened intakes designed according to the most recent CDFG screening criteria (CDFG 2000), further minimizing diversion-related impacts by reducing fish mortality. The net effect of the proposed project would be a decrease in fish entrainment associated with river diversions to the project area and improved conditions for special-status fish populations. This impact is considered beneficial.

Impact
4.15-h

***Fisheries - Water Discharges to the Delta**. Stormwater from the RID Area would eventually be pumped into Paradise Cut, drain into Old River, and possibly affect special-status fish species. However, the overall water quality of discharges into Paradise Cut would be improved under the proposed project compared to the agricultural return flow experienced under existing conditions. This impact is considered **beneficial**.*

Currently, most of the RID Area is used for agricultural production and excess agricultural tailwater (irrigation runoff) and storm drainage is collected into a central drainage ditch and pumped into Paradise Cut. With the proposed project, the 280-acre artificial lake in the RID Area would be used to collect and store onsite drainage. The project drainage system would be designed to allow stormwater to be kept on the surface and flow through grassy swales located along parks and paseos before entering the lake. This process is designed to maximize percolation through the soil in the parks and paseos and clean the remaining flow as it passes through the vegetation.

The artificial wetlands created along the internal lake would provide additional treatment to stormwater/wastewater before it enters the lake. Because the movement of water would be slowed and the water would pass through the wetland vegetation and soil, sediment and a variety of contaminants would be removed from the water before it flowed into the lake. To maximize percolation into the ground, the lake would not be lined. Only when the runoff is extreme and the lake exceeds design levels would water from the lake be pumped into Paradise Cut (typically winter and spring).

Preproject and postproject models of mean monthly mass loading of total dissolved solids (TDS) into the Delta from the project site show a reduction in mass loading into the Delta for the postproject condition. (Refer to section 4.8, "Hydrology and Water Quality," for a detailed description of the water quality modeling.) In addition, most of the discharges from the proposed project would occur in the winter and spring, when dilution would greatly improve the loading conditions in the Delta. Under the existing condition (agricultural production), most of the mass is discharged during summer, when the Delta water levels are reduced and water quality problems are exacerbated. Exhibit 4.8-15 shows the seasonal volumes of water discharged into Paradise Cut both with and without the proposed project. The agricultural return water is currently pumped into Paradise Cut primarily from April through September. The higher quality water under the proposed project would be pumped into Paradise Cut primarily in December through April. Under the proposed project, habitat conditions for fish species would benefit from both the higher quality and the improved timing of discharges.

Water temperature is a critically important component of water quality for fish species in the Delta. Generally, warmer water is more detrimental to several key native species, including chinook salmon and steelhead trout. Water temperature of the existing agricultural discharges from the project site can be relatively high because the discharges consist of agricultural runoff mostly during late spring and throughout the summer. The proposed project, however, would shift the discharges primarily into the months of December through April, when ambient water temperatures both within and surrounding the RID Area would be cool. Consequently, water temperature is not considered to be an issue with the proposed discharges into Paradise Cut and the Delta, and the project's effects on water temperature could be beneficial.

In summary, the postproject condition would improve overall water quality and therefore habitat conditions for fisheries in the project vicinity relative to existing, preproject conditions. Therefore, impacts on fisheries associated with releases of stormwater discharges into Paradise Cut are considered beneficial.

Impact **4.15-i**

Fisheries - Altered Hydrology from Water Discharges. *The discharge of stormwater, surface water runoff, and wastewater may alter the hydrology of Paradise Cut and adversely affect fishery resources. However, alterations would be minor and would be compensated for by increased water volumes associated with widening and deepening the Paradise Cut canal. This impact is considered* ***less than significant.***

The amount of water that would be discharged into Paradise Cut would be greatly reduced during summer for the postproject condition but increased in winter (Exhibit 4.8-15). Under preproject conditions, approximately 1,100-1,600 acre-feet per month of water is being discharged into Paradise Cut during the summer. Under postproject conditions at full buildout, fewer than 100 acre-feet per month of water would be pumped into Paradise Cut during summer. In February, however, approximately 1,000 acre-feet per month of water would be discharged into Paradise Cut with the project, whereas water discharges under existing conditions are approximately 400 acre-feet per month (Table 4.8-24).

Existing fisheries habitat in Paradise Cut is often relatively poor for special-status fish species because it is a terminal slough with poor water quality and no direct connection to the San Joaquin River. The additional and cleaner water discharges under the proposed project during December through March would improve fisheries habitat conditions in Paradise Cut. However, reduced discharges during the summer months, although of higher quality than under existing conditions, could still reduce flushing and water exchange in the cut and adversely affect water quality. This potential impact is minimized because the proposed project design substantially increases the volume of water in the Paradise Cut channel by both widening and deepening this water body. Modifications to the channel also would increase tidal flows into and out of Paradise Cut, allowing for greater flushing and water movement. Consequently, any reductions in summer discharges to Paradise Cut would be compensated for by an increased volume of water in Paradise Cut at all times associated with the proposed project.

Any impacts on fisheries habitat resulting from changes in the hydrology of Paradise Cut associated with altered water discharges are considered less than significant.

Impact **4.15-j**

Fisheries - Maintenance Dredging of Back Bays. *Maintenance dredging of back bays may have substantial adverse effects on water quality and fish habitat in the San Joaquin River, Old River, and the back bays themselves. This impact is considered* ***significant.***

Back bays would not exist without the proposed project. The proposed project thereby creates fish habitat by creating back bays. These back bays, however, would require periodic maintenance dredging approximately every 5-10 years, depending on hydraulic conditions. The back bays would be designed to be "self-flushing," but it is still anticipated that dredging would be required. In general, dredging has an adverse impact on fisheries resources by causing substantial sedimentation that could cause reduced visibility for fish and subsequent impairment of feeding success, gill abrasion, respiratory distress, habitat modification through the introduction of fines, and smothering of benthic organisms. These impacts would be greatest in the back bays, but some sediment also would likely reach the adjacent river (Old River, San Joaquin River). Sacramento splittail in particular could be affected because it may occupy the shallower water of the back bays and use it for spawning, rearing, and foraging habitat, especially during the spawning season (January through July).

Although fisheries habitat in the back bays would be created as part of the proposed project, impacts on fisheries resources associated with ongoing dredging of the back bays are considered significant because special-status fish species could be subject to substantial adverse effects in the back bays as well as in the adjacent rivers.

Impact **4.15-k**

Fisheries - Habitat Modifications in Paradise Cut. *Habitat changes in Paradise Cut resulting from channel modifications, increased flood flows, and setback levee designs could provide additional fisheries habitat, particularly for Sacramento splittail. This impact is considered* ***beneficial***.

There is little or no fisheries data available for Paradise Cut. However, fall-run juvenile chinook salmon and Sacramento splittail in particular could inhabit Paradise Cut temporarily (particularly during and after flood flows) because it has potentially suitable habitat for both species, and both fish species have been present in beach seine samples in the project vicinity. Splittail have also been present in real-time monitoring surveys within the project vicinity. Flood flows currently spill from the San Joaquin River into Paradise Cut approximately once every 4 years when flows exceed 18,000 cfs. During these times, chinook salmon, Sacramento splittail, and other fish species could swim into Paradise Cut. These species could also occur in Paradise Cut at other times because of its connection indirectly to the San Joaquin River via Old River.

Flood flows would be increased in Paradise Cut by widening and deepening the flow area in the cut and removing existing flow restrictions near the Paradise Weir at the San Joaquin River. Modifying Paradise Cut would not change when water from the San Joaquin River overflows Paradise Weir into Paradise Cut (18,000-cfs flows). Consequently, the proposed project does not change the frequency when special-status species may enter Paradise Cut from flood flows. However, the volume of water flowing through Paradise Cut would approximately double under the proposed project when flood-level waters flow over the Paradise Weir. This additional water coupled with the expanded Paradise Cut channel would create a type of floodplain, shallow-water habitat that is desired by juvenile chinook salmon and Sacramento splittail. Even during nonflood events, Sacramento splittail may find the expanded habitat to be conducive for spawning and rearing.

The channel modifications and substantial changes to Paradise Cut have the opportunity to provide habitat benefits for fish that otherwise may not occur in the cut. The current use and value of Paradise Cut for special-status species are unknown but thought to be relatively poor. Under the proposed project, however, habitat conditions could be improved in Paradise Cut by increasing the water volume in Paradise Cut at all times, improving the water quality of discharges from the RID Area, and creating desirable shallow water and SRA habitat. These impacts are all considered to be beneficial impacts for fisheries resources in Paradise Cut.

Impact
4.15-I

Fisheries - Diversion of Chinook Salmon Smolts. *Increasing flood flows in Paradise Cut may divert chinook salmon smolts from the San Joaquin River into Paradise Cut, resulting in higher entrainment and predation mortality if these fish reach the CVP/SWP pumps. However, incidence of increased flood flows would be infrequent, and any increases in salmon smolts entering Paradise Cut would be minor. This impact is considered* ***less than significant****.*

There are four primary considerations in evaluating the impacts of the Paradise Cut channel modifications on fall-run chinook salmon smolts that might enter Paradise Cut: (1) the *timing* of preproject and postproject inflow to Paradise Cut relative to the timing of salmon outmigration, (2) the *frequency* of inflows, (3) the *magnitude* of flows, and (4) the *duration* of any changes in flood flows entering Paradise Cut both preproject and postproject.

Fall-run chinook salmon smolts can begin migrating downstream and out of the San Joaquin River beginning as early as January and continuing through June. The primary outmigration period is typically April through June. Generally, between April 15 and May 15, the head of Old River barrier is temporarily placed at Old River to prevent chinook salmon from migrating into Old River and traveling to the SWP and CVP pumps where entrainment and predation mortality can be high. However, the barrier is not installed if flows are too high to safely and effectively install the rock structure. Paradise Cut provides another route for migrating salmon smolts to reach Old River during flood events when the San Joaquin River overtops the Paradise Weir and floodwaters flow to Old River.

Water from the San Joaquin River could potentially overflow Paradise Weir into Paradise Cut between December and July, but approximately 85% of the overflow occurrences since 1979 have occurred in January through May. Because the weir itself would not be altered as part of the proposed project, the timing of overflows into Paradise Cut would not be altered, and the timing of opportunities for salmon smolts to enter Paradise Cut would not change.

In addition, because the proposed project would not alter the Paradise Weir, the project would not affect the *frequency* of when flood flows enter Paradise Cut. Currently, flows enter Paradise Cut when the San Joaquin River reaches approximately 18,000 cfs. This flow level would not be modified.

Retaining the existing weir also ensures that the *duration* of flows into Paradise Cut during flood events would not change under the proposed project. For example, a preproject flood event exceeding 18,000 cfs for 17 days on the San Joaquin River (whereby flows into Paradise Cut occur for 17 days) would, under postproject conditions, still result in flows into Paradise Cut for the same 17-day period.

The Paradise Cut modifications planned as part of the proposed project would allow for increased *magnitude* of storage and conveyance of flood flows entering Paradise Cut. The hydraulics are complex but are best explained by comparing changes in water surface elevations on the San Joaquin River (at Paradise Weir) with the changes in water surface elevations in Paradise Cut (downstream of the Paradise Weir). For a 10-year recurrence interval flood, the proposed channel modifications would reduce the head water elevation on the San Joaquin River (at Paradise Weir) by 0.42 foot and the tail water elevation at Paradise Cut (downstream of the weir) by 0.67 foot (Table 4.8-32). The differential is approximately 3 inches. This head differential would draw more water into Paradise Cut during the 10-year flood event than would otherwise occur without the project. For a 50-year recurrence interval flood, the comparable San Joaquin River stage is reduced 0.35 foot and the Paradise Cut stage is reduced 0.54 foot. This approximately 2-inch head differential again draws more water into Paradise Cut than without the project. Consequently, even though the water surface elevations are *decreasing* both in the San Joaquin River and in Paradise Cut downstream of the weir, more water is passing across the weir because the head differential is increased under the proposed project.

Section 4.8, "Hydrology and Water Quality," includes an evaluation of the proposed project impact on overall flood flows moving west of Stewart Tract (through both Paradise Cut and the Head of Old River). This evaluation found that during flows of 18,000-20,000 cfs in the San Joaquin River, postproject flows into the Old River system would be only 0.5-0.6% greater than under existing conditions (Table 4.8-31). At flows of 25,000-50,000 cfs in the San Joaquin River, the increase into Old River would be only 2.3-3.1%.

During high flows, the increase in water entering Old River via Paradise Cut and the Head of Old River is not considered substantial enough to cause significant increases in outmigrating chinook salmon smolts entering Old River. Currently, an unknown number of migrating salmon enter Old River via Paradise Cut and the Head of Old River during flood events and ultimately travel to Clifton Court Forebay. Mortality levels for these fish are higher than for those that remain in the San Joaquin River. Under the proposed project, an unknown but slightly higher number of migrating salmon smolts would enter Paradise Cut and ultimately reach Clifton Court Forebay. However, the infrequency of the events, coupled with the large flows in the overall system and relatively small stage changes, are considered to cause less-than-significant impacts on outmigrating chinook salmon smolts.

It would be virtually impossible to quantify, measure, estimate, or monitor this impact with any degree of precision or accuracy because of the substantial flows occurring in the system during flood events. It would be expected, however, that higher flows would draw some additional small number of chinook salmon smolts off of the San Joaquin River and into Paradise Cut and the Head of Old River. Chinook salmon smolt behavior typically results in most fish migrating high in the water column near the center of the river at night. This behavior would result in fewer fish being diverted into Paradise Cut and the Head of Old River compared proportionately to water flow, but the specific flow dynamics with the proposed project are complex and the site-specific nature of chinook salmon migration is unknown at Paradise Weir and the Head of Old River.

In conclusion, San Joaquin River flood events that overtop the Paradise Weir (more than 18,000 cfs) are relatively rare and do not occur each year. Some of these flood events would occur prior to outmigration of all or a large portion of the fall-run chinook salmon fry and smolts. The stage change in flows over the most common flood recurrence interval (10-50 years) indicates a fairly small change in stage of approximately 2-3 inches at Paradise Weir and an overall increase in combined flows into Paradise Cut and the Head of Old River of no more than 3.1%. While there would be some slight increased mortality to San Joaquin River fall-run chinook salmon smolts, this impact would be small and unmeasurable. This potential impact is considered to be less than significant, and there are no reasonable measures to further minimize this specific impact. This impact mechanism would have very minimal, if any, adverse impact on other races of chinook salmon from the Sacramento River, especially in flood-flow years.

Impacts on other species are also considered to be less than significant for the reasons specified above for fall-run chinook salmon. In addition, when the other habitat, water quality, and water supply enhancements associated with the proposed project are considered, the net result is a small overall project benefit to chinook salmon and other fish populations.

The proposed project would have no impact on upstream-migrating adult chinook salmon because flows in the San Joaquin River have never been recorded to be 18,000 cfs or higher during the migration period. Consequently, no water would flow into Paradise Cut during the migration period, and adult salmon would not have access to Paradise Cut.

Impact
4.15-m

Fisheries - Creation of New Fish Habitat in the RID Area. *Creation of the new internal lake in the RID Area would result in an increase in available fish habitat. This impact is considered* ***beneficial****.*

The internal lake in the RID Area would create fish habitat that under current conditions does not exist. The lake initially would be stocked with warmwater game fish and would likely support populations of numerous Delta species over time. Delta species could enter the internal lake through purposeful capture of fish and release into the lake, through the transfer of eggs or larvae through the intake pumps, or through fish predators such as piscivorous birds accidentally dropping captured and alive fish into the lake. The presence of the lake where only agricultural fields previously existed is considered to be a beneficial impact.

Impact
4.15-n

Fisheries - Introduction of Exotic Fish into the Delta. *Exotic fish species could be transferred from the project lake into the Delta, resulting in adverse impacts on existing Delta fish populations. This impact is considered* ***less than significant****.*

The Delta is inhabited primarily by exotic fish and invertebrate species that have been accidentally introduced to the system. The introduction of new exotic species into the Delta or creation of habitat conditions that substantially increase the survival of additional introduced species would be considered an adverse impact.

Any species that exists in the project's internal lake could be introduced into the Delta by anyone either purposely or accidentally. Fish eggs, larvae, juveniles, or adults could become entrained and pumped into Paradise Cut when water is pumped from the internal lake. As described in the "Internal Lake and Water System" section of Chapter 3, only species currently existing in the Delta would be planted in the internal lake. USFWS, NMFS, and CDFG also would be consulted regarding the appropriate species for stocking the internal lake. Therefore, the probability of introducing a new exotic species into the Delta remains unchanged with or without the proposed project. This impact is considered less than significant.

Impact
4.15-o

Fisheries - Increased Water Consumption. *There is a potential indirect impact on fisheries resources associated with providing increased domestic water to support the proposed project. This impact is considered* ***less than significant****.*

The City of Lathrop would provide domestic water to the proposed project. An estimated 2,700 acre-feet per year of potable water is currently consumed in the City on an annual basis. All this water is supplied by the City's existing municipal well system. It is estimated that by 2025, the total available normal year water supply in the City would be 16,891 acre-feet per year, with 5,100 acre-feet per year coming from groundwater (municipal wells) and 11,791 acre-feet per year coming from surface water sources (Nolte Associates 2002 [SB 610 analysis included in Appendix J]). Surface water would be provided from the South San Joaquin Irrigation District (SSJID) South County Surface Water Supply Project (SCSWSP). At full buildout, it is estimated that the proposed project would have a water demand of 5,114 acre-feet per year, with the City having ample water available to supply the River Islands project as well as other projects planned in the City's Sphere of Influence (Nolte Associates 2002) (also see section 4.11, "Public Utilities").

Use of surface water to support the proposed project would have an indirect impact on fisheries in the Delta; however, this impact is extremely minor relative to total surface water use in the state and is considered less than significant.

4.15.4 MITIGATION MEASURES

No mitigation measures are necessary for the following less-than-significant or beneficial impacts.

4.15-a	RID Area Construction Sediment
4.15-e	Pier and Dock Construction
4.15-f	Structural Habitat Features
4.15-g	Entrainment in Project Pumps
4.15-h	Water Discharges to the Delta
4.15-i	Altered Hydrology from Water Discharges
4.15-k	Habitat Modifications in Paradise Cut
4.15-l	Diversion of Chinook Salmon Smolts
4.15-m	Creation of New Fish Habitat in the RID Area
4.15-n	Introduction of Exotic Fish into the Delta
4.15-o	Increased Water Consumption

The following mitigation measures are provided for significant impacts.

4.15-b **Fisheries - Levee Breaching.** The City shall ensure that a SWPPP is prepared and implemented during construction activities and that all water quality requirements included in various agency permits are adhered to. In addition, in-water work shall be restricted to periods when potential impacts on special-status fish species would be minimized.

The City shall ensure that as project development proceeds, SWPPPs are prepared and implemented during construction. Goals of the SWPPPs shall include establishing procedures to minimize accelerated soil erosion, minimizing accelerated sedimentation in drainages and other receiving waters, minimizing or eliminating nonstormwater runoff, avoiding contaminant releases, and ensuring long-term stabilization of project soils. Also see Mitigation Measures 4.8-a and 4.8-c in section 4.8, "Hydrology and Water Quality." The City shall also ensure that all water quality requirements imposed by regulatory agencies (e.g., NMFS, USFWS, RWQCB, USACE) are implemented during project construction.

In-water work shall be avoided and/or minimized during months when fish species are more susceptible to disturbance, particularly chinook salmon and Sacramento splittail. In-water construction activities in Old River and Paradise Cut should be conducted to the extent practical from July 1 through December 31. The highest priority months to avoid and/or minimize in-water work in Old River and Paradise Cut are March, April, and May, with January, February, and June being the second highest priority to avoid. In addition, all construction activities in Paradise Cut and associated levees must be completed during non-flood flows, when the San Joaquin River is not overtopping the Paradise Weir and there is no immediate threat of the river overtopping the weir.

In-water construction activities in the San Joaquin River should be further restricted to avoid the primary adult fall-run chinook salmon upstream migration in August, September, and October. As much of the in-water work in the San Joaquin River as possible should be conducted between July 1 and August 31. If a longer construction period is required, the months of January, February, and June should be considered first; September and October should be considered next; and March, April, and May should be considered last.

Implementation of Mitigation Measure 4.15-b would reduce fisheries impacts associated with levee breeching to less-than-significant levels.

4.15-c **<u>Fisheries - Bridge and Utility Crossings</u>.** The City and the project applicant shall implement all measures identified for 4.15-b. Implementation of the items included in Mitigation Measure 4.15-b also would address potential construction impacts associated with bridge crossings over the San Joaquin River. In addition, the SWPPP used for the directional boring of the 4-inch natural gas pipeline under the San Joaquin River shall include specific measures to avoid, minimize, and, if necessary, clean up bentonite/drilling slurry releases into the river. Measures could include monitoring drilling slurry pressures and halting drilling if pressures drop significantly; monitoring the river for bentonite plumes; avoiding drilling at night; and having containment booms, vacuum trucks, and other containment and cleanup equipment onsite during drilling. Also see Mitigation Measure 4.8-e in section 4.8, "Hydrology and Water Quality."

Implementation of Mitigation Measure 4.15-c would reduce fisheries impacts associated with bridge and utility crossing construction to less-than-significant levels.

4.15-d **Fisheries - Paradise Cut Bridge.** The project applicant shall implement all measures identified for 4.15-b. All construction activities in Paradise Cut must be completed during non-flood flows, when the San Joaquin River is not overtopping the Paradise Weir and there is no immediate threat of the river overtopping the weir.

Implementation of Mitigation Measure 4.15-d would reduce fisheries impacts associated with the construction of the Golden Valley Parkway Bridge over Paradise Cut to less-than-significant levels.

4.15-j **Fisheries - Maintenance Dredging of Back Bays.** Dredging of back bays would be permitted only between July 1 and August 31, the period when special-status fish species that could occur in the project area are least likely to be affected. It is expected that a consultation with USFWS and NMFS under Section 7 of the ESA would be required for these agencies to approve the proposed project. The dredging window described above may be altered based on the consultation with USFWS and NMFS.

Implementation of Mitigation Measure 4.15-j would reduce fisheries impacts associated with dredging of back bays to less-than-significant levels.

4.15.5 Residual Significant Impacts

No residual significant impacts would occur with implementation of the mitigation measures recommended in this section.

4.16 CULTURAL RESOURCES

4.16 CULTURAL RESOURCES

This section evaluates the potential environmental impacts of the River Islands project on cultural resources. It is based on an archaeological survey report prepared for the proposed project by EDAW dated April 2002 and a separate historical structures evaluation report prepared for the proposed project by EDAW in May 2002. Sufficient detail is provided in this section to analyze cultural resources at a project level of detail for both Phase 1 and Phase 2 of the proposed project.

Given the confidentiality requirements of the state and the California Historical Resources Information System (CHRIS), references to the locations of cultural resources sites in this SEIR are provided in general rather than specific terms. The archaeological and historic structures reports, which identify specific locations of cultural resources sites in the project area, are on file for review by authorized individuals with the Central California Information Center of the CHRIS and at the City of Lathrop Community Development/Planning Department, 16775 Howland Road, Suite One, Lathrop, California 95330 (209/858-2860, extension 327).

4.16.1 REGULATORY BACKGROUND

LATHROP GENERAL PLAN

The Lathrop General Plan (General Plan) contains two policies in the Open Space for Health, Welfare, and Well-Being element of the plan that relate to archeological and cultural resources. The first policy addresses known cultural resources sites. The City is required to evaluate potential conflicts with known sites when an application for development in the plan area is filed. Confidentiality shall be maintained between the City and the developer to prevent uninvolved parties from obtaining information on the location of the resource and potential vandalism. Alternatives for development design intended to protect cultural resources shall be reviewed by a Native American having competence in understanding and interpreting the importance of the resources and of the most desirable methods to ensure their preservation.

The second General Plan policy addresses previously unrecorded or unknown cultural resource sites that may be unearthed during project construction. The City and the developer shall take note when projects are located near natural water courses or known archeological or cultural resources. In such cases, the City shall instruct the developer, construction foreman, and City inspectors of the potential for damage to artifacts and sites, as well as provide written instructions requiring a halt to all excavation work in the event of any find until the significance of the find can be evaluated by competent archaeological and Native American specialists.

WEST LATHROP SPECIFIC PLAN

The West Lathrop Specific Plan (WLSP) itself does not specifically address cultural resources. However, the WLSP Environmental Impact Report (EIR) identifies potential impacts on cultural resources from plan development and requires implementation of several mitigation measures. Mitigation measures relevant to the River Islands project include protection of known significant cultural resources sites and treatment of previously unrecorded or unknown sites consistent with the second cultural resources policy in the General Plan (see preceding subsection). Additional mitigation measures relevant to Stewart Tract were related to the Gold Rush era-themed Gold Rush City amusement park (e.g., displaying existing historic structures in theme park) and would not be applicable to the mixed-use development planned under the River Islands project.

STATE CEQA GUIDELINES

The California Environmental Quality Act (CEQA) offers guidelines regarding impacts on historic and prehistoric cultural resources. CEQA states that if implementation of a project would result in significant impacts on important cultural resources, then alternative plans or mitigation measures must be considered. However, only significant cultural resources need to be addressed. State CEQA Guidelines define a significant historical resource as "a resource listed or eligible for listing on the California Register of Historical Resources" (CRHR) (Public Resources Code §5024.1). A historical resource may be eligible for inclusion on the CRHR if it:

- is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; or
- is associated with the lives of persons important in our past; or
- embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- has yielded, or may be likely to yield, information important in prehistory or history.

In addition, the State CEQA Guidelines require consideration of unique archaeological sites (§15064.5). If an archaeological site does not meet the criteria for inclusion on the CRHR but does meet the definition of a unique archeological resource as outlined in the Public Resource Code (§21083.2), it may be treated as a significant historical resource. Treatment options under §21083.2 of CEQA include a project that preserves such resources in place in an undisturbed state. Other acceptable methods of mitigation under §21083.2 include excavation and curation or study in place without excavation and curation (if the study finds that the artifacts would not meet one or more of the criteria for defining a "unique archaeological resource").

Public Resources Code §15064.5(e) of the State CEQA Guidelines requires that excavation activities be stopped whenever human remains are uncovered and that the county coroner be called in to assess the remains. If the county coroner determines that the remains are those of Native Americans, the Native American Heritage Commission must be contacted within 24 hours. At that time, §15064.5(d) of the State CEQA Guidelines directs the lead agency to consult with the appropriate Native Americans as identified by the Native American Heritage Commission and directs the lead agency (or applicant) to develop an agreement with the Native Americans for the treatment and disposition of the remains.

For historic structures, §15064.5(b)(3) of the State CEQA Guidelines indicates that a project that follows the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, or the Secretary of the

Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (1995), shall mitigate impacts to a level of less than significant.

4.16.2 Existing Conditions

The following sections contain a summary of the existing cultural resources within the proposed project area, including the River Islands Development Area (RID Area), the Upper Paradise Cut Improvement Project Area (PCIP Area), the Paradise Cut Conservation Area (PCC Area), the adjacent rivers, and locations in the immediate vicinity of the project site that might be indirectly affected by project activities. These specific areas were examined as a whole and are presented here as a whole, referred to as the project area.

The analysis of the project area is based in part on a review of previous survey and recordation efforts in the vicinity. Data from previous surveys were collected during a records search conducted by the Central California Information Center of the CHRIS. The records search indicated that there were several known historic and prehistoric resources within the project area documented during previous surveys. Most of these resources were not considered significant under the specifications of CEQA and are not discussed in this document. Significant and potentially significant resources within the project area that were identified in the records search include the former Southern Pacific Railroad (SPRR) (Union Pacific Railroad [UPRR] west of Interstate-5 [I-5]), State Historic Landmark 780-7), which is eligible for listing on the CRHR, and the former Western Pacific Railroad (WPRR) (UPRR east of I-5), as well as the first landing place of the sailing launch *Comet* (State Historic Landmark 437). In addition, prehistoric site CA-SJO-255 was identified as a burial mound within the southeastern portion of the project site. The mound was purportedly removed and used as fill elsewhere approximately 50 years ago. Far Western Anthropological Research Group (Wohlgemuth and Mears 1994) conducted test excavations in the area and determined that the site had been completely destroyed.

Archaeological Setting

The earliest well-documented entry and spread of humans into California occurred at the beginning of the Paleo-Indian Period (10,000-6000 B.C.). Social units are thought to have been small and highly mobile. Known sites have been identified within the contexts of ancient pluvial lake shores and coast lines evidenced by such characteristic hunting implements as fluted projectile points and chipped stone crescent forms. Prehistoric adaptations over the ensuing centuries have been identified in the archaeological record by numerous researchers working in the area since the early 1900s, as summarized by Fredrickson (1974) and Moratto (1984). Due to the plentiful resources and temperate climate described above, the Central Valley was well populated prehistorically and served as the location for some of the more substantial village sites known in California.

Beardsley (1948) and Lillard, Heizer, and Fenenga (1939) and others conducted numerous studies that form the core of our early understanding of upper Central Valley archaeology. Little has been found archaeologically that dates to the Paleo-Indian (10,000-6000 B.C.) or the Lower Archaic time periods; however, archaeologists have recovered a great deal of data from sites occupied by the Middle Archaic period. The lack of sites from earlier periods may be due to high sedimentation rates that left the earliest sites deeply buried and inaccessible. During the Middle Archaic Period (3000-1000 B.C.), the broad regional patterns of foraging subsistence strategies gave way to more intensive procurement practices. Subsistence economies were more diversified, possibly including the introduction of acorn-processing technology. Human populations were growing and occupying more diverse settings. Permanent villages that were occupied throughout the year were established, primarily along major waterways. The onset of status distinctions and other indicators of growing sociopolitical complexity mark the Upper Archaic Period (1000 B.C. to A.D. 500). Exchange systems become more complex and formalized. Evidence of regular, sustained trade between groups was seen for the first time.

Several technological and social changes characterized the Emergent Period (A.D. 500-1800). The bow and arrow were introduced, ultimately replacing the dart and atlatl (a spear-throwing device). Territorial boundaries between groups became well established. It became increasingly common that distinctions in an individual's social status could be linked to acquired wealth. Exchange of goods between groups became more regularized with more goods, including raw materials, entering into the exchange networks. In the latter portion of this period (A.D. 1500-1800), exchange relations became highly regularized and sophisticated. The clamshell disk bead became a monetary unit for exchange, and increasing quantities of goods moved greater distances. Specialists arose to govern various aspects of production and exchange.

Three time periods were well represented in archaeological assemblages in the general vicinity of the project site. These assemblages are discussed in detail in Moratto (1984) and summarized here. The Windmiller Pattern (3000-1000 B.C.) of archaeological assemblages included an increased emphasis on acorn use as well as a continuation of hunting and fishing activities. Ground and polished charmstones, twined basketry, baked-clay artifacts, and worked shell and bone were hallmarks of Windmiller culture. Widely ranging trade patterns brought goods in from the Coast Ranges and trans-Sierran sources as well as closer trading partners. Distinctive burial practices identified with the Windmiller Pattern also appeared in the Sierra foothills, indicating possible seasonal migration into the Sierra. The Berkeley Pattern (1000 B.C. to A.D. 500) represented a greater reliance on acorns as a food source than was seen previously. Distinctive stone and shell artifacts distinguished it from earlier or later cultural expressions. The Berkeley Pattern appears to have developed in the Bay Area and was spread through the migration of Plains Miwok Indians. The Augustine Pattern (A.D. 500 to Historic Era) may have been stimulated by the southern migration of Wintuan people from north of the Sacramento Valley. Their culture was marked by increasing populations resulting from more intensive food procurement strategies, as well as a marked change in burial practices, increased trade activities, and a well-defined ceramic technology.

ETHNOGRAPHIC SETTING

Ethnographically, the Northern Valley Yokuts occupied the project vicinity, that is, the land on either side of the San Joaquin River from the Delta to south of Mendota. The Diablo range probably marked the Yokuts' western boundary (Wallace 1978); the eastern edge would have lain along the Sierra foothills. Yokuts occupation of the northern parts of the range may be relatively recent, as linguistic evidence points toward an earlier Miwok occupation. The Yokuts gradually expanded their range northward and clearly occupied the area during the Spanish Colonial period, as evidenced by mixed historic and prehistoric artifact assemblages. The late prehistoric Yokuts may have been the largest ethnic group in precontact California. The triblet, populated by a few hundred to a few thousand occupants, served as the basic political unit (Moratto 1984). Structures ranged from single-family dwellings to multifamily communal structures and included sweat houses and ceremonial lodges.

Euroamerican contact with the Northern Valley Yokuts began with infrequent excursions by Spanish explorers traveling through the Sacramento-San Joaquin Valley in the late 1700s to early 1800s. Many Yokuts were lured or captured by missionaries and scattered among the various missions. Many escaped and returned to the valley. Yokuts raiding parties targeting the Spanish (and later Mexican) cattle herds became prevalent, leading to retaliatory action by the settlers. The malaria epidemic of 1833 decimated the Yokuts population, killing thousands of the tribesmen. The influx of Europeans during the Gold Rush era further reduced the population due to disease and violent relations with the miners. Though there was no gold within the Yokuts territory, miners passing through on their way to the diggings caused a certain amount of upheaval. Many former miners who had seen the richness of the San Joaquin Valley on their way east later returned to settle and farm the area (Wallace 1978).

HISTORIC SETTING

The first known European settlers in the San Joaquin County area were trappers with the Hudson's Bay Company, mainly of French descent, many of whom settled in the area still known today as French Camp. In 1829, Spaniards attempted to find a new location for a mission in the area. They were defeated in a battle on the banks of the Stanislaus River by Chief Estanisloa, Chief of the Si-yak-um-na (Cook 1975).

Captain C. M. Weber was a German immigrant who left his native land in 1836. After stays in New Orleans and Salt Lake City, Weber struck out on his own and made his way to Sutter's Fort, where he was employed as overseer and general assistant to Sutter. He made a trip to San Jose sometime during 1841, where he struck up a partnership with Guillermo Gulnac. In 1842, they built and opened a flourmill and made sea biscuits (hardtack). In 1843, Gulnac obtained a land grant of 48,000 acres near French Camp and raised cattle (Cook 1975). This became known as Campo de los Franceses (Beck and Haase 1974).

Weber moved from San Jose to Stockton in 1847, after Gulnac gave Weber a half interest in the rancho. Weber could not himself obtain a land grant because he was not a Mexican citizen. He later purchased the other half interest from Gulnac. Weber also convinced several other settlers to locate to this area by offering them land (Cook 1975). In 1868, the Central Pacific Railroad (CPRR) announced its intentions to build a rail yard in Lathrop. Chinese labor was brought in to do the work, and a settlement grew up around the rail yard (Cook 1975).

Propelled by a combination of economic factors, proponents of a transcontinental railroad did not gain serious headway until the mid-19th century. Between 1853 and 1855, a series of comprehensive surveys were conducted by Army Engineers to identify possible routes. Construction of the railroad began in Sacramento, California, in January 1863 (VanMoorleghem 1994), though at that point only the Sacramento to Omaha segment had been authorized.

The two companies building the line were the CPRR and the UPRR. The CPRR was managed by the "Big Four," namely Leland Stanford, Collis Huntington, Charles Crocker, and Mark Hopkins. The UPRR was run by Thomas Durant, Oakes Ames, Oliver Ames, and Greenville Dodge (known as America's greatest railroad builder). The meeting of the rails occurred on May 10, 1869, in Promontory, Utah.

The driving of the golden spike, uniting the CPRR and UPRR, in May 1869, is commonly perceived as the final step in construction of the first Transcontinental Railroad. However, completion of the drawbridge spanning the San Joaquin River at Mossdale in September 1869 actually completed the link to San Francisco (Kyle 1990). An iron truss replaced the original structure in 1895. The current drawbridge was completed in 1942 (Hillman and Covello 1985). The site has been designated as California Historical Landmark 780-7 and is eligible for listing on the CRHR.

The *Comet*, the first known sail launch to travel up the San Joaquin River from San Francisco, landed at Mossdale in 1846. It carried 20 Mormans who went on to found a settlement on the Stanislaus River. Two years later, Doak and Bonsell operated the first ferry across the San Joaquin River, at the same spot. This location has been designated as California Historical Landmark 437.

The WPRR was completed in several segments, all built around the turn of the century. The railroad eventually ran from Oakland to Salt Lake City, crossing the eastern edge of the project area. High construction costs and low revenues forced the company into early bankruptcy. Corporate reorganization and the purchase of several small local railroads revitalized the WPRR (Crump 1965, Dunscomb and Stindt 1980).

ARCHAEOLOGICAL RESOURCES

Survey Methods

Before field surveys were conducted, two information requests were submitted by EDAW to the Central California Information Center. Data also were used from an earlier records search requested by Peak and Associates in fall 1999. The records searches included reviews of sites listed in the National Register of Historic Places, California Historical Landmarks, and other government-designated cultural resource sites, as well as a review of information center maps and files of the findings of previous cultural resource surveys conducted in the project area.

The records search information was supplemented with a field survey performed by a team of archaeologists. The field survey covered all portions of the RID Area, PCC Area, and PCIP Area that had not been subject to previous archaeological survey. The pedestrian portion of the archaeological survey was conducted from mid-January to mid-February 2002. Due to the season, all crops planted across the project area had been harvested, with the exception of two walnut orchards. Surface visibility ranged from good to excellent, though stubble from harvested alfalfa partially obscured soils in some fields. The archaeological survey team recorded two isolated artifacts, a prehistoric site, and segments of two historic railroads. A separate historic structures survey was conducted in May 2002, which is discussed in more detail later in this chapter.

Results

The following section describes archaeological and historical sites recorded in the project area.

Site RI-1

Site RI-1 is a prehistoric artifact scatter that includes flaked stone, groundstone, and at least two perforated circular bone beads. Examination of the 1915 U.S. Geological Survey (USGS) Lathrop 7.5-minute quadrangle map shows a slight rise in the same area; thus, the artifacts noted during the recent survey may represent remnants of a destroyed occupation mound. The presence of the rise on the 1915 map indicates that this deposit likely does not represent redeposited material from the burial mound (CA-SJO-255; P-39-000007) recorded by Far Western Anthropological Research (Wohlgemuth and Mears 1994).

Green and gray chert, as well as basalt, flakes were observed. In addition, archaeologists identified three biface thinning flakes, a thumbnail scraper, several metate fragments, a mano and fragments of others, two cores, and two center-drilled bone beads. Angular fractured basalt fragments, possibly heat affected, were found scattered across the site area. Some of these fragments may be attributable to plow breakage, however.

A number of small, medium, and large mammal faunal bone fragments were also noted. These were examined in the field. Several fragments could be conclusively identified as faunal. Three long bone shaft fragments did not include diagnostic elements that clearly identified them as faunal, leaving the possibility that they might be human. The presence of at least two beads on the site reinforces the potential that human skeletal remains may be present. The site was mapped and photographed, including close-up photos of several of the tools. The upper portions of the site have been disturbed by past agricultural activities, but from a pedestrian survey it is impossible to determine whether the site has maintained any integrity beneath the plow zone disturbance.

This site is considered a potential remnant of a prehistoric burial mound. If it is a remnant of a burial mound, it may meet the requirements for inclusion on the CRHR as a significant or unique cultural resource. Additional data, obtained during subsurface testing, would be required to make such a determination.

Site RI-2 (P-39-000002)

Site RI-2 consists of a 1.75-mile-long segment of railroad berm and tracks and a drawbridge over the San Joaquin River. Abandoned power poles/lines with glass and ceramic insulators parallel the tracks. The original drawbridge, opened in September 1869, was the last link in the Transcontinental Railroad. An iron truss replaced that structure in 1895, and the current drawbridge was completed in 1942 (Hillman and Covello 1985). The drawbridge is described more fully in the Historic Structures Report available at the City of Lathrop Community Development Department/Planning Division, 16775 Howland Road, Suite One, Lathrop, California 95330 (209/858-2860, extension 327). A plaque on Manthey Road, near the bridge, notes the drawbridge location as Historic Landmark 780-7. A second plaque, in the same spot, identifies the first landing spot of the *Comet*, the first sailing vessel to navigate the upper San Joaquin River (Historic Landmark 437) 1942 (Hillman and Covello 1985).

The railroad grade was originally owned by the CPRR, which was purchased by the SPRR and now is owned by the UPRR. This railroad has not been formally evaluated or recorded; however, portions have been previously noted as P-39-000002 (CA-SJO-250H). The trestle over the river has a 1946 date in the concrete. Two modern concrete culverts cross through the railroad berm, underneath the tracks. The culverts were installed by the UPRR after flooding in 1997 that washed out the railroad berm in the location where the culverts are now found. Railroad debris (e.g., ties) as well as modern rubbish are scattered along the berm.

The construction of the Transcontinental Railroad was a defining event in United States history that has been thoroughly documented. Because of its prominence in American history and its association with the lives of people important in California history, it is presumed that the railroad as a whole is eligible for listing on the CRHR, as well as on the National Register of Historic Places. Therefore, individual segments of the railroad are also presumed eligible.

Isolate RI-1

Isolate RI-1, a prehistoric artifact, consists of a granular green chert primary flake with bifacial flaking on one end, forming a steep end scraper or chopping tool. Cortex remains on part of the dorsal surface. The tool measures 6.5cm x 5.0cm x 3.0cm. The artifact was found in an agricultural field just west of Paradise Road and north of the levee lining the northern border of Paradise Cut. No other artifacts were noted in the vicinity. This artifact was not collected. Because it was found in a disturbed context, it is impossible to identify the exact spot the artifact was originally deposited.

This isolated artifact may demonstrate the likely presence of Native Americans in the vicinity at some point in the past. However, manufacture of the artifact cannot be pinpointed to a specific date, technological tradition, or cultural source. Therefore, other than the recognition of Native American presence in the area, this artifact does not appear to possess values or information potential that would qualify it for inclusion on the CRHR.

Isolate RI-2

Isolate RI-2, a prehistoric artifact, consists of an obsidian biface midsection, with serrated edges. The overall shape is lanceolate, and the base appears to be tapering, but because the proximal and distal ends are missing, no definitive typological identification can be made. This artifact was sent to the Northwest Research Obsidian Studies Laboratory for sourcing and hydration analysis. The results (Appendix M) identified the material as Napa obsidian and a hydration rind thickness of approximately 3.7μ. This hydration measurement correlates to the Upper Archaic period and indicates that the tool was manufactured approximately 2,000 years ago (Heipel and Ludwig 2001).

This isolated artifact again demonstrates the presence of Native Americans in the project vicinity at some point in the past. However, manufacture of the artifact can be traced only to a general date and technological tradition. Its greatest information potential has already been explored through the testing program described above. In addition, the source of the artifact is questionable. The biface was found on a floodplain between a levee and the San Joaquin River, which implies a number of possible origins. The artifact may have been washed into the area, it may have eroded out of imported levee fill, or it may have originated nearby. All seem equally likely explanations. Therefore, other than the recognition of Native American presence in the area, this artifact does not appear to possess additional values or information potential that would qualify it for inclusion on the CRHR.

HISTORIC STRUCTURES ANALYSIS

In the project area, there are a total of 28 structures/structure complexes whose age qualifies them as potential historic resources: eight historic dwellings (or complexes), three historic barns/sheds, two historic silo complexes, two portions of historic railroads, and 13 historic canals. Most of the dwellings and sheds were constructed between the 1930s and the 1950s, while the silos appear to date from the 1910s. The railroads include one trestle and one drawbridge that was rebuilt in the 1940s. Many of the canals were initially excavated in the 1920s.

Site RI-1H

Site RI-1H consists of two wooden structures that appear to be from the 1940s and a large corrugated tin shed that may have been installed in the 1950s. Overall integrity on these structures is extremely low. These structures do not appear to be associated with persons or events significant to our past, nor are they representative of a high style of architecture. Therefore, they do not appear to be eligible for listing on the CRHR.

Site RI-2H

Several structures make up site RI-2H. Central to the site is a single-story wooden dwelling, but there are also two corrugated tin sheds, a smaller shed roofed open structure (four-post structure with a roof and no walls), and a metal trailer. Most of the structures are from the 1940s or 1950s and exhibit varying degrees of integrity. These structures do not appear to be outstanding examples of an architectural style, nor are they associated with persons or events significant to our past. Therefore, they do not appear to be eligible for listing on the CRHR.

Site RI-3H

Site RI-3H consists of two single-story wooden buildings that function as a dwelling and an outbuilding. A metal trailer is on the north side of the residence. The integrity of these structures is poor. These structures do not appear to be associated with persons or events significant to our past, nor are they representative of a high style of architecture. Therefore, they do not appear to be eligible for listing on the CRHR.

Site RI-4H

Site RI-4H consists of a farm shed and cattle chute that most likely were once part of a farming complex. Integrity of this structural complex is poor, and if it was associated with a farming complex at one time, that is no longer evident. This site does not appear to be associated with persons or events significant to our past. It is not a good representation of an architectural style. Therefore, it does not appear to be eligible for listing on the CRHR.

Site RI-6H

This complex appears to date to the 1930s and includes a single-story wood-framed dwelling, a wood-framed shed, and two metal sheds. The largest of the two metal sheds is not historic. Despite its good integrity, site RI-6H does not appear to be associated with persons or events significant to our past. It is not a good representation of an architectural style. Therefore, it does not appear to be eligible for listing on the CRHR.

Site RI-7H

A single-story dwelling and a corrugated metal shed sit on site RI-7H. Both structures retain a moderate degree of integrity. These buildings do not appear to be associated with persons or events significant to our past, nor are they good representations of an architectural style. Therefore, this site does not appear to be eligible for listing on the CRHR.

Site RI-8H

Site RI-8H consists of a single-story dwelling, a metal shed, and a wooden shed. The dwelling appears to have the best integrity of the structures on the site. These buildings do not appear to be associated with persons or events significant to our past. As fairly typical examples of mid-19th century rural architecture, they are not outstanding architecturally. Therefore, these structures do not appear to be eligible for listing on the CRHR.

Site RI-9H

Site RI-9H includes a single-story wood frame dwelling and a shed roofed open structure. Several metal sheds lie just to the northeast of the dwelling, but they are not historic. The residence has been altered in several areas. The integrity of these structures has been compromised, removing any possibility that these structures are outstanding examples of their architectural style. Since they also do not appear to be associated with persons or events significant to our past, these structures do not appear to be eligible for listing on the CRHR.

Site RI-10H

Site RI-10H consists of two brick silos that were once part of a larger dairy complex. Although their setting has been somewhat compromised by the loss of farm-related structures around them, these silos are in good condition. They are noticeable reminders on the landscape of the farming community that settled this area. They are also associated with a dairy farm that is reported to have once been the largest dairy farm in the nation. Dairy activities were an important part of the economy of this area during its early settlement period. For their association with the early dairy farming of the area, these silos are likely to be eligible for listing on the CRHR.

Site RI-11H

Site RI-11H contains two wood frame sheds with corrugated metal siding and roofs. The integrity of these structures is low, as several portions of siding and roof are missing. Since they also do not seem to be associated with persons or events significant to our past, these structures do not appear to be eligible for listing on the CRHR.

Site RI-12H

Site RI-12H consists of a group of four brick silos that were once part of a larger dairy complex. They are the same construction as site RI-10H, which is nearby. Although their setting has been somewhat compromised by the loss of some of the farm-related structures around them, these silos are in good condition. They are noticeable reminders on the landscape of the farming community that settled this area. They are also associated with a dairy farm that is reported to have once been the largest dairy farm in the nation. Dairy activities were an important part of the economy of this area during its early settlement period. For their association with the early dairy farming of the area, these silos are likely to be eligible for listing on the CRHR.

Site RI-13H (P-39-000002)

Site RI-13H consists of a railroad section and drawbridge that crosses the San Joaquin River. It is the site of the completion of the first Transcontinental Railroad and is also in the area of the first landing place of the sailing launch *Comet*. These are both state landmarks, which are commemorated by a plaque at the site. Although the current bridge is not the original bridge that connected the railroad on either side of the river, the new bridge is still of historic age. It is a good example of a vertical lift drawbridge, a type that is fairly common in the Sacramento-San Joaquin Delta but is not ubiquitous in California. Site RI-13H may be eligible for listing on the CRHR.

Site RI-14H

Site RI-14H consists of a single-story dwelling and two metal sheds. Integrity is fairly good for all of these structures. These buildings do not appear to be associated with persons or events significant to our past. As fairly typical examples of mid-19th century rural architecture, they are not outstanding architecturally. Therefore, these structures do not appear to be eligible for listing on the CRHR.

Site RI-15H

Site RI-15H consists of a single-story dwelling and garage. Overall integrity of this residence is good. These structures do not appear to be associated with persons or events significant to our past, nor are they representative of a high style of architecture. Therefore, they do not appear to be eligible for listing on the CRHR.

Sites RI-16H, -17H, -18H, -19H, -20H, -21H, -22H, -23H, -24H, -25H, -26H, -27H, and -28H

Sites RI-16H, -17H, -18H, -19H, -20H, -21H, -22H, -23H, -24H, -25H, -26H, -27H, and -28H consist of canals that flow throughout the project area. They are all unlined dirt ditches of varying widths and depths. Many of them were probably initially installed in the 1920s, when the area was first heavily settled. Overall integrity of these sites is good, although some canals have been shortened since the 1950s. Canals are common throughout California, and there is nothing unusual about these canals. Since they are also not associated with persons or events significant to our past, these canals do not appear to be eligible for listing on the CRHR.

Site RI-29H (P-39-000098)

Site RI-29H is a 500-foot segment and trestle of a previously recorded railroad. However, this particular segment was not part of the previous recordation. The trestle is a typical wood-beam crossing. Although the railroad itself may be eligible for listing, this section does not appear to contribute to its significance. Therefore, these portions do not appear to be eligible for listing on the CRHR.

4.16.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

The following analysis is based on a combination of background research, archaeological pedestrian surveys, and an assessment of historic structures. The project phase divisions (1a/1/2) are not specifically addressed in the current discussion. Known sites would be physically affected during construction of Phase 1; however, mitigation measures for unanticipated discoveries, visual impacts, or human remains would be the same for all phases. Therefore, the analysis discusses the project area as a whole, rather than by phase activities.

In addition, a project-level analysis of cultural resources was conducted for both Phase 1 and Phase 2 rather than a project-level analysis for Phase 1 and a separate program-level analysis for Phase 2. The less specifically defined Phase 2 elements do not preclude a project-level analysis of cultural resources because the ground disturbance associated with any development, rather than the type or density of development, typically determines impacts. Cultural resource pedestrian surveys covered the entire RID Area, PCC Area, and PCIP Area, providing sufficient data to support a project-level analysis across all these locations.

PRIOR WLSP EIR ANALYSIS

The WLSP EIR addresses known cultural resources identified in the plan area. However, when that document was prepared, archaeological surveys had not been completed for all lands at the River Islands project site. As a result of additional cultural resources surveys for the River Islands project, new cultural resources have been identified within the project area. In addition, the physical layout of the River Island project differs in several aspects from the project addressed in the WLSP. Given these altered conditions, a new and independent analysis of cultural resources has been conducted for this SEIR.

THRESHOLDS OF SIGNIFICANCE

The River Islands project would cause a significant impact on cultural resources if it would:

- cause a substantial adverse change in the significance of a unique archaeological resource or a historical resource as defined in §21083.2 of CEQA and §15064.5 of the State CEQA Guidelines, respectively, or
- disturb any human remains, including those interred outside of formal cemeteries.

Section 15064.5 of the State CEQA Guidelines defines "substantial adverse change" as physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings.

Section 21083.2 of CEQA defines "unique archaeological resource" as an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets one or more of the following criteria: (1) that it contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information; (2) that it has a special and particular quality, such as being the oldest of its type or the best available example of its type; or (3) that it is directly associated with a scientifically recognized important prehistoric or historic event or person.

Section 15064.5 of the State CEQA Guidelines defines "historical resource" as a resource (1) listed on, or determined to be eligible by the State Historical Resources Commission for listing on, the CRHR; (2) listed in a local register of historic resources or as a significant resource in a historical resource survey, or (3) considered to be "historically significant" by a lead agency as supported by substantial evidence in the record. Generally, a resource shall be considered by the lead agency to be "historically significant" if it meets any of the following criteria for listing on the CRHR: (a) is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (b) is associated with the lives of persons important in our past; (c) embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic value; or (d) has yielded, or may be likely to yield, information important in prehistory or history.

To be eligible for listing on the CRHR, a property must have both historic significance and integrity. Integrity is judged by considering the property's retention of location, design, setting, workmanship, materials, feeling, and association.

IMPACT ANALYSIS

This section describes impacts and potential impacts on cultural resources as a result of implementation of the River Islands project.

Impact 4.16-a

__Cultural Resources - Listed Archaeological Sites__. Construction of the proposed project would alter the surrounding visual context of cultural resources listed as California historic landmarks. This impact is considered ***significant***.

Two cultural resources located in the project area are eligible for or are presumed eligible for listing on the CRHR: the drawbridge crossing the San Joaquin River and the landing place of the sail launch *Comet*. The proposed project, as currently designed, would not physically affect the landmarks but may involve visual impacts on these sites.

Construction of the Golden Valley Parkway bridge over the San Joaquin River during Phase 2 and houses on the high-ground corridor north of the bridge during Phase 1 would alter the visual character of the area surrounding these sights. Building modern structures on the north side of the bridge would remove the ability to view the bridge with a background of open space and a river and delta system more consistent with the historical context of this feature. Modern structures in the project area could also impede on views from the sail launch *Comet* landing site. Because these sites are eligible (bridge) or potentially eligible (*Comet*) for listing on the CRHR, degrading remaining views that reflect the historic context of the sites would be considered a significant impact.

Impact 4.16-b

__Cultural Resources - Recorded Archaeological Sites__. Construction of the proposed project would affect one prehistoric archaeological site and two archaeological isolates recorded during the field survey. One of these sites, RI-1, could represent a unique archaeological resource. This impact is considered ***potentially significant***.

Construction of the proposed project would affect the prehistoric archaeological site recorded during the pedestrian field survey of the project area, as well as the two isolated finds. The potential significance of these impacts is evaluated below.

Site RI-1 is a prehistoric artifact scatter located in the Phase 1a area of the proposed project. Site RI-1 includes flaked stone tools, groundstone, and at least two perforated circular bone beads. A number of mammalian faunal fragments were also noted. Three long bone shaft fragments did not include diagnostic elements that clearly identified them as faunal, leaving the possibility that they might be human. The presence of beads at the site indicates a potential that human skeletal remains may be present.

Although there is no visible evidence of a mound at the site now, examination of the 1915 USGS quadrangle map indicates that this may have been a mound site in the past. Several other prehistoric mound sites have been noted in the vicinity. Therefore, the site is considered to potentially be the remnants of a prehistoric burial mound. If the site is the remnant of a burial mound, it may meet the requirements for inclusion on the CRHR as a significant or unique cultural resource. Additional data, obtained during subsurface testing, would be required to make such a determination.

While the site is not listed on the National Register of Historic Places or CRHR, it may represent a unique archaeological resource as defined by CEQA and thus may be eligible for listing. The potential for prehistoric occupation debris or burials within the mound can be determined only by subsurface testing and evaluation. If the site were to represent a unique archaeological resource as determined by such subsurface testing and evaluation, implementing the proposed project could result in a substantial adverse change to the resource. This impact would be significant.

The two isolated prehistoric artifacts have been recorded and have yielded their full data potential. They do not meet the criteria for unique archaeological resources. There is no evidence that these isolated finds indicate the presence of subsurface deposits. There is evidence that these artifacts have been removed from their original depositional contexts either through fluvial activity or agricultural activities, further reducing their information potential. Therefore, any impacts on these isolates are considered less than significant.

Impact **4.16-c**

<u>Cultural Resources - Historic Properties</u>*. Project construction would result in the removal of several existing structures, as well as construction of structures near offsite historic properties that would not be removed. Three of these offsite structures and groups of structures are, or appear to be, eligible for listing on the California Register of Historical Resources. This impact is considered* ***significant****.*

The two sets of silos and the railroad drawbridge that crosses the San Joaquin River (RI-10H, -12H, -13H) are considered eligible for listing on the CRHR. The proposed project, as currently designed, would not physically affect these offsite resources but may involve visual impacts on these sites. Visual impacts are those that alter the setting of a historic resource. The construction of new structures that are visible near these historic resources may have a significant impact on the resources, depending on the type, form, size, and design of the structure. Some proposed project features, such as levee improvements, would not have an impact on the resources because the levees would generally be consistent with the historic landscape. However, modern buildings associated with the Employment Center would be visible north of the silo complexes. Also, homes and the Golden Valley Parkway Bridge would be visible north of the railroad bridge (see the discussion of Impact 4.16-a above). Because these structures are listed (railroad bridge) or potentially eligible for listing (silos) on the CRHR, degrading remaining views that reflect the historic context of these sites is considered a significant impact.

The remaining historic structures inventoried in this document do not appear to be associated with persons or events significant to our past, are not outstanding examples of a particular architectural style or representative of a high style of architecture, and do not appear to be eligible for listing on the CRHR. Therefore, impacts on these structures are considered less than significant.

Impact
4.16-d

Cultural Resources - Undiscovered/Unrecorded Archaeological Sites*. Construction of the proposed project may affect as yet undiscovered or unrecorded archaeological sites. This impact is considered* ***potentially significant.***

Although no listed archaeological sites exist on the project site, and no recorded archaeological sites occur beyond those discussed previously, as yet undiscovered or unrecorded cultural resource sites may be uncovered by project construction activities. If such resources were to represent significant or unique archaeological resources as defined by CEQA, any substantial change to or destruction of these resources would be a significant impact.

Impact
4.16-e

Cultural Resources - Undiscovered/Unrecorded Human Remains*. Project-related construction activities could affect as yet undiscovered or unrecorded human remains. Such impacts would be considered* ***significant.***

Although no human remains have been listed or recorded in the project area, they are known to occur in the project vicinity. As yet undiscovered human remains may be uncovered by project construction activities. Any disturbance of human remains would be a significant impact.

Impact
4.16-f

Cultural Resources - Offsite Resources*. Specific construction corridors/footprints have not been absolutely defined for several offsite project elements (e.g., electrical transmission lines, Golden Valley Parkway link to I-205). Construction-related activities during installation of these facilities could affect as yet undiscovered or unrecorded archaeological sites in these areas. Such impacts may be considered* ***significant.***

Although general corridors or footprints have been identified for several offsite project features, in some cases centerlines or project boundaries have not been confirmed sufficiently to allow efficient archeological field surveys (e.g., electrical transmission lines, Golden Valley Parkway route to I-205, I-205/Chrisman Road interchange, I-5/Louise Avenue interchange improvements). Also, property access for surveys is not currently available in many of these areas. However, cultural resources records searches conducted for this project and other projects in the vicinity encompass the area potentially affected by offsite project features. The footprints for these offsite features may contain cultural resources that could be affected by project activities. Depending on the type and quality of the resource, impacts could be considered significant.

4.16.4 MITIGATION MEASURES

The following mitigation measures are provided for significant and potentially significant impacts.

4.16-a **Listed Archaeological Sites.** Before project implementation, the City of Lathrop shall retain an architectural historian to completely record the railroad drawbridge associated with site RI-2 (also called RI-13H) (P-39-00002) within the project area. This shall be completed to the standards of a Historic American Engineering Record. Recordation of the site would result in permanent documentation of the architectural, visual, and historic context of the site and would give historians and others access to documentation on preproject conditions. This is a standard mitigation practice for cultural resources and historic properties. In addition, as the project is developed, a public interpretive feature such as a plaque or sign shall be installed in a public space on the project site (e.g., park, trail), describing the history and significance of the railroad bridge. The bridge must be visible from the location of the interpretive feature.

Implementation of Mitigation Measure 4.16-a would reduce the impact on site RI-13H to a less-than-significant level.

4.16-b **Recorded Archaeological Sites**. The City of Lathrop shall retain a professional archaeological consultant to conduct Phase II testing at prehistoric site RI-1. The investigations shall be conducted before construction begins at this site. As currently envisioned, this site would be affected during Phase 1a activities. If any archaeological resources found at the site are concluded by the archaeologist to represent "unique archaeological resources," as defined by CEQA, the archaeologist shall recommend additional actions deemed necessary for the protection of these resources. Such actions may include additional testing, data recovery, mapping, capping, or avoidance of the resource. The City shall ensure additional protection actions (if needed) are implemented prior to construction at this site.

Implementation of Mitigation Measure 4.16-b would reduce the impact on recorded archeological sites to a less-than-significant level.

4.16-c **Historic Properties.** Before project implementation the City of Lathrop shall retain an architectural historian to completely record sites RI-10H and RI-12H (historic grain silos). This shall be completed to the standards of a Historic American Engineering Record. Recordation of the sites would result in permanent documentation of the architectural, visual, and historic context of the resources and would give historians and others access to documentation on preproject conditions. This is a standard mitigation practice for cultural resources and historic properties. In addition, as the project is developed, a public interpretive feature such as a plaque or sign shall be installed in a public space on the project site (e.g., park, trail) or on the shoulder of Manthey Road near the silos. The interpretive feature shall explain Lathrop's agricultural history as well as the history of the dairy the silos were associated with.

Implementation of Mitigation Measure 4.16-c would reduce the impact on the listed archaeological sites to a less-than-significant level.

4.16-d **Undiscovered/Unrecorded Archaeological Sites**. Before the initiation of construction or ground-disturbing activities associated with the proposed project, all construction personnel shall be alerted to the possibility of buried cultural resources. If artifacts or unusual amounts of stone, bone, or shell are uncovered during construction activities, work within 50 feet of the specific construction site at which the suspected resources have been uncovered shall be suspended, and the City of Lathrop Community Development Department/Planning Division shall be immediately contacted. At that time, the City shall retain a professional archaeological consultant. The archaeologist shall conduct a field investigation of the specific site and recommend mitigation deemed necessary for the protection or recovery of any cultural resources concluded by the archaeologist to represent significant or potentially significant resources as defined by CEQA. The City shall implement the mitigation prior to the resumption of construction activities at the construction site.

Implementation of Mitigation Measure 4.16-d would reduce the potential impact on undiscovered/ unrecorded archeological sites to a less-than-significant level.

4.16-e **Undiscovered/Unrecorded Human Remains**. If human remains are discovered at any project construction sites during any phase of construction, work within 50 feet of the remains shall be suspended immediately, and the City of Lathrop Community Development Department/Planning Division and the county coroner shall be immediately notified. If the remains are determined by the county coroner to be Native American, the Native American Heritage Commission (NAHC) shall be notified within 24 hours, and the guidelines of the NAHC shall be adhered to in the treatment and disposition of the remains. The City of Lathrop shall also retain a professional archaeological consultant. The archaeologist shall conduct a field investigation of the specific site and consult with the Most Likely Descendant identified by the NAHC. As necessary, the archaeological consultant may provide professional assistance to the Most Likely Descendant including the excavation and removal of the human remains. The City shall implement any mitigation prior to the resumption of activities at the site where the remains were discovered.

Impacts on burials would be reduced to less-than-significant levels with the implementation of Mitigation Measure 4.16-e.

4.16-f **Offsite Resources**. Once disturbance areas for offsite project elements are sufficiently defined and property access is available, the City shall retain a professional archaeological consultant to review the results of existing records searches and conduct field surveys, as needed, for these facilities. If cultural resources are found in the potential disturbance area, Mitigation Measures 4.16-a through 4.16-c shall be implemented as appropriate. If discoveries are made during construction, Mitigation Measures 4.16-d and 4.16-e shall be implemented.

Potential impacts on offsite cultural resources would be reduced to less-than-significant levels with the implementation of Mitigation Measure 4.16-f.

4.16.5 Residual Significant Impacts

No residual significant cultural resource impacts would occur with implementation of the recommended mitigation measures.

4.17 AESTHETIC RESOURCES

4.17 AESTHETIC RESOURCES

This section describes the existing aesthetic setting of the project site and the regulatory background that applies to the project. This section also includes an evaluation of the potential impacts of the River Islands project on visual and scenic resources. Sufficient detail is provided in this section to analyze issues related to aesthetic resources at a project level of detail for both Phase 1 and Phase 2 of the proposed project.

4.17.1 REGULATORY BACKGROUND

No scenic highways or other features in the project area would potentially trigger state or federal visual resource regulations. The three regulatory documents that apply to aesthetic resources on the proposed project site are the City of Lathrop General Plan (General Plan), the West Lathrop Specific Plan (WLSP), and the 1996 WLSP Environmental Impact Report (WLSP EIR). The General Plan identifies visual and scenic resources in the City of Lathrop and recommends mitigation measures to protect these resources. The WLSP guides potential development on the proposed project site and includes many specific design guidelines to reduce or eliminate adverse impacts on scenic and visual resources in the City of Lathrop and on the proposed project site. The WLSP EIR specifically analyzes visual impacts associated with WLSP implementation and provides mitigation measures beyond the design guidelines included in the WLSP.

CITY OF LATHROP GENERAL PLAN

The General Plan identifies the following scenic resources in the Lathrop area:

- views of agricultural lands to the west and south and
- views of the Coast Ranges to the west.

The General Plan recognizes that views of the San Joaquin River also could be considered a scenic resource. However, views of the river are obscured by the surrounding levee system. Thus, the San Joaquin River can be viewed only from the tops of the levees and at bridge crossings.

In addition to these scenic resources, the General Plan suggests that the current "degree of darkness" in Lathrop, especially in residential neighborhoods, is an important visual resource. The current degree of darkness allows clear views of the nighttime sky (stars, constellations) as weather permits.

The following General Plan policies for achieving visual and scenic quality in new developments apply to the proposed project:

- An architectural design review shall be required of all planned developments and of all multifamily, office, commercial, institutional, and industrial uses.

- The visual interface between commercial/industrial areas and residential areas shall be designed and developed so as to avoid obtrusive visual impacts of commercial or industrial activities on nearby residential areas.
- All outdoor storage areas shall be visually screened with ornamental fencing or walls and with landscaping.
- The regional open space system should include 20-50 feet of landscaped buffer corridors, which serve as buffer zones between two types of conflicting land uses, such as residential and commercial or residential and industrial.
- All gas, electrical, telephone, and cable distribution lines should be placed underground; if overhead transmission line rights-of-way are required, they should be incorporated into open space corridors so as to minimize their visual impacts on the urban environment.

WEST LATHROP SPECIFIC PLAN

The WLSP includes objectives and design guidelines aimed at creating an aesthetically pleasing environment for visitors and residents to enjoy. For example, objectives in Chapter 5 of the WLSP, "Community Design," include establishing distinctive gateways to welcome guests to West Lathrop and creating signature landscaped parkways, waterways, and trails that define an attractive image and knit the various land uses together.

The following discussion summarizes visual resource features addressed in the WLSP Community Design Guidelines, and the WLSP's recommendations for avoiding adverse visual impacts.

Gateways

The WLSP recommends the installation of landscaped gateways at either end of the bridge crossings over the San Joaquin River and Paradise Cut. The design and construction of a "signature" bridge, visible from great distances, for the northern crossing of the San Joaquin River also is recommended.

Streetscapes and Street Tree Plantings

Streetscape design should be appropriate for and complementary to all the uses along the plan area rights-of-way. The extent of streetscape treatment in West Lathrop generally should be consistent with the volume of traffic along the roadway (i.e., the greater the volume of traffic, the more extensive the landscape treatment and the provisions for nonmotorists). The several major streets in West Lathrop will require consistent street tree design and planting and associated ground cover on the median and parkway edge of each street. The focus should be on attractive plantings that are demonstrably low maintenance. One or more landscape and lighting districts shall be created and charged with the responsibility of ongoing maintenance.

Off-Street Trails and Parks

The trail system should offer a quiet, safe, landscaped environment primarily for walking, jogging, and bicycle travel. The trails should be easy to use, and key trails should be well lit to allow for evening use. Public parks in West Lathrop should be sited in strategic locations throughout the community. Hardscape or paved plazas and softscape lawn areas are both appropriate. Neighborhood parks shall incorporate areas for both active and passive recreation.

Schools

The public schools should be sited and designed in conformance with California Department of Education standards. The accompanying recreational facilities should be designed to meet City of Lathrop standards.

Levees

Public access along the tops of levees should be as extensive as possible. Grading of the inside slopes of the levees should allow reasonable access to the tops of the levees. In addition, periodic trails or steps should be provided to invite access to the top of the levee.

Walls and Fences

A variety of walls and fences would be required in the project area, ranging from backyard fences to sound walls separating arterial traffic from homes. The potential for glare from vehicle traffic on residential areas would be mitigated by the construction of aesthetically designed walls and installation of landscaping along the perimeter of expressways to screen views of traffic from residential areas. Fencing and walls should be of consistent quality and design throughout the project site. The designs should vary according to function (e.g., visual separation, security, noise attenuation). Fences near Paradise Cut should not interrupt views of the natural environment. Information on the design, location, scale, and materials for any walls or fences shall be a required component of site/building design submitted for a building permit.

Sound Walls

Sound walls should be minimized and used only where noise volumes mandate them. If required, the scale should be the minimum required, and the design and materials should be consistent with the surrounding landscape and architectural materials. All sound walls should be integrated into the natural topography to the extent feasible and planted with vines and/or shrubbery.

Signage

In a master planned community, comprehensive signage contributes to the quality and integrity of the community. The comprehensive signage system for the proposed project would be designed by the Design Review Board as part of the design guidelines package.

Lighting

Lighting systems should be employed to provide lighting levels commensurate in illumination level and scale with the land uses they serve. In addition, a safe level of lighting is to be designed to orient visitors at night. One or more landscape and lighting districts shall be created and charged with the responsibility of ongoing maintenance.

WLSP EIR

The WLSP EIR identifies existing scenic resources in the planning area as farmland, stands of valley oak trees, the San Joaquin River and its tributaries, riparian vegetation along waterways, old farm structures, the UPRR bridge, and the old U.S. Highway 50 bridge across the San Joaquin River.

The WLSP EIR states that the visual accessibility of these resources is related to their distance from transportation corridors and from areas of open space where they can be observed. Principal views in the planning area are provided from the freeway corridors and from County roads west of Interstate 5 (I-5) that extend to the San Joaquin River and onto Stewart Tract.

Because of their general elevation above adjacent lands, views from the freeway corridors provide both middleground and background views of the agricultural areas to the west and south and to the Coast Ranges to the west. Views of the San Joaquin River are wholly restricted except at bridges or on top of the bordering levees because of the height of the levee system.

The WLSP EIR cites a series of aesthetic impacts that would result from development in West Lathrop, some of which are applicable to the proposed project. These impacts generally could be characterized as light and glare impacts and visual impacts that result from the conversion of agricultural lands to urban uses. Many of the light and glare impacts were associated with the theme park.

4.17.2 EXISTING CONDITIONS

The following sections contain a summary of the visual character of the proposed project site and its existing scenic resources. The discussion also includes a description of locations from which the project site is visible and the visual character of the surrounding land. The existing conditions descriptions are accompanied by exhibits that present photographs taken during various site visits in spring and summer 2002. The locations where these photographs were taken are shown in Exhibit 4.17-1. All exhibits are provided together at the end of this section.

VISUAL CHARACTER OF PROJECT SITE

The River Islands Development Area (RID Area) is generally flat with elevations at +3 to +16 feet National Geodetic Vertical Datum (NGVD). The site slopes slightly from east to west at less than a 1% gradient. The area is almost entirely undeveloped; agricultural uses (Exhibit 4.17-2, viewpoint 1) and orchards dominate the landscape. However, several structures are scattered over the site that typically would be found in agricultural areas (Exhibit 4.17-2, viewpoint 2), such as equipment storage facilities, sheds, single-family dwellings, transient work housing, and irrigation equipment. The edges of the proposed project site rise to levees, beyond which are Old River, the San Joaquin River, and Paradise Cut.

Exhibit 4.17-3 (viewpoint 3) depicts a typical levee, characterized by low vegetative ground cover near the river, transitioning into a grassy ground cover and topped with a gravel access road. Exhibit 4.17-3 (viewpoint 4) also depicts a levee face on the San Joaquin River; in the distance is the temporary fish barrier installed at the confluence with Old River. Typical levee conditions in the northern portion of the RID Area along Old River are shown in Exhibit 4.17-4 (viewpoint 5). There is little variation in appearance or visual appeal along the levee faces.

The Paradise Cut Conservation Area (PCC Area) is entirely undeveloped (e.g., absent of structures) because of its function as a flood bypass facility. The landscape is dominated by agricultural lands with several canals and sloughs running through the area (Exhibit 4.17-4, viewpoint 6). Small inclusions of riparian vegetation often are associated with the water features. The Upper Paradise Cut Improvement Project Area (PCIP Area) consists solely of the bypass channel and the Paradise Weir at the San Joaquin River.

Visual Character of Surrounding Area

Water features are an important visual element in the project area. There are approximately 17 miles of levees that buffer the RID Area from Old River, the San Joaquin River, and Paradise Cut. The land surrounding the project site beyond these levees and water bodies is mostly agricultural, consisting of irrigated field and row crops and orchards, along with a few farmsteads and outbuildings. The general character of surrounding areas is described below and can be seen in the exhibits associated with the following "Views of Project Site" section.

- **North:** Old River forms the northern edge of the site, beyond which are agricultural lands interspersed with farmsteads and associated outbuildings.

- **East:** Old River transitions to the San Joaquin River to form the eastern boundary of the site, beyond which are agriculture lands that buffer the site from the developed City of Lathrop to the east and southeast.

- **South/Southeast:** The Union Pacific Railroad (UPRR) tracks border the site on the southeast, with I-5 running roughly parallel to the tracks further to the southeast. The towers of the existing UPRR bridge over the San Joaquin River provide a distinctive visual landmark that can be seen for several miles. Several brick grain silos on the east side of the UPRR railroad berm also act as a distinctive landmark visible from I-5. East of I-5, the remaining portion of Stewart Tract is dominated by agricultural lands, as well as a sand and gravel extraction facility.

- **West/Southwest:** Paradise Cut forms the southwest portion of the site. Beyond Paradise Cut to the west are mostly agricultural lands with associated homes and structures.