Draft Environmental Impact Report

City of Manteca Wastewater Quality Control Facility and Collection System Master Plans Update Project

SCH #2006052164

Prepared for:

City of Manteca

Prepared by:

EDAW
2022 J Street
Sacramento, CA 95811

July 2007

EDAW | AECOM

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ABBREVIATIONS AND ACRONYMS

μg/l	micrograms per liter
°F	Fahrenheit
29 CFR	Title 29 of the Code of Federal Regulations
40 CFR	Volume 40 of the Code of Federal Regulations
AB	Assembly Bill
ADWF	average dry-weather flow
AFY	acre-foot per year
AIA	Air Impact Assessment
APCO	Air Pollution Control Officer
AQAPs	Air Quality Attainment Plans
ARB	California Air Resources Board
B.P.	Before Present
Basin Plan	Water Quality Control Plan for the Sacramento–San Joaquin River Basins
Bay-Delta Plan	1995 Bay-Delta Water Quality Control Plan
BMPs	best management practices
BOD	Biochemical oxygen demand
CAA	federal Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CalARP	Accidental Release Prevention
Cal-EPA	California Environmental Protection Agency
Cal-OSHA	Department of Industrial Relations
Caltrans	California Department of Transportation
CBC	California Building Standards Code
CCAA	California Clean Air Act
CCIC	Central California Information Center
CCR	California Code of Regulations
CDMG	California Department of Conservation, Division of Mines and Geology
CDO	Cease and Desist Order No. R5-2004-0029
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CHABA	Committee of Hearing, Bio Acoustics, and Bio Mechanics
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
City	City of Manteca
City general plan	*City of Manteca General Plan 2023*
CIWMB	California Integrated Waste Management Board
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
cps	cycles per second
CPUC	California Public Utilities Commission
CRHR	California Register of Historic Resources
CTR	California Toxics Rule
CUPA	Certified Unified Program Agency
CVP	Central Valley Project

CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
DAF	dissolved air flotation
dB	decibels
dBA	A-weighted decibel
dBA/DD	dBA per doubling of distance
DBCP	dibromochloropropane
DBPs	disinfection byproducts
DEIR	draft environmental impact report
Delta	Sacramento–San Joaquin Delta
DFG	California Department of Fish and Game
DHS	State Department of Health Services
DLDs	dedicated land disposal areas
DOT	U.S. Department of Transportation
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EC	electrical conductivity
EDB	Ethylene dibromide
EFH	essential fish habitat
EHD	San Joaquin County Environmental Health Division
EMT	Emergency Medical Technician-1
EPA	U.S. Environmental Protection Agency
EPCRA	Federal Emergency Planning and Community Right to Know Act
ESA	federal Endangered Species Act
ESJCGB	Eastern San Joaquin County Groundwater Basin
ESU	Evolutionarily Significant Unit
FAA	Federal Aviation Administration
FCOC	French Camp Outlet Canal
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FMMP	Farmland Mapping and Monitoring Program
fps	feet/second
FTA	Federal Transit Administration
GAMAI	*Guide for Assessing and Mitigating Air Quality Impacts*
GC	California Government Code
gpm	gallons per minute
GWUDI	groundwater under the direct influence of surface water
HAPs	hazardous air pollutants
HAZOP	RMP Hazard and Operability Study
HCP	habitat conservation plan
HMMP	Hazardous Materials Management Plan
HORB	Head of Old River Barrier
HRAs	health risk assessments
HUD	U.S. Department of Housing and Urban Development
Hz	hertz

I-5	Interstate 5
in/sec	inch per second
INM	Integrated Noise Model
ISR	Indirect Source Review
IWMP	Integrated Waste Management Plan
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hours
L_{dn}	Day-Night Noise Level
L_{eq}	Equivalent Noise Level
LIM	Land Inventory and Monitoring
L_{max}	Maximum Noise Level
L_{min}	Minimum Noise Level
LOS	level of service
L_X	Statistical Descriptor
M	large-magnitude
MACT and BACT	maximum or best available control technology for toxics
MBTA	federal Migratory Bird Treaty Act
MCLG	Maximum contaminant level goal
MCLs	Maximum Contaminant Levels
MEI	Maximally Exposed Individual
MFD	Manteca Fire Department
mg/l	milligrams per liter
mgd	million gallons per day
MLD	Most Likely Descendent
MRZs	Resource Zones
MSDSs	Material Safety Data Sheets
Mw	Moment Magnitude
NAHC	Native American Heritage Commission
NEHRP	National Earthquake Hazards Reduction Program
NEHRPA	National Earthquake Hazards Reduction Program Act
NEPA	National Environmental Policy Act
NESHAP	national emissions standards for HAPs
NHPA	National Historic Preservation Act
NMFS	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NMHC	nonmethane hydrocarbon
NO	nitric oxide
NOC	notice of completion
NOI	Notice of Intent
NOP	notice of preparation
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPDWRs	National Primary Drinking Water Regulations
NRCS	Natural Resources Conservation Service
NTR	National Toxics Rule
OES	Office of Emergency Services
OHWM	ordinary high-water mark

OPR	State of California Governor's Office of Planning and Research
OSHA	Occupational Safety and Health Administration
OWTS	on-site wastewater treatment systems
ozone	photochemical smog
PAH	polycyclic aromatic hydrocarbons
PCE	perchloroethylene
PG&E	Pacific Gas and Electric
PL	Public Law
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
POTWs	publicly owned treatment works
ppm	part per million
ppt	parts per thousand
PPV	peak particle velocity
PQP	Public/Quasi-Public
PRC	Public Resources Code
project	Collection System Master Plans Update Project
PUC	Public Utilities Commission
RAS	return activated sludge
RCRA	Resource Conservation and Recovery Act
RMP	Risk Management Plan
RMS	root mean square
RWD	Reports of Waste Discharge
RWQCB	regional water quality control board
SCS	U.S. Soil Conservation Service
SCSWSP	South County Surface Water Supply Project
SCWSP	South County Water Supply Project
SDWA	Safe Drinking Water Act
SENL	Single-Event [Impulsive] Noise Level
SIP	State Implementation Plan
SJCDEH	San Joaquin County Environmental Health Department
SJCOES	San Joaquin County Office of Emergency Services
SJCOG	San Joaquin Council of Governments
SJMSCP	*San Joaquin County Multi-Species Habitat Conservation and Open Space Plan*
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMARA	Surface Mining and Reclamation Act
SR	State Route
SSBs	solids storage basins
SSJID	South San Joaquin Irrigation District
SWAT	special weapons and tactics
SWP	State Water Project
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
T-BACT	best available control technology for TACs
Thermal Plan	Water Quality Control Plan for Control of Temperatures in Coastal and Interstate Waters and Enclosed Bays and Estuaries of California
TMDL	Total Maximum Daily Load

TNM	Traffic Noise Model
tpd	tons per day
tpy	tons per year
TSS	total suspended solids
UBC	Uniform Building Code
UCMP	University of California Museum of Paleontology
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UV	ultraviolet light
VAMP	Vernalis Adaptive Management Plan
VDE	visible dust emissions
VMT	vehicle miles traveled
WAS	waste activated sludge
WDRs	waste discharge requirements
WGF	wastewater generation factors
WQCF	wastewater quality control facility
WTP	water treatment plant

1 INTRODUCTION

1.1 PURPOSE OF THE ENVIRONMENTAL IMPACT REPORT

The City of Manteca (City) has prepared this draft environmental impact report (DEIR) to disclose the potential environmental effects of the proposed Manteca Wastewater Quality Control Facility (WQCF) and Collection System Master Plans Update Project (project). This DEIR was prepared in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended through Public Resources Code Section 21000 et seq.) and the State CEQA Guidelines (California Code of Regulations Section 15000 et seq.). An EIR is a full disclosure, public information document in which the significant environmental impacts of a project are evaluated, feasible measures to mitigate significant impacts are identified, and alternatives to the project that can reduce or avoid significant environmental effects are considered.

An EIR is an informational document used in the planning and decision-making process by the lead agency and responsible and trustee agencies. The lead agency is the public agency with primary responsibility over the project. In accordance with State CEQA Guidelines Section 15051(b)(1), "the lead agency will normally be the agency with general governmental powers, such as a city or county, rather than an agency with a single or limited purpose." In the case of the proposed project, the lead agency is the City of Manteca, which will be responsible for overall approval.

The purpose of an EIR is not to recommend either approval or denial of a project. CEQA requires decision-makers to balance the benefits of a project against its unavoidable environmental effects in deciding whether to carry out a project. The lead agency will consider the DEIR, comments received on the DEIR, and responses to those comments before making a decision. If environmental impacts are identified as significant and unavoidable, the lead agency may still approve the project if it determines that the social, economic, or other benefits outweigh the unavoidable impacts. The lead agency would then be required to prepare "Findings" and a "Statement of Overriding Considerations" that discuss the specific reasons for approving the project, based on information in the EIR and other information in the record.

1.2 SCOPE OF THE ENVIRONMENTAL IMPACT REPORT

Pursuant to Section 15143 of the State CEQA Guidelines, a lead agency may limit the EIR's discussion of environmental effects to specific issues where significant effects on the environment may occur. The City used a variety of information to determine which issue areas would result in potentially significant or significant effects on the environment. This information included field surveys of the project site, review of project characteristics, comments from public and agency consultation, and comments received on the notice of preparation (NOP). An NOP was circulated to public agencies and the public on May 25, 2006, for a 30-day review period. A public scoping meeting was held on June 14, 2006, at 5 p.m. in the Manteca City Council Chambers. Comments received on the NOP are included in Appendix A. Since publication of the NOP, the City decided to alter the alignments of several proposed wastewater collection system pipeline segments (see Exhibit 3-3, "Proposed Project Components"). These changes do not substantially alter the elements of the project as described in the NOP because the new collection system pipeline alignment is similar to the original collection system alignment as described in the NOP, and the new collection system would connect to the existing collection system primarily within previously developed portions of the city.

Based on the NOP, public comments on the NOP, and preliminary analysis, the project would have less-than-significant impacts on recreation and population and housing as discussed below. These issues will not be evaluated further in this DEIR.

1.3 EFFECTS FOUND NOT TO BE SIGNIFICANT

This section contains a discussion of the environmental effects found not to be significant pursuant to the State CEQA Guidelines Section 15128, which provides that "[a]n EIR shall contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and were therefore not discussed in detail in the EIR."

The project's effects on recreation and population and housing were found to be less than significant and are not included in the detailed analysis of potential project impacts.

1.3.1 RECREATION

The project does not include any public recreation elements nor would it significantly increase demand for recreational facilities in the project area because the project does not include proposals for new housing. Therefore, the project would not increase demands for park or other recreational facilities and would not result in accelerated physical deterioration of existing recreational facilities. The project would not result in the need for new or expanded recreational facilities and no impacts to these facilities would occur. However, the project would have indirect growth-inducing and secondary environmental effects. Growth inducing and secondary effects of growth are discussed in Chapter 6, "Other CEQA Required Sections," of this DEIR.

1.3.2 POPULATION AND HOUSING

The project is the upgrade and expansion of wastewater treatment facilities at the City of Manteca WQCF and the expansion of the wastewater collection system throughout the City. No housing is located within the facility footprint, nor does the project propose to construct any new housing. Therefore, the project would have less-than-significant population and housing impacts, and population and housing impacts of the project are not evaluated further in this DEIR. However, the project would have indirect growth-inducing and secondary environmental effects. Growth inducing and secondary effects of growth are discussed in Chapter 6, "Other CEQA Required Sections," of this DEIR.

1.4 LEAD, FEDERAL, RESPONSIBLE, AND TRUSTEE AGENCIES

As defined in State CEQA Guidelines Section 15367, the lead agency is the public agency that has the principal responsibility for carrying out or approving the project. Other state or local public agencies that may or will use the EIR to carry out their discretionary approval power over the project are responsible agencies, as defined by CEQA Section 21069 and State CEQA Guidelines Section 15381. Trustee agencies, as defined by State CEQA Guidelines Section 15381, are state agencies that have jurisdiction by law over resources affected by a project that are held in trust for the people of the State of California.

The City of Manteca is the lead agency with primary authority for approval of the project. Additional agencies (listed below) with potential permit or approval authority over the project, or elements thereof, will have the opportunity to review this document during the public review period, and will use this information in consideration and issuance of any permits required for the project.

Public agencies with known or potential permits, other approvals, or jurisdiction by law over resources on the site are listed below.

1.4.1 LEAD AGENCY

- City of Manteca (project approval)

1.4.2 FEDERAL AGENCIES

- U.S. Bureau of Reclamation (Canal Crossing Permit)
- U.S. Army Corps of Engineers (Section 404 of Clean Water Act Permit)
- U.S. Fish and Wildlife Service (Federal Endangered Species Act permit)
- National Marine Fisheries Service (Federal Endangered Species Act)

1.4.3 STATE RESPONSIBLE AGENCIES

- State Water Resources Control Board (National Pollutant Discharge Elimination System permit)
- California Department of Health Services (Title 17 and 22 recycled wastewater rules)
- California Department of Transportation (state highway encroachment permit)
- State of California Reclamation Board (flood control plan encroachment permit)

1.4.4 STATE TRUSTEE AGENCIES

- California Department of Fish and Game (Streambed Alteration Agreement, California Endangered Species Act Permit)

1.4.5 LOCAL RESPONSIBLE AGENCIES

- San Joaquin Valley Air Pollution Control District (authority to construct and permit to operate)

- San Joaquin Council of Governments (implementation of San Joaquin County Multi-Species Habitat Conservation and Open Space Plan)

1.5 PUBLIC REVIEW PROCESS

Consistent with the requirements of CEQA, a good faith effort has been made during the preparation of this DEIR to contact affected agencies, organizations, and individuals who may have an interest in the project. As described above, this effort included the circulation of the NOP on May 25, 2006, and a public scoping meeting in the City of Manteca on June 14, 2006. In addition, early consultation with relevant agencies, organizations, and individuals assisted in the preparation of this DEIR. The City of Manteca has filed a notice of completion (NOC) with the Governor's Office of Planning and Research, State Clearinghouse, indicating that this DEIR has been completed and is available for review and comment by the public. This DEIR is being circulated for a 45-day public review period, during which time written comments will be received by the City of Manteca at the following address:

Phil Govea, Deputy Director of Public Works—Engineering
City of Manteca
Public Works Department
1001 W. Center Street
Manteca, CA 95337
Facsimile: (209) 239-8495
Email: pgovea@ci.manteca.ca.us

Copies of the DEIR can be found at the following addresses:

Manteca City Clerk
1001 W. Center Street
Manteca, CA 95337

City of Manteca
Public Works Department
1001 W. Center Street
Manteca, CA 95337

Manteca Branch Library
Stockton–San Joaquin County Public Library
320 West Center Street
Manteca, CA 95336

A public hearing on this DEIR will also be held at the Manteca City Council Chambers at 3 p.m. on August 8, 2007, during the review period, to receive oral comments on the document. A public notice of availability of the DEIR, which also includes the date, time, and specific location for the public hearing, has been published in the Manteca Bulletin.

1.6 TERMINOLOGY USED IN THE ENVIRONMENTAL IMPACT REPORT

This DEIR includes the following terminology to denote the significance of environmental impacts of the project:

- **Less-Than-Significant Impact:** A less-than-significant impact is one that would not result in a substantial and adverse change in the environment. This impact level does not require mitigation.

- **Significant Impact:** CEQA Section 21068 defines a significant impact as one that causes "a substantial, or potentially substantial, adverse change in any of the physical conditions in the area affected by the project." Feasible mitigation measures or alternatives to the project must be considered to reduce the magnitude of significant impacts to less-than-significant levels.

- **Potentially Significant Impact:** A potentially significant impact is one that, if it were to occur, would be considered a significant impact as described above; however, the occurrence of the impact cannot be definitely determined. For CEQA purposes, a potentially significant impact is treated as if it were a significant impact and would require mitigation.

- **Significant and Unavoidable Impact:** A significant and unavoidable impact is one that would result in a substantial adverse effect on the environment that cannot be feasibly mitigated to a less-than-significant level. A project with significant unavoidable impacts can still be approved, but the city would be required to prepare a Statement of Overriding Considerations, pursuant to State CEQA Guidelines Section 15093, explaining the social, economic, or other benefits of the project that outweigh the significant environmental impacts.

- **Thresholds of Significance:** A criterion to define at what level an impact would be considered significant. A criterion is defined based on examples found in CEQA or the State CEQA Guidelines, scientific and factual data relative to the lead agency jurisdiction, views of the public in affected areas, the policy/regulatory environment of affected jurisdictions, and other factors.

1.7 ENVIRONMENTAL IMPACT REPORT ORGANIZATION

This DEIR is organized into chapters, as identified and briefly described below. Chapters are further divided into sections (e.g., Section 4.1, "Land Use and Agricultural Resources").

Chapter 1, "Introduction." Chapter 1 describes the purpose and organization of the DEIR, context, and terminology used in the DEIR.

Chapter 2, "Executive Summary." This section summarizes the project description, alternatives to the project, significant environmental impacts that would result from the project, and mitigation measures proposed to reduce or eliminate those impacts.

Chapter 3, "Project Description." Chapter 3 describes project location, background, proposed actions by the City, federal, trustee, and responsible agency actions, project characteristics, and project objectives. This chapter also describes project construction and regulatory requirements.

Chapter 4, "Affected Environment, Thresholds of Significance, Environmental Impacts, and Mitigation Measures." For each environmental issue area, this chapter describes the existing environmental setting, discusses the environmental impacts associated with the proposed project, and identifies mitigation for the impacts.

Chapter 5, "Cumulative Impacts." This chapter contains a discussion of cumulative impacts that would result from the proposed project in combination with reasonably foreseeable projects in the project area.

Chapter 6, "Other CEQA Required Sections." The potential for the project to foster economic or population growth, or remove obstacles to growth are evaluated in Chapter 6. Project and cumulative impacts that cannot be mitigated to a less-than-significant level are also documented in this chapter.

Chapter 7, "Alternatives to the Project." This chapter describes alternatives to the project at a level consistent with CEQA requirements outlined in State CEQA Guidelines Section 15126.6(d). This chapter presents brief descriptions of alternatives that could mitigate the project's environmental impacts while meeting most of the project's objectives. This chapter also describes alternatives previously considered and rejected.

Chapter 8, "References." This chapter sets forth a comprehensive listing of all sources of information used in the preparation of the DEIR, including agencies or individuals consulted during preparation of the DEIR.

Chapter 9, "Report Preparation." This chapter identifies the DEIR authors and consultants who provided analysis in support of the DEIR's conclusions.

Appendices. Appendices contain various technical reports, letters, official publications, summarized or otherwise used for preparation of the DEIR.

1.8 TECHNICAL STUDIES USED IN THE ENVIRONMENTAL IMPACT REPORT

Several studies or reports have been prepared in support of the analysis presented in this DEIR and are included in the appendices, where appropriate. In addition, the following studies and reports were prepared in connection with the project, and are available at the City of Manteca, Public Works Department, 1001 West Center Street, Manteca, CA 95337.

- *Draft Environmental Impact Report, Volumes 1 and 2, Manteca General Plan 2023* (Wade Associates 2003a)

- *City of Manteca General Plan 2023 Policy Document* (Wade Associates 2003b)
- *San Joaquin County General Plan* (San Joaquin County 1992)
- *Soil Survey of San Joaquin County California* (Natural Resources Conservation Service 1992)
- *Geotechnical Investigation Report Proposed Additions to Manteca Wastewater Treatment Plant, Manteca, California* (Kleinfelder 1997)
- *Addendum to Geotechnical Investigation Report Proposed Additions to Manteca Wastewater Treatment Plant, Manteca, California* (Kleinfelder 2004)
- *Preliminary Geotechnical Services Report Proposed Promenade Shops at Central Valley, Manteca, California* (Kleinfelder 2005)
- *Risk Management Plan, City of Manteca Wastewater Quality Control Facilities. Version 1* (Sierra-Pacific Group 1999)
- *Near and Far Field Dilution Analysis of the Manteca Wastewater Discharge* (Resource Management Associates 2006)
- *Antidegradation Analysis for proposed Wastewater Quality Control Facility Discharge Modification* (Larry Walker Associates 2007)
- *City of Manteca 2005 Urban Water Management Plan* (City of Manteca 2005)

2 EXECUTIVE SUMMARY

2.1 INTRODUCTION

The City of Manteca Wastewater Quality Control Facility (WQCF) and Collection System Master Plans Update Project would provide additional wastewater treatment and conveyance capacity to accommodate growth planned for in the City of Manteca's (City) General Plan. The environmental analysis in this Draft EIR is based on an evaluation of how environmental conditions would be expected to change as a result of implementing the project. Public comments on the Draft EIR will provide important input for the City's decision on the proposed project. This section summarizes the information contained in the Draft EIR, including a summary of the project description, environmental impacts, mitigation measures, and alternatives.

2.2 THE EIR PROCESS

The City of Manteca, as lead agency or public agency that has the primary authority to approve the project, must certify the EIR as being adequate according to the California Environmental Quality Act (CEQA), and consider its environmental information when taking action on the project. Other public agencies with approvals of the project are considered responsible agencies; these agencies would consider the environmental effects of the project based on this Draft EIR. The purpose of an EIR is to identify and assess the environmental impacts that would directly or indirectly occur as a result of the project.

The Draft EIR has been released for public review to receive comments from interested parties on its completeness and adequacy in disclosing the environmental effects of the project. Written responses to significant environmental points raised in comments will be prepared and published. Together, the Draft EIR, comments received on the Draft EIR, and the responses to comments will constitute the Final EIR.

2.3 SUMMARY OF THE PROJECT DESCRIPTION

2.3.1 PROJECT LOCATION

The WQCF occupies approximately 22 acres of a 210-acre City-owned site, which is bounded generally by Yosemite Avenue to the north, SR 120 to the south, Airport Way to the east, and both McKinley Avenue and the Union Pacific Railroad to the west. The proposed WQCF expansion and upgrades would primarily be located within the existing 22-acre WQCF site. A proposed treated effluent outfall pipeline would extend from the WQCF to a side-bank outfall structure at the San Joaquin River.

Proposed wastewater collection system improvements would generally be located along the perimeter of the city. Local roadways in the vicinity of the proposed wastewater collection system trunk sewers include Woodward Avenue, Lathrop Road, and Airport Way. A proposed recycled water distribution system would primarily follow Woodward Avenue, Airport Way, and Center Street.

2.3.2 OBJECTIVES OF THE PROJECT

The City of Manteca, as the lead agency, has developed the following primary objectives to satisfy the requirements of the State CEQA Guidelines Section 15124 (b):

- provide sufficient conveyance and treatment capacity to meet projected growth within the City of Manteca's WQCF service area through the year 2023;
- provide for orderly and cost-effective expansion of City WQCF facilities and conveyance systems;

- comply with current water quality standards and provide flexibility to address changes in standards and regulations; and

- be sensitive to community concerns in relation to the planning, design, construction, and operation of City WQCF and collection system facilities and programs.

2.3.3 ELEMENTS OF THE PROJECT

The project would expand WQCF treatment capacity from 9.87 million gallons per day (mgd) to 27 mgd average dry weather flow (ADWF), would construct new trunk sewers to accommodate growth planned for in the City's general Plan (adopted in 2003), and would construct a new recycled water distribution system. The project would result in the construction of treatment facilities to achieve compliance with water quality limitations including rapid mixing and flocculation tanks to address turbidity requirements and a tertiary ultraviolet (UV) light disinfection treatment system to address wastewater reuse requirements. The proposed project would reach buildout via a two-phase, incremental expansion, with capacity increasing from 9.87 to 17.5 mgd ADWF in the first phase, and then from 17.5 to 27 mgd ADWF in the second phase. The proposed increase in capacity would be accommodated using the City's long-term effluent disposal strategy of on-site land application, urban landscape irrigation, and San Joaquin River discharge. The proposed project would also include the incremental construction of three new trunk sewers and improvements to the collection system.

2.3.4 SUMMARY OF ALTERNATIVES TO THE PROJECT

This EIR evaluates the following alternatives to the project:

- No Project Alternative (9.87 mgd)
- Increased Land Disposal Alternative
- Advanced Wastewater Treatment Alternative
- Modified Pipeline Alignment Alternative

The No Project Alternative and the Modified Pipeline Alternative are environmentally superior to the project. The Advanced Wastewater Treatment Alternative would result in environmental tradeoffs compared to the project. The Increased Land Disposal Alternative would not be environmentally superior to the project.

The No Project Alternative would not attain any of the project's objectives. The Modified Pipeline Alternative would attain all of the project's objectives.

NO PROJECT ALTERNATIVE (9.87 MGD)

Under the No Project Alternative (9.87 mgd), the 2007 WQCF and 2006 collection system master plans would not be implemented, and discharge at the WQCF would not exceed the currently permitted discharge rate of 9.87 mgd. The WQCF would be projected to accommodate increased urban growth in the City service area for the next 5-10 years depending on the buildout rate of proposed development, at which time the average dry weather flow (ADWF) discharge from the WQCF is projected to reach the plant's currently permitted ADWF capacity of 9.87 mgd. Under this alternative, WQCF discharges would be "capped" at 9.87 mgd ADWF, and growth in the City's service area would be constrained. Plant improvements needed to address regulatory requirements, ongoing maintenance needs, or technical upgrades (including buildout of the WQCF) would still be implemented, but capacity would not be increased above 9.87 mgd. If the No Project Alternative were implemented, other options would need to be considered to address the wastewater treatment demands associated with future development in the City's service area. Because any discussion of the size, location, and infrastructure requirements of a potential new wastewater treatment plant would be speculative, a potential new plant is not discussed in this alternative analysis.

INCREASED LAND DISPOSAL ALTERNATIVE

The Increased Land Disposal Alternative would maximize the discharge of treated effluent to nearby agricultural lands. In order to maintain existing water quality and constituent loadings to the San Joaquin River from the time the WQCF reaches its current permitted capacity of 9.87 mgd ADWF through the proposed buildout capacity of 27 mgd ADWF, it is estimated that a maximum effluent-to-land disposal capacity of 18 mgd would be required.

Treated effluent from the WQCF is currently either land applied to approximately 190 acres of City-owned land or discharged to the San Joaquin River. The City has examined a number of effluent-to-land disposal strategies that would have sufficient capacity for disposal of 18 mgd of treated wastewater year-round. Because of the relatively high unit cost and other implementation constraints of urban water reuse, the increased land disposal alternative would apply undisinfected, denitrified, secondary effluent to existing City-owned land surrounding the WQCF and to future City-purchased land at some distance from the WQCF. While the City has examined the costs of purchasing land from one to 10 miles away for effluent disposal, economic considerations and land availability make the purchase of land farther away from the WQCF a more tenable proposition. To that end, the increased land disposal alternative includes high-rate irrigation (260 in/yr) of City-owned land at the WQCF property (4,600 ac-ft/year or 4.11 mgd) and agricultural irrigation on acreage within 10 miles of the WQCF that would be purchased by the City (15,560 ac-ft/year or 13.89 mgd) as a means of collectively applying 18 mgd of undisinfected, denitrified, secondary effluent to land year-round. This alternative would allow the reclamation of up to approximately two thirds of WQCF effluent at the proposed build-out capacity of 27 mgd ADWF. Additional pipelines would be required to convey treated effluent from the WQCF to the selected land disposal site. All facilities proposed at the WQCF to treat up to 27 mgd of wastewater and proposed collection system and recycled water distribution pipelines would be constructed under this alternative.

ADVANCED WASTEWATER TREATMENT ALTERNATIVE

Because the proposed project includes nitrification-denitrification, tertiary filtration and UV disinfection facilities, the remaining advanced wastewater treatment options available to the City are microfiltration and reverse osmosis (MF/RO). RO is a membrane separation process that is used for the removal of dissolved constituents from wastewater remaining after advanced treatment with tertiary filtration or microfiltration. RO treatment relies on applied pressure to force water through a semi-permeable membrane while restraining the passage of particulate and high molecular weight constituents. Membranes exclude ions, but require high pressures to produce the deionized water. Passage of water through the membrane produces a relatively ion free effluent stream and a concentrated brine stream. MF occurs prior to RO in order to remove larger organic and inorganic particles that foul the RO membrane and thus increase membrane resistance to water flow and reduce membrane service life.

The Advanced Wastewater Treatment alternative would involve the implementation of advanced microfiltration and reverse osmosis (MF/RO) technology. In order to maintain existing water quality and TDS loadings in the San Joaquin River from the time the WQCF reaches its current permitted capacity of 9.87 mgd ADWF through the proposed buildout capacity of 27 mgd ADWF, it is estimated that a maximum MF/RO capacity of 21 mgd would be required (LWA 2007). This alternative assumes that the blending of effluent streams of different qualities is permitted and, therefore, only a portion of WQCF tertiary effluent would need to undergo MF/RO prior to blending with non-MF/RO tertiary effluent and discharge to the San Joaquin River.

Although no significant water quality impacts were identified for the project, the project would exceed currently adopted standards for aluminum (although a water effects ratio [WER] study has been completed to identify an appropriate site-specific objective for total aluminum in the San Joaquin River that is both sufficiently protective of aquatic life and identifies available assimilative capacity for aluminum in the river under which the WQCF can discharge its effluent); however, this impact was determined to be less than significant because the current adopted standard is believed, based on available science, to be overly protective of water quality and aquatic resources. The MF/RO process would reduce the concentration and loadings of aluminum and other metals in the effluent compared to the proposed project. This treatment technology is evaluated in the analysis provided below.

MODIFIED PIPELINE ALIGNMENT ALTERNATIVE

The proposed project would incrementally add new collection system sewer pipelines to meet the development goals adopted in the City of Manteca General Plan 2023. Building upon the existing wastewater collection system, new wastewater collection system pipelines would convey wastewater to an influent pump station at the WQCF. In addition, a new recycled water distribution system would be constructed in stages to supply recycled water citywide. Implementation of the proposed project would also result in construction of an approximately 14,000-foot 48-inch diameter outfall pipeline parallel to the existing outfall pipeline. Although proposed pipelines would mainly be constructed within developed roadways, some proposed pipeline segments would traverse sensitive biological habitats such as freshwater marsh and riparian forest habitats. This alternative would modify the pipeline alignments to avoid sensitive biological habitats wherever feasible.

The proposed pipeline routes for the wastewater collection system, effluent outfall, and recycled-water distribution system cross or are located immediately adjacent to three canals that contain sensitive biological habitats (Exhibits 4.5-1, 4.5-2a, 4.5-2b, and 4.5-2c). The proposed wastewater collection system would cross a drainage canal north of Yosemite Avenue and west of Airport Way (Exhibit 4.5-2a). The crossing, referred to as Alignment A, is located 1,000 feet east of the confluence of the drainage canal with the French Camp Outfall Canal. Beginning at a point just west of Airport Way and north of the Southern Pacific Railroad tracks, another portion of the proposed wastewater collection system route (referred to as Alignment B) would be located within 5 feet of a drainage canal for approximately 2,000 feet (Exhibit 4.5-2b). This canal is also a tributary of the French Camp Outfall Canal and averages 20 feet wide. Water and dense freshwater marsh vegetation types are present within and along the banks of the channel. The proposed wastewater collection system also crosses the French Camp Outfall Canal south of the WQCF property and north of SR 120 (Exhibit 4.5-2c). This area, referred to as Alignment C, contains water and freshwater marsh vegetation in the channel of the canal.

The modified pipeline alignment alternative would alter the three pipeline alignments that cross or are located immediately adjacent to canals that contain sensitive biological habitats. At Alignment A, the alternative would realign the pipeline to the east and north of the French Camp Outfall Canal to avoid crossing the drainage canal. At Alignment B, the pipeline alignment would be realigned northeast and away from the drainage canal to avoid dense freshwater marsh habitat. Lastly, the alternative would realign Alignment C east of the drainage canal.

At Alignment C, the City has determined that it is infeasible to modify the collection system alignment. The collection system pipeline alignment south of the WQCF was established considering the location and depth of the influent pump station constructed at the WQCF under the Phase III improvements project. Due to topography and long trunk sewer lengths, there is minimal flexibility in modifying the collection system pipeline route in the vicinity of freshwater marsh habitat north of SR 120 and east of McKinley Avenue without compromising the ability to convey wastewater to the influent pump station by gravity. Because of the congested core of the treatment plant site and the desire to limit construction impacts, the influent pump station was sited along the easterly boundary of the city property. Therefore, it would be infeasible to realign the collection system at Alignment C because it is essentially fixed to allow for connection to a previously constructed stub within the treatment plant core.

ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The State CEQA Guidelines require identification of an environmentally superior alternative. If the No Project Alternative is environmentally superior, CEQA requires selection of the "environmentally superior alternative other than the no project alternative" from among the project and the alternatives evaluated.

Table 2-1 identifies whether each of the three alternatives would have "greater," "less," or "similar" impacts as the project for each of the 13 environmental issue areas evaluated in this Draft EIR. Based on the listing of lesser and greater impacts as identified in Table 2-1, the No Project Alternative would appear to be the environmentally superior alternative. The No Project Alternative would avoid the project's significant and unavoidable impacts

associated with Important Farmland and generation of substantial odors. Because the No Project Alternative would not result in any significant and unavoidable impacts, it is the environmentally superior alternative and it is superior to all other alternatives considered. However, this alternative would not meet any project objectives. Further, it would not resolve existing non-compliance issues associated with the temperature of the effluent. Most importantly, this alternative would not result in the expansion of the WQCF to meet buildout demands associated with the City's General Plan (2023). As such, this alternative may result in the curtailment of growth within the City until an alternate plan for wastewater disposal could be developed.

Table 2-1
Comparison of the Impacts of the Alternatives with Those of the Proposed Project

Environmental Issues	Alternative			
	No Project (9.87 mgd)	Increased Land Disposal	Advanced Wastewater Treatment	Modified Pipeline Alignment
Land Use and Agricultural Resources	Less	Similar or Greater	Similar	Similar
Visual Resources	Less	Similar	Similar	Similar
Air Quality	Less	Similar	Similar	Similar
Noise	Less	Similar	Similar	Similar
Terrestrial Biological Resources	Less	Greater	Similar	Less
Hazards and Hazardous Materials	Similar	Similar	Similar or Greater	Similar
Geology, Soils, and Seismicity	Similar	Similar	Similar	Similar
Paleontological Resources	Less	Similar	Similar	Similar
Hydrology and Water Quality	Similar	Similar	Less	Similar
Public Services and Utilities	Similar	Similar	Similar	Similar
Transportation and Circulation	Less	Greater	Similar	Similar
Cultural Resources	Less	Similar	Similar	Similar
Fisheries and Aquatic Resources	Similar	Greater	Less*	Similar*

* Assumes construction of a treated effluent cooling tower to reduce thermal impacts.
Source: EDAW 2007

The Increased Land Disposal Alternative would not be environmentally superior to the project because it would not avoid any of the project significant and unavoidable impacts related to Important Farmland and generation of odors and it would result in greater environmental impacts in four resource areas including greater impacts to Important Farmland, sensitive habitats and species, construction-related traffic impacts, and fishery impacts. While this alternative may achieve most project objectives, because of the substantial expense involved with securing additional land for effluent disposal, it may not be able to meet the project objective of providing for the "cost-effective" expansion of City WQCF facilities.

The Advanced Wastewater Treatment alternative would result in environmental tradeoffs compared to the proposed project. While impacts to water quality and fisheries would be reduced compared to the proposed project as a result of greater constituent removal efficiencies, this alternative could result in greater hazardous material impacts as a result of the brine that is produced as a by-product of the MF/RO process. This alternative would not reduce or eliminate the project's significant and unavoidable impacts (e.g., Important Farmland and odors). While this alternative may achieve most project objectives, because of the substantial expense involved with constructing and operating MF/RO facilities, it may not be able to meet the project objective of providing for the "cost-effective" expansion of City WQCF facilities. However, from a water quality perspective, the Advanced

Wastewater Treatment Alternative would be the environmentally superior alternative because this alternative would have greater constituent removal efficiencies than the project.

Overall, the Modified Pipeline Alignment Alternative would be environmentally superior to the project. This alternative would not avoid the project's significant and unavoidable impacts (e.g., Important Farmland and odors); however, this alternative would substantially reduce the project's impacts to sensitive resources. Further, all project objectives would be achieved with implementation of this alternative.

2.4 SUMMARY OF ENVIRONMENTAL IMPACTS AND RECOMMENDED MITIGATION MEASURES

Table 2-2, presented at the end of this chapter, provides a summary of the project-specific environmental impacts of the project, the level of significance of the impact before mitigation, recommended mitigation measures, and the level of significance of the impact after implementation of the mitigation measures.

The project would result in project-level significant and unavoidable adverse impacts in five areas: Agricultural Resources and Air Quality. In addition, the project would contribute to cumulative significant and unavoidable adverse impacts in three areas: Agricultural Resources, Visual Resources, and Air Quality.

2.5 AREAS OF CONTROVERSY

Section 15123 of the CEQA Guidelines requires the summary section of an EIR to include "areas of controversy known to the lead agency."

The following issues, in no order of importance, are controversial issues known to the City of Manteca:

- Traffic congestion along area roadways
- Conversion of farmland to urban uses
- Visual impacts of the project (i.e., lighting, character)
- Alteration of land use and potential conflicts with existing land uses
- Water quality impacts in the San Joaquin River
- Fishery resource impacts in the San Joaquin River

Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.1 Land Use and Agricultural Resources			
4.1-1: Potential for Division of an Established Community. The project would not develop a new use that would extend into an established community or interfere with existing vehicular or pedestrian traffic moving from one side of an established community to another. The project would result in the construction of wastewater treatment facilities on City-owned land and underground pipelines primarily within City right-of-way. Interim and permanent pumping stations would be integrated with new or existing residential subdivisions. Therefore, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.1-2: Potential Conflicts with Existing Land Uses in or Adjacent to the Project Area. WQCF improvements would be constructed within and near the existing WQCF footprint on City-owned property. The wastewater collection system, recycled-water distribution system, and outfall pipelines associated with the proposed project would be installed below grade and would have no effect on adjacent land uses. Interim and permanent pumping stations would be mainly below grade and would be integrated with surrounding land uses. Therefore, the project would not result in land use conflicts between the project area and adjacent land uses. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.1-3: Conversion of Important Farmland to Nonagricultural Use. Implementation of the proposed project would result in the conversion of approximately 41 acres of Prime Farmland and Farmland of Statewide Importance to nonagricultural use. Conversion of agricultural land would be considered a significant impact.	S	**4.1-3: Conversion of Important Farmland to Nonagricultural Use.** The City will pay the required City agricultural mitigation fee to help offset the conversion of Important Farmland. Consistent with Chapter 13.42 of the Manteca Municipal Code, a $2,000 agricultural mitigation fee will be assessed for every acre of Important Farmland that would be developed as part of the proposed project. A total of $82,000 ($2,000 multiplied by 41 acres) will be made available to acquire farmland conservation easements and/or farmland deed restrictions. Consistent with goals of the City's Right to Farm ordinance, this mitigation measure would reduce the occurrence of conflicts between nonagricultural and agricultural land uses from development pressure by preserving agricultural lands located within the project vicinity.	SU

LTS = Less than Significant S = Significant PS = Potentially Significant SU = Significant and Unavoidable

Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		Implementation of this mitigation measure would substantially reduce significant impacts associated with the conversion of approximately 41 acres of Important Farmland on the WQCF site and along pipeline alignments because funding conservation easements would provide assistance to public and private sectors in protecting other farmland from the pressures of development. The agricultural mitigation fee would be used to specifically purchase farmland easements and/or farmland deed restrictions to partially offset project impacts; however, approximately 41 acres of Important Farmland would still be unavoidably lost. In addition, no new farmland would be made available, and the productivity of existing farmland would not be improved as a result of this mitigation measure. Thus, full compensation for losses of Important Farmland would not be achieved. No other feasible mitigation is available.	
4.2 Visual Resources			
4.2-1: Impacts on a Scenic Vista. No views on or near the WQCF site or potential pumping station sites would be considered a scenic vista. Therefore, development of the project would not alter or obscure views of a scenic vista. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.2-2: Damage to Scenic Resources within a State Scenic Highway. No state scenic highways are located within the vicinity of the project area. Therefore, implementation of the project would not result in damage to scenic resources along a state scenic highway. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.2-3: Impacts on Existing Visual Character. Implementation of the proposed project would result in an increase in the number of structures at the WQCF site and would result in the construction of pumping stations and a side-bank outfall structure. WQCF facilities would be similar in size and mass to existing structures and would appear to blend with existing facilities at the WQCF. Pumping station and side-bank outfall facilities would also be similar in size and mass to existing facilities and would appear to blend with existing residences and outfall structures. Therefore, the project would not substantially	LTS	No mitigation is necessary.	LTS

LTS = Less than Significant S = Significant PS = Potentially Significant SU = Significant and Unavoidable

Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
alter the existing visual character of the project area. This would be a less-than-significant impact.			
4.2-4: Impacts of Construction-Related Nighttime Lighting. Project construction could, at times, continue past dusk. High-intensity lighting may be used to illuminate construction sites associated with the WQCF site, pumping stations, parallel outfall pipeline, and pipeline alignments. This lighting could be visible to nearby residences and could contribute to skyglow in the surrounding area. Although construction-related lighting would be temporary, it could result in intrusive glare in areas adjacent to project construction sites. This would be a potentially significant construction-related lighting impact.	PS	**4.2-4: Impacts of Construction-Related Nighttime Lighting.** If construction activity occurs after dusk and nighttime lighting is required to illuminate any construction sites associated with the proposed project, the City will ensure that all construction lights are directed away from adjacent development and that all construction lighting is shielded to minimize glare.	LTS
4.2-5: Increase in Operational Nighttime Lighting. The project would increase the use of lighting during nighttime hours at the WQCF and proposed pump stations. However, the proposed lighting would be similar in function and design to existing on-site lighting or nearby subdivision lighting sources and would blend with existing sources so as not to substantially increase the amount of nighttime illumination in these areas. Further, proposed lighting sources would meet the City's lighting standards adopted for the purpose of minimizing nighttime light and glare. This would be a less-than-significant impact.	LTS	No mitigation is necessary.	LTS
4.3 Air Quality			
4.3-1: Generation of Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors. Modeled short-term project-generated emissions from construction equipment for projects constructed during Phase 1 (2008 to 2010 based on construction projections presented in Table 3-4) would exceed SJVAPCD's significance threshold of 10 tpy and project applicable SJVAPCD-required and other control measures for fugitive dust are not currently part of the project description. Project-generated, construction- related emissions of criteria air pollutants and precursors could violate or contribute substantially to an existing or projected air quality	S	**4.3-1: Generation of Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors.** A. SJVAPCD has indicated that the project may be subject to Rule 9510, Indirect Source Review (SJVAPCD 2006d). It would appear that the WQCF expansion portion of the project would be exempt in accordance with Section 4.4.3 of the Rule, which exempts facilities that are subject to the New and Modified Source Rule. Construction of the collection system and outfall would result in emissions of NO_X in excess of 2.0 tons per year, which is a baseline for applicability of the Rule. Therefore, the City of Manteca will ensure that the proposed project complies	SU/LTS

LTS = Less than Significant S = Significant PS = Potentially Significant SU = Significant and Unavoidable

Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
violation, expose sensitive receptors to substantial pollutant concentrations, especially considering the nonattainment status of San Joaquin County, and/or conflict with air quality planning efforts. As a result, this impact would be a significant.		with the following, as required by law: ► Submit an Air Impact Assessment (AIA) application to SJVAPCD. The AIA application will be submitted on a form provided by the SJVAPCD and contain, but not limited to, the applicant's name and address, detailed project description, on-site emission reduction checklist, monitoring and reporting schedule, and an AIA. The AIA shall quantify construction NO_X and PM_{10} emissions associated with the project. (PM_{10} emissions would be less than 2 tpy; therefore, it may be acceptable to limit the AIA analysis to NO_X emissions.) This will include the estimated construction baseline emissions, and the mitigated emissions for each applicable pollutant for the development project, or each phase thereof, and shall quantify the off-site fee, if applicable. General mitigation requirements, as contained in the ISR rule, include the following: • Exhaust emissions for construction equipment greater than 50 horsepower used or associated with the project will be reduced by 20% of the total NO_X and by 45% of the total PM_{10} exhaust emissions from the statewide average as estimated by ARB. • Consider using less polluting construction equipment, which can be achieved by utilizing add-on controls, cleaner fuels, or newer lower emitting equipment. • Additional strategies for reducing construction emissions may include, but are not limited to: - Providing commercial electric power to the project site in adequate capacity to avoid or minimize the use of portable electric generators and the equipment; - Substitution of electric-powered equipment for diesel engine driven equipment; and - Limiting the hours of operation of heavy duty equipment and/or the amount of equipment in use	

LTS = Less than Significant S = Significant PS = Potentially Significant SU = Significant and Unavoidable

Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		at any one time. ► The requirements listed above can be met through any combination of on-site, emission-reduction measures or off-site fees. The ISR rule provides a method of calculating fees to be paid to offset any NO_X and PM_{10} emission reductions that would not be achieved by selection of construction equipment and fuels. B. The City of Manteca will ensure that the proposed project complies with SJVAPCD's Regulation VIII, "Fugitive Dust Prohibitions," and that all applicable control measures, as required by law, are implemented during construction to reduce the generation of fugitive PM_{10} and $PM_{2.5}$ emissions. Regulation VIII contains, but not limited to, the following required control measures. 1. Prewater site sufficient to limit visible dust emissions (VDE) to 20% opacity. 2. Phase work to reduce the amount of disturbed surface area at any one time. 3. During active operations, apply water or chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity. 4. During active operations, construct and maintain wind barriers sufficient to limit VDE to 20% opacity. 5. During active operations, apply water or chemical/organic stabilizers/suppressants to unpaved haul/access roads and unpaved vehicle/equipment traffic areas sufficient to limit VDE to 20% opacity and meet the conditions of a stabilized unpaved road surface. 6. An owner/operator shall limit the speed of vehicles traveling on uncontrolled unpaved access/haul roads within construction sites to a maximum of 15 miles per hour. 7. An owner/operator shall post speed limit signs that meet State and Federal Department of Transportation standards at each construction site's uncontrolled unpaved access/haul road entrance. At a minimum, speed limit signs shall also be	

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		posted at least every 500 feet and shall be readable in both directions of travel along uncontrolled unpaved access/haul roads. 8. When handling bulk materials, apply water or chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity. 9. When handling bulk material, construct and maintain wind barriers sufficient to limit VDE to 20% opacity and with less than 50% porosity. 10. When storing bulk materials, comply with the conditions for a stabilized surface as listed above. 11. When storing bulk materials, cover bulk materials stored outdoors with tarps, plastic, or other suitable material and anchor in such a manner that prevents the cover from being removed by wind action. 12. When storing bulk materials construct and maintain wind barriers sufficient to limit VDE to 20% opacity and with less than 50% porosity. If utilizing fences or wind barriers, apply water or chemical/organic stabilizers/suppressants to limit VDE to 20% opacity or utilize a three-sided structure with a height at least equal to the height of the storage pile and with less than 50% porosity. 13. Limit vehicular speed while traveling on the work site sufficient to limit VDE to 20% opacity. 14. Load all haul trucks such that the freeboard is not less than 6 inches when material is transported across any paved public access road sufficient to limit VDE to 20% opacity. 15. Apply water to the top of the load sufficient to limit VDE to 20% opacity. 16. Cover haul trucks with a tarp or other suitable cover. 17. Clean the interior of the cargo compartment or cover the cargo compartment before the empty truck leaves the site; and prevent spillage or loss of bulk material from holes or other openings in the cargo compartment's floor, sides,	

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		and/or tailgate; and load all haul trucks such that the freeboard is not less than 6 inches when material is transported on any paved public access road, and apply water to the top of the load sufficient to limit VDE to 20% opacity; or cover haul trucks with a tarp or other suitable cover. 18. Owners/operators shall remove all visible carryout and trackout at the end of each workday. 19. An owner/operator of any site with 150 or more vehicle trips per day, or 20 or more vehicle trips per day by vehicles with three or more axles shall take the actions for the prevention and mitigation of carryout and trackout. 20. Within urban areas, an owner/operator shall prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved surface exit point of a site. 21. Within rural areas, construction projects 10 acres or more in size, an owner/operator shall prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved surface exit point of a site. 22. For sites with paved interior roads, an owner/operator shall prevent and mitigate carryout and trackout. 23. Cleanup of carryout and trackout shall be accomplished by manually sweeping and picking-up; or operating a rotary brush or broom accompanied or preceded by sufficient wetting to limit VDE to 20% opacity; or operating a PM10-efficient street sweeper that has a pick-up efficiency of at least 80%; or flushing with water, if curbs or gutters are not present and where the use of water would not result as a source of trackout material or result in adverse impacts on storm water drainage systems or violate any National Pollutant Discharge Elimination System permit program. 24. An owner/operator shall submit a Dust Control Plan to the Air Pollution Control Officer (APCO) prior to the start of	

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		any construction activity on any site that will include 10 acres or more of disturbed surface area for residential developments, or 5 acres or more of disturbed surface area for nonresidential development, or will include moving, depositing, or relocating more than 2,500 cubic yards per day of bulk materials on at least three days. Construction activities shall not commence until the APCO has approved or conditionally approved the Dust Control Plan. An owner/operator shall provide written notification to the APCO within 10 days prior to the commencement of earthmoving activities via fax or mail. The requirement to submit a dust control plan shall apply to all such activities conducted for residential and nonresidential (e.g., commercial, industrial, or institutional) purposes or conducted by any governmental entity. C. The City of Manteca will ensure that the following SJVAPCD-recommended additional control measures will be implemented by the proposed project during construction to further reduce fugitive PM_{10} and $PM_{2.5}$ dust emissions. 1. Install sandbags or other erosion control measures to prevent silt runoff to public roadways from adjacent project areas with a slope greater than 1%. 2. Suspend excavation and grading activity when winds exceed 20 mph. 3. Limit area subject to excavation, grading, and other construction activity at any one time. D. The City of Manteca will ensure that the following SJVAPCD-recommended additional control measures will be implemented by the proposed project during construction to further reduce construction equipment exhaust emissions. 1. Minimize idling time (e.g., 10-minute maximum). 2. Replace fossil-fueled equipment with electrically driven equivalents (provided they are not run via a portable generator set). This measure would be particularly applicable to the utilization of signal boards.	

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		3. Staging areas for heavy-duty construction equipment shall be located as far as possible from sensitive receptors. 4. Use alternative fueled or catalyst equipped diesel construction equipment, where reasonable available, such as equipment capable of using biodiesel or emulsified fuel. Alternative fuels and NO_X reduction equipment should be ARB-certified. 5. Limit the hours of operation of heavy duty equipment and/or the amount of equipment in use at any one time. 6. Curtail construction during periods of high ambient pollutant concentrations; this may include ceasing of construction activity during the peak-hour of vehicular traffic on adjacent roadways or on Spare the Air Days. Implementation of Mitigation Measures 4.3-1A and D would result in the required minimum 20% reduction in NO_X emissions and a 45% reduction in PM_{10} emissions from heavy-duty diesel equipment, as compared with statewide average emissions. In addition, implementation of these measures would also result in a 5% reduction in ROG emissions from heavy-duty diesel equipment. All or part of the reductions may result from on-site equipment and fuel selection; the remainder would result from off-site reductions achieved through the payment of fees. Implementation of these measures would reduce temporary, short-term, construction-related emissions of ROG and NO_X generated by the proposed project, but not to a less-than-significant level, as emissions would still exceed SJVAPCD's significance thresholds. As a result, this impact (generation of construction-related NO_X emissions) would remain significant and unavoidable. With respect to fugitive PM_{10} dust emissions, implementation of Mitigation Measures 4.3-1B and C would ensure compliance with Regulation VIII, which is required by law, and include additional SJVAPCD-recommended control measures. As a result, this impact (generation of construction-related fugitive PM_{10} dust emissions) would be reduced to a less-than-significant level.	

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.3-2: Generation of Long-Term Operation-Related (Regional) Emissions of Criteria Air Pollutants and Precursors. Operation-related activities would not result in project-generated emissions of ROG or NO_X that exceed SJVAPCD's significance threshold of 10 tpy. Thus, project-generated, operation-related emissions of criteria air pollutants and precursors would not violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, or conflict with air quality planning efforts. As a result, this impact would be a less-than-significant..	LTS	No mitigation is necessary.	LTS
4.3-3: Exposure of Sensitive Receptors to Toxic Air Contaminant Emissions. The project would not expose sensitive receptors to substantial emissions of TACs because construction emissions would be temporary and would rapidly dissipate with distance from the source and proposed operations would not result in the exceedance of the SJVAPCD's screening criteria for project's resulting in significant TAC emissions. As a result, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.3-4: Generation of Long-Term Operation-Related (Local) Mobile-Source Emissions of Carbon Monoxide. The proposed project would generate a trip increase that is less than 1.0% of existing traffic volumes on local area roadways and would not decrease the LOS of these roadways. The proposed project would be defined as a small project (e.g., generates less than 1,000 trips per day) for which no quantitative analysis would be required. Project-generated, long-term operation-related (local) mobile-source emissions of CO would not violate or contribute substantially to a violation of the CAAQS or NAAQS, or expose sensitive receptors to substantial pollutant concentrations. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.3-5: Exposure of Sensitive Receptors to Odors. The WQCF is known to produce odors and there has been at least one confirmed compliant per year over a three year period. While the design of the project incorporates all feasible odor control technologies to reduce project-generated odors, it is unknown	SU	**4.3-5: Exposure of Sensitive Receptors to Odors**, design of the WQCF would incorporate all feasible odor control technologies to reduce the potential for the exposure of sensitive receptors to odors. However, at this time it is not possible to determine if these measures would reduce the number of complaints to less than one per year	SU

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
whether these technologies would limit odor complaints to less than one per year, which is the significance standard used by the SJVAPCD for significant odor problems. No other feasible odor control technologies are available to reduce the intensity of odors at the WQCF site and that would guarantee that odor complaints would be limited to one per year. Therefore, this impact would be significant and unavoidable.		averaged over three years. No further odor reduction measures are feasible. Therefore, this impact would remain significant and unavoidable.	
4.4 Noise			
4.4-1: Short-Term Increases in Construction Source Noise Levels. If construction activities were to occur during the more noise-sensitive hours or if construction equipment were not properly equipped with noise control devices, construction-generated source noise could result in the exposure of persons to or generation of noise levels in excess of applicable standards, could result in annoyance and/or sleep disruption to occupants of any existing noise-sensitive land uses in the project vicinity, and/or could create a substantial temporary increase in ambient noise levels. As a result, this impact would be potentially significant.	PS	**4.4-1: Short-Term Increases in Construction Source Noise Levels.** To reduce the exposure of noise-sensitive receptors to project-generated construction source noise levels, the City will implement the following measures: ► Limit all construction activities within the city to the hours from 7 a.m. to 7 p.m. to ensure compliance with Section 17.13.04(A) of the City of Manteca Municipal Code. ► Limit all construction activities within the county, or affected by the County, to the hours from 6 a.m. to 9 p.m. to ensure compliance with the San Joaquin County Development Code (Section 9-1029.9[C][3]). ► Properly maintain and equip all construction equipment with noise control, such as mufflers, in accordance with manufacturers' specifications. ► Place noisy stationary equipment (e.g., compressors, generators) away from existing off-site noise-sensitive receptors and/or provide acoustical shielding.	LTS
4.4-2: Long-Term Increases in Traffic Source Noise Levels. Because operation would generate few traffic trips in comparison to existing traffic volumes on local roadways, the proposed project would not result in a noticeable change in the traffic noise contours of area roadways. Thus, long-term increases in traffic source noise levels would not result in the exposure of persons to or generation of noise levels in excess of applicable standards or create a substantial permanent increase in ambient noise levels at existing noise-sensitive receptors. As a result, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.4-3: Long-Term Increases in Stationary- and Area-Source Noise Levels. Long-term on-site stationary-source noise would not result in the exposure of persons to or generation of noise levels in excess of applicable standards or create a substantial permanent increase in ambient noise levels in the project vicinity. Area sources of noise (e.g., landscape maintenance equipment) would not be anticipated to differ substantially from existing noise equipment levels. As a result, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.4-4: Compatibility of Proposed Land Uses with On-site Noise Levels. Project implementation would not result in the exposure of any sensitive receptors, proposed as part of the project, or any people working in the area to noise levels that exceed applicable City or County standards, including aircraft-generated noise levels. As a result, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.4-5: Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration or Noise Levels. Short-term project-generated vibration levels from construction sources could exceed FTA's maximum-acceptable vibration standard of 80 VdB with respect to human response for residential use at vibration-sensitive land uses. As a result, this impact would be significant.	S	**4.4-5: Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration or Noise Levels.** To reduce the exposure of vibration-sensitive receptors to project-generated construction source vibration levels, the City will implement the following measure: ► Construction activities within 60 feet of occupied residences will be performed without equipment that produces relatively high levels of vibration (e.g., use jackhammers in place of hoe rams).	LTS
4.5 Terrestrial Biological Resources			
4.5-1: Impacts on Common Plants and Wildlife. Implementation of the project would not substantially reduce available habitat or the population of any common plant or animal species because most of the species present in the project area are common and widely distributed throughout the county, and implementation of the proposed project would not have a substantial effect on regional populations of common species throughout the region. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.5-2: Impacts on Special-Status Plants. Implementation of the proposed project would result in loss and disturbance of riparian, freshwater marsh, and annual grassland habitat that could potentially support 13 special-status plant species. This impact would be potentially significant.	PS	**4.5-2: Impacts on Special-Status Plants.** The proposed project is located in the Central Zone of the SJMSCP. Eleven of the special-status plants listed in Table 4.5-1 are addressed in the SJMSCP. The City will request coverage under the SJMSCP and fees will be paid in the amount determined by SJCOG during the application and review process for the project. If SJCOG determines, based on an independent review by a qualified biologist, that suitable habitat for special-status plants would be affected, the following measures may be required to reduce impacts on the 11 special-status species covered by the SJMSCP: ► Before project construction, surveys for the 11 special-status plants covered by the SJMSCP 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. Surveys shall be conducted in accordance with specific methodologies described in Section 5.2.2 of the SJMSCP. If any of the 11 special-status plants are found, the following measures will be implemented: • *Greene's tuctoria, Delta button celery, Sanford's arrowhead and slough thistle:* If these species are present in the project area and cannot be avoided, a mitigation plan will be developed, with review and input from the regulatory agencies (e.g., DFG). The mitigation plan will identify mitigation measures for any populations affected by the proposed project, such as creation of off-site 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. These measures will be designed to ensure that the project does not result in a net reduction in the population size or range of Greene's tuctoria, Delta button celery, Sanford's arrowhead, and slough thistle. • *Recurved larkspur, Wright's trichocoronis, alkali milk vetch, Suisun Marsh aster, rose-mallow, Delta mudwort, and Delta tule pea:* If these species are found in the project area and cannot be avoided, a mitigation strategy will be	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		developed with review and input from the regulatory agencies (e.g., DFG). The mitigation strategy will first consider the feasibility of establishing a conservation easement. If dedication of a conservation easement is found not to be a feasible mitigation option, payment of SJMSCP development fees will be used to mitigate impacts on these species. Use of conservation easements or development fees for establishment of habitat preserves, or a combination of the two mechanisms, will be structured to ensure that the project does not result in an overall net reduction in the population size or range of recurved larkspur, Wright's trichocoronis, alkali milk vetch, Suisun Marsh aster, rose-mallow, Delta mudwort, and Delta tule pea. • The remaining two species, San Joaquin spearscale and lesser spearscale, are not covered in the SJMSCP. Surveys for these species 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. If survey results indicate that neither species is present in project area, no additional mitigation will be required. If populations of these species are encountered during the surveys, they will be avoided to the extent feasible. If avoidance is not possible, plants will be evaluated for their biological importance based on the known distribution of the plants and other pertinent data, in consultation with DFG. If significant impacts would occur, a mitigation plan will be developed in coordination with DFG. The plan will detail specific measures to reduce impacts on the plants to a less-than-significant level, which may include a combination of avoidance, salvage, replanting, or protection of off-site populations as deemed appropriate by DFG. The plan will also include methods for monitoring of mitigation success and reporting requirements.	
4.5-3: Impacts on Vernal Pool Crustaceans, California Tiger Salamander, and Western Spadefoot Toad. Implementation of the proposed project would result in loss and disturbance of	PS	**4.5-3: Impacts on Vernal Pool Crustaceans, California Tiger Salamander, and Western Spadefoot Toad.** For the wastewater collection system alignment approximately 900 feet north of	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
annual grassland habitat that could support vernal pools and other wetlands suitable for vernal pool crustacean species, California tiger salamander, and western spadefoot. This impact would be potentially significant.		Yosemite Avenue and the effluent outfall pipeline alignment, the City will request coverage under the SJMSCP and fees will be paid in the amount determined by SJCOG during the application and review process for the project. SJCOG may also determine, based on an independent review by a qualified biologist, that the following measures will be implemented to reduce impacts on the vernal pool crustaceans, California tiger salamander, and western spadefoot toad if potential habitat is present in the project area and would be affected by plan implementation. **Vernal Pool Crustaceans** ► Filling of vernal pools will be delayed until pools are dry and samples from the top layer of vernal pool soils are collected. Soil collections will be sufficient to include a representative sample of plant and animal life present in the pools by incorporating seeds, cysts, eggs, spores and similar inoculum. ► Collected soils will be dried and stored in pillowcases labeled with the date and location of soils collected. Soils will be deposited with the Joint Powers Authority (JPA). The JPA shall retain the soils in a cool, dry area and shall be responsible for providing soils to vernal pool construction managers for inoculating newly created vernal pools on Preserve lands. **California Tiger Salamander and Western Spadefoot Toad** If potential California tiger salamander and spadefoot toad habitat is determined to be present and could be affected, surveys will be conducted according to the current protocol approved by the Technical Advisory Committee (TAC) and the permitting agencies (i.e., DFG and USFWS). If salamanders and/or toads are detected, incidental take minimization measures will be developed in coordination with the TAC and permitting agencies. This may be conducted as part of the CWA Section 404 permitting process, if such a permit is required. The measures will be based on the need to avoid and minimize impacts on breeding, feeding, and sheltering behaviors of California tiger salamander and spadefoot toad, and will include consideration of the following: ► effects on aquatic habitat, including retaining pools and	

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		maintaining appropriate pool hydrology to enable successful metamorphosis of larvae to occur, but without fostering nonnative aquatic predators; ► retention of small mammal burrows and other suitable estivation habitat (e.g., underground holes, cracks, or niches) in adjacent uplands; ► the fact that maintenance of open habitat between breeding ponds and estivation sites (e.g., roads and other linear barriers) can increase mortality or even prevent migrations and dispersal, significantly increasing harm to and mortality of salamanders and toads); ► siting replacement wetland habitat, whenever possible, within approximately 1.5 miles of other known breeding sites.	
4.5-4: Impacts on Giant Garter Snake. Implementation of the proposed project would disturb irrigation/drainage canals and ditches that provide suitable aquatic and upland habitat for giant garter snake and could result in direct take of individuals. This impact would be potentially significant.	PS	**4.5-4: Impacts on Giant Garter Snake.** The City will request coverage under the SJMSCP and fees will be paid in the amount determined by SJCOG during the application and review process for the project. SJCOG may also determine, based on an independent review by a qualified biologist, that the following measures will be implemented to reduce impacts on giant garter snake: ► Construction will occur during the active period for the snake, between May 1 and October 1. Between October 2 and April 30, the JPA, with the concurrence of the permitting agencies' representatives on the TAC, shall determine whether additional measures are necessary to minimize and avoid take. ► Vegetation clearing within 200 feet of the banks of potential aquatic habitat for giant garter snake will be limited to the minimum area necessary. ► The movement of heavy equipment within 200 feet of the banks of potential aquatic habitat for giant garter snake will be confined to existing roadways to minimize habitat disturbance. ► Before ground disturbance, all on-site construction personnel will be given instruction regarding the presence of SJMSCP-covered species and the importance of avoiding impacts on these species and their habitats. ► In areas where wetlands, irrigation ditches, marsh areas, or other	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		potential giant garter snake habitats are being retained on the site: a. Temporary fencing will be installed at the edge of the construction area and the adjacent wetland, marsh, or ditch. b. Working areas, spoils, and equipment storage and other project activities will be restricted to areas outside of marshes, wetlands, and ditches. c. Water quality will be maintained and construction runoff into wetland areas will be limited through the use of hay bales, filter fences, vegetative buffer strips, or other accepted equivalents. ► If on-site wetlands, irrigation ditches, marshes, etc., are being relocated in the vicinity, the newly created aquatic habitat will be created and filled with water before dewatering occurs and the existing aquatic habitat is destroyed. In addition, nonpredatory fish species that exist in the aquatic habitat and that are to be relocated will be seined and transported to the new aquatic habitat as the old site is dewatered. ► If wetlands, irrigation ditches, marshes, etc., will not be relocated in the vicinity, then the aquatic habitat will be dewatered at least 2 weeks before construction begins. ► Preconstruction surveys for the giant garter snake (conducted after completion of environmental reviews and before ground disturbance) will occur within 24 hours of ground disturbance. Other provisions of the USFWS *Standard Avoidance and Minimization Measures during Construction Activities in Giant Garter Snake Habitat* will be implemented (excluding programmatic mitigation ratios which are superseded by the SJMSCP's mitigation ratios).	
4.5-5: Impacts on Northwestern Pond Turtle. Implementation of the proposed project is unlikely to result in loss or disturbance of nesting northwestern pond turtle because suitable nesting habitat for this species is not present within the project area. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.5-6: Impacts on Raptors. Implementation of the proposed project would result in the disturbance and/or loss of active nests and foraging habitat for special-status and common raptors. This impact would be potentially significant.	PS	**4.5-6: Impacts on Raptors.** The City will request coverage under the SJMSCP and fees will be paid in the amount determined by SJCOG during the application and review process for the project. Compensation for loss of agricultural lands will also mitigate the loss of foraging habitat for raptor species. SJCOG may also determine, based on an independent review by a qualified biologist, that the following measures will be implemented to reduce impacts on special-status raptors. **Swainson's Hawk** The City has the option of retaining known or potential Swainson's hawk nest trees (i.e., trees that hawks are known to have nested in within the past 3 years or trees, such as large oaks, that the hawks prefer for nesting) or removing the nest trees. If the City elects to retain a nest tree, and to encourage tree retention, the following incidental take minimization measure will be implemented during construction activities: ► If a nest tree becomes occupied during construction activities, then all construction activities will remain a distance of two times the dripline of the tree, measured from the nest. ► If the City elects to remove a nest tree, then nest trees may be removed between September 1 and February 15, when the nests are unoccupied. **Burrowing Owl** The City will prevent ground squirrels from occupying the project site early in the planning process by employing one of the following practices: ► New vegetation will be planted or existing vegetation will be retained entirely covering the site at a height of approximately 36 inches above the ground. Vegetation will be retained until construction begins. ► If burrowing owls are not known or suspected on a project site, the City will disk or plow the entire project site to destroy any ground squirrel burrows. At the same time burrows are destroyed, ground squirrels will be removed through one of approved methods described in Appendix A of the SJMSCP to	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		prevent reoccupation of the project site (also found at http://www.sjcog.org/). If these measures are not attempted or are attempted but fail, and burrowing owls occupy the project site, then the following measures will be implemented: • During the nonbreeding season (September 1–January 31), burrowing owls occupying the project site will be removed from the project site by passive relocation as described in DFG's *Staff Report on Burrowing Owl Mitigation* (DFG 1995). • During the breeding season (February 1–August 31), occupied burrows will not be disturbed and will be provided with a 75-meter protective buffer until the Technical Advisory Committee (TAC)—with the concurrence of the permitting agencies' representatives on the TAC—or a qualified biologist approved by the permitting agencies verifies through noninvasive means that either the birds have not begun egg laying, or juveniles from the occupied burrows are foraging independently and are capable of independent survival. Once the fledglings are capable of independent survival, the burrow can be destroyed. **White-Tailed Kite** Before the start of any ground-disturbing activities (e.g., project site grading), preconstruction surveys will investigate all potential nesting trees on the project site (e.g., especially tree tops 15–59 feet above the ground in oak, willow, eucalyptus, cottonwood, or other deciduous trees), during the nesting season (February 15–September 15) whenever white-tailed kites are noted on-site or within the vicinity of the project site during the nesting season. A setback of 100 feet from nesting areas will 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 will be marked by brightly colored temporary fencing.	

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		Northern Harrier A setback of 500 feet from nesting areas will 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 will be marked by brightly colored temporary fencing. **Common Raptors** ► If project activity would occur during the raptor nesting season (February 15–September 15), preconstruction surveys will be conducted during the nesting season in suitable nesting habitat within 100 feet of areas of project activity. The survey will be conducted within 2 weeks before the beginning of construction or tree removal. A setback of 100 feet from active nesting areas will 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 will be marked by brightly colored temporary fencing.	
4.5-7: Impacts on Other Special-Status Birds. Implementation of the proposed project would result in disturbance and removal of a relatively small amount of potential foraging habitat for tricolored blackbird and loggerhead shrike. Loss of active nests of these species is unlikely to result, because construction of the proposed pipelines would only temporarily disturb less than 1 acre of marginally suitable nesting habitat, pipelines would be constructed below ground, and the project would avoid impacts on freshwater marsh habitat within the French Camp Outlet Canal by implementing trenchless construction methods. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.5-8: Impacts on Wildlife Movement and Nursery Sites. Implementation of the proposed project would not substantially interfere with wildlife movement or impede the use of wildlife nursery sites because the project area does not connect open space that serves as important wildlife habitat or nursery sites. This would be a less-than-significant impact.	LTS	No mitigation is necessary.	LTS
4.5-9: Impacts on Protected and Heritage Trees. Implementation of the proposed project would result in the potential loss and disturbance of native oaks and other existing trees that are protected by local ordinances. This impact would be potentially significant.	PS	**4.5-9: Impacts on Protected and Heritage Trees.** The City will implement the following measures to reduce impacts of the proposed project on protected and heritage trees: ► Before project implementation, a tree survey shall be conducted by a qualified botanist to enumerate and evaluate all trees that meet standards in the applicable City codes outlined above that could be affected by implementation of the proposed project. ► Trees that are subject to protection, but must be removed as a result of project implementation, will be replaced in accordance with tree planting specifications established by the City Tree Ordinance. Replacement trees will be planted on-site at a location in the general vicinity that is consistent with City standards. ► Replacement tree plantings will be monitored in accordance with City monitoring protocols. If monitoring indicates that replacement plantings are not meeting performance standards, remedial measures will be implemented. Appropriate measures will be determined by the City. and will be implemented until it is demonstrated that replacement plantings meet performance standards.	LTS
4.5-10: Impacts on Sensitive Habitats, Including Jurisdictional Waters of the United States. Implementation of the project could result in fill or reconfiguration of less than 1 acre of potentially jurisdictional waters of the United States, including drainage canals and the San Joaquin River, and associated freshwater marsh and riparian habitat. This impact would be potentially significant.	PS	**4.5-10: Impacts on Sensitive Habitats, Including Jurisdictional Waters of the United States.** The City will avoid impacts on the San Joaquin River and its tributaries and impacts on freshwater marsh habitat within the French Camp Outlet Canal and its tributaries by implementing the following construction methods: ► trenchless construction methods such as horizontal directional drilling or bore-and-jack to bore under the French Camp Outlet Canal in two locations and bore under a tributary of the French	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		Camp Outlet Canal in one location; ► limiting open-cut trench installation near sensitive habitat to improved and unimproved roadways; and ► limiting construction equipment and material to roadways and disturbed upland areas (e.g., agricultural fields and vineyards). Although it is anticipated that the construction techniques discussed above would avoid impacts on the French Camp Outlet Canal, any proposed action involving tunneling or boring under navigable waters requires a USACE Section 10 permit. Therefore, the City will apply to USACE for a Section 10 permit under the Rivers and Harbors Act to obtain permission to pass under the French Camp Outlet Canal and its tributary. Where construction activities would occur within 25 feet of the French Camp Outlet Canal or its tributaries or other areas with freshwater marsh, biological monitoring will be conducted to ensure that there are no adverse effects on these sensitive habitats. A determination of waters of the United States, including wetlands and riparian habitat that would be affected by construction of the effluent outfall structure, would be made by qualified biologists through the formal Section 404 wetland delineation process. If necessary, the City will consult with the appropriate agencies (e.g., USACE, DFG, and the U.S. Environmental Protection Agency), and authorization for fill of jurisdictional areas will be secured from USACE via the Section 404 permitting process and other applicable resource agencies' permitting processes, if required. As part of these processes, measures will be developed to minimize impacts, such as conducting activities during the low-flow season and erecting protective fencing to minimize the area of impact and potential for runoff and siltation. Any jurisdictional habitat that is removed will be replaced or rehabilitated on a "no-net-loss" basis in accordance with applicable agency regulations and at a location and by methods agreeable to the applicable agencies. In addition, construction of the effluent outfall structure may require an encroachment permit from the State Reclamation Board. Therefore, the City will consult with the Reclamation Board before initiating any construction activities.	

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.5-11: Consistency with an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Other Approved Conservation Plan. Implementation of the proposed project would not conflict with or be inconsistent with the adopted San Joaquin Multi-Species Conservation Plan. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.6 Hazards and Hazardous Materials			
4.6-1: Creation of a Significant Hazard to the Public or the Environment. Existing safety practices and health and safety programs currently in effect would continue to be implemented with expansion of the Manteca WQCF and construction of new pipelines for the wastewater collection system and recycled-water distribution. In addition, use of hazardous materials during project construction and operation would be in compliance with federal, state, and local regulations. Because adequate safety procedures and precautions are in place and would continue with implementation of the Manteca WQCF and Collection System Master Plan Updates, and the project would implement and comply with existing hazardous materials regulations, the potential for accidental releases of hazardous materials or other significant hazards to the public or the environment would be less than significant.	LTS	No mitigation is necessary.	LTS
4.6-2: Emission or Handling of Hazardous Materials or Waste Near a School. Existing safety practices and health and safety programs currently in effect would continue to be implemented with expansion of the Manteca WQCF and Collection System Master Plan Updates. Because adequate safety procedures and precautions are in place and would continue with implementation of the Manteca WQCF and Collection System Master Plan Updates, and the project would reduce the use of acutely hazardous materials at the WQCF, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.6-3: Interference with an Adopted Emergency Response Plan or Emergency Evacuation Plan. The Manteca WQCF has a Hazardous Materials Management Plan in place and	LTS	No mitigation is necessary.	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
implementation of this plan would continue with proposed project implementation. Also, the proposed project would not interfere with implementation of an adopted emergency response plan or emergency evacuation plan, and project contractors would be required to prepare a Construction Traffic Management Plan. Therefore, emergency response plan or emergency evacuation plan impacts would be less than significant.			
4.6-4: Potential Wildfire Hazard. The project area is not located in a designated wildland fire area or a High Fire Hazard Severity Zone. Therefore, the project would not expose people or structures to significant risk of loss or injury involving wildland fires. This impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.7 Geology, Soils, and Seismicity			
4.7-1: Risks to People and Structures Caused by Strong Seismic Ground Shaking. The project area is approximately 23 miles from the nearest potentially active fault and is located in CBC Seismic Zone 3. The proposed facilities would be designed to meet or exceed current state engineering and design criteria. Further, although not required by the CBC, the City would design its wastewater treatment facilities to protect against severe seismic events and natural disasters. Therefore, construction of the proposed project would not expose people and structures to seismic-related structural and nonstructural damage and associated hazards. This would be a less-than-significant impact.	LTS	No mitigation is necessary.	LTS
4.7-2: Risks to People and Structures Caused by Seismic-Related Ground Failure. Based on the underlying soil conditions in the project area and the shallowness of the groundwater table, construction of the proposed project has the potential to expose people or structures to seismic-related ground failure, including liquefaction and differential settlement. Therefore, this impact is considered potentially significant.	PS	**4.7-2: Risks to People and Structures Caused by Strong Seismic-Related Ground Failure.** a. Before contract bidding for project construction, the approved project design plans and specifications, including grading and foundation plans, shall be reviewed by a soils engineer approved by the City. This review shall be completed to assess whether the recommendations in project geotechnical reports prepared by Kleinfelder are sufficient for construction of the buildings and facilities described in the final project design plans. If these	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		measures are deemed insufficient, the geotechnical engineer shall prepare supplemental site-specific geotechnical report(s) with appropriate recommendations sufficient to ensure the safety of project structures and site occupants. These measures could include, but are not limited to, the construction of deep foundations, installation of driven piles, and extra reinforcement of foundation slabs. At a minimum, these measures shall demonstrate that the proposed project design would meet CBC and City design standards. b. During project design and construction, all measures outlined in project geotechnical reports for the proposed project and, if necessary, measures included in the supplemental site-specific geotechnical report(s) shall be implemented to ensure that project structures and site occupants would be safe during seismic events. c. The on-site soils will likely be saturated by rainfall in the winter and early spring months. If the construction schedule requires continued work during the wet months, the City shall consult with a qualified civil engineer and implement any additional recommendations provided, as conditions warrant.	
4.7-3: Construction-Related Erosion Hazards. Based on soil types and topography, excavation, movement, and grading of soil could result in erosion during project construction, particularly during periods of strong winds. This impact is considered potentially significant.	PS	**4.7-3: Construction-Related Erosion Hazards.** ► A grading and erosion control plan shall be prepared by a California Registered Civil Engineer prior to issuance of any grading permits. The plan shall be consistent with the CBC grading requirements and shall include the site-specific grading required for new construction. The City shall ensure that the construction contractor is responsible for securing a source of transportation and deposition of excavated materials. ► BMPs for erosion and siltation prevention, as further described in Section 4.9, "Hydrology and Water Quality," of this Draft EIR, will be implemented at proposed project areas during all construction activities. The City will consult with the Central Valley Regional Water Quality Control Board to acquire the appropriate regulatory approvals that may be necessary to obtain Section 401 water quality certification, State Water Board statewide NPDES stormwater permit for general construction	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		activity, and any other necessary site-specific waste discharge requirements (WDRs) or waivers. As required under the NPDES stormwater permit for general construction activity, the City will prepare and submit the appropriate Notice of Intent (NOI) and prepare the SWPPP and any other necessary engineering plans and specifications for pollution prevention and control. The SWPPP and other appropriate plans shall identify and specify the use of erosion and sediment control BMPs, means of waste disposal, implementation of approved local plans, non-stormwater management controls, permanent post-construction BMPs, and inspection and maintenance responsibilities. BMPs will include dust control measures such as wetting the top layer of exposed soils and covering soil stockpiles, as necessary. ► The SWPPP would also specify the pollutants that are likely to be used during construction that could be present in stormwater drainage and non-stormwater discharges. A sampling and monitoring program would be included in the SWPPP that meets the requirements of State Water Board Order 99-08-DWQ to ensure that the BMPs are effective. ► Prior to issuance of any grading permits, construction techniques will be identified that would reduce the potential for runoff, and the plan shall identify the erosion and sedimentation control measures to be implemented. The SWPPP shall also specify spill prevention and contingency measures, identify the types of materials used for equipment operation, and identify measures to prevent or clean up spills of hazardous materials used for equipment operation and hazardous waste. Emergency procedures for responding to spills shall also be identified. BMPs identified in the SWPPP shall be used in all subsequent site development activities. The SWPPP shall identify personnel training requirements and procedures that would be used to ensure that workers are aware of permit requirements and proper installation and performance inspection methods for BMPs specified in the SWPPP. The SWPPP shall also identify the appropriate personnel responsible for supervisory duties related to implementation of the SWPPP. All construction contractors shall retain a copy of the approved SWPPP on the construction site.	

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.7-4: Risks to People and Structures Resulting from Unstable Soil Conditions. Soils in the southwest portion of the project area have a very high clay content and are rated by the NRCS as highly plastic with a high shrink-swell potential. Therefore, it is possible that expansive soils identified in the southwest portion of the project area could damage wastewater collection system, effluent outfall, and recycled water distribution system pipelines and related structures. Because expansive soils are located in the southwest portion of the project area and groundwater levels in the project area are high, this would be a potentially significant impact.	PS	**4.7-4: Risks to People and Structures Resulting from Unstable Soil Conditions.** The City shall implement Mitigation Measure 4.72, described above, to reduce the risks to people and structures resulting from unstable soil conditions in the proposed project area.	LTS
4.7-5: Risk of Structural Damage Caused by Corrosive Soils. The corrosiveness of project area soils was not tested to determine whether the soils could cause damage to buried concrete slabs and foundations and buried metal pipes during the operation of the proposed project. However, because the City's engineering design process for the project would ensure the identification of corrosive soils and the implementation of project designs that would minimize damage to buried concrete slabs, foundations, or buried metal pipes, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.7-6: Potential Removal of Mineral Resources. Because sand resources in the project area would not be suitable for aggregate mining, the proposed project would result in less-than-significant impacts to mineral resources.	LTS	No mitigation is necessary.	LTS
4.8 Paleontological Resources			
4.8-1: Disturbance of Paleontological Resources During Earthmoving Activities. Although no previously recorded paleontological sites are known to occur at the WQCF site, pumping station sites, or within the proposed collection system and recycled water distribution system pipeline routes, previously undiscovered paleontological resources could be present in sediments of the Modesto Formation that underlie the project area. In addition, fossils have been found at excavations in similar soils less than 2 miles from the project area.	PS	**4.8-1: Disturbance of Paleontological Resources during Earthmoving Activities.** For earthmoving activities at the project area, the City will implement the following measures: (1) Before the start of construction activities, construction personnel involved with earthmoving activities shall be informed of the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction activities, and proper notification procedures should fossils be encountered. This training shall be prepared and presented by a qualified	LTS

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Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Therefore, construction activities could potentially disturb unknown subsurface paleontological resources. This would be a potentially significant impact.		paleontologist or archaeologist. (2) If paleontological resources are discovered during earthmoving activities, the construction crew shall immediately cease work in the vicinity of the find and the City Public Works Department shall be notified. The City will retain a qualified paleontologist to evaluate the resource and prepare a proposed recovery plan in accordance with Society of Vertebrate Paleontology guidelines (1995). The recovery plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recovery of identified resources will be implemented by the City before construction activities resume at the site.	
4.9 Hydrology and Water Quality			
4.9-1: Effects on Potential On-site and Off-site Flooding Risk from Increased Stormwater Runoff. The project would result in the generation of minor volumes of additional stormwater; however, adequate stormwater capacity would be available to covey increased stormwater generated by the project, and the project would not increase the potential for on-site or off-site flooding during storm events. This would be a less-than-significant impact.	LTS	No mitigation is necessary.	LTS
4.9-2: Reduction in Groundwater Recharge. The City of Manteca does not serve as a substantial groundwater recharge area. Therefore, proposed development would result in a less-than-significant groundwater recharge impact.	LTS	No mitigation is necessary.	LTS
4.9-3: Effects of Potential Off-site Flooding Risk from Increased Treated Effluent Discharge. Project implementation would increase the amount of treated effluent discharged into the San Joaquin River; however, the incremental amount of treated effluent (i.e., up to 17.13 mgd) discharged into San Joaquin River would not be substantial in relation to the total flow rate of the San Joaquin River. Therefore, the project would not cause flooding downstream of the WQCF along the San Joaquin River. This is considered a less-than-significant impact.	LTS	No mitigation is necessary.	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.9-4: Effects of Proposed Project Discharge on Biochemical Oxygen Demand (BOD) Concentrations in Receiving Waters. The project is projected to reduce effluent BOD concentrations compared to the existing WQCF discharge concentrations and projected concentrations would be below the City's existing adopted NPDES effluent limitation, which has been established by the RWQCB to be protective of water quality. Therefore, this impact is considered less than significant.	LTS	No mitigation is necessary.	LTS
4.9-5: Effects of Proposed Project Discharge on Biochemical Oxygen Demand (BOD) Concentrations in Receiving Waters. The project is projected to reduce effluent BOD concentrations compared to the existing WQCF discharge concentrations and projected concentrations would be below the City's existing adopted NPDES effluent limitation, which has been established by the RWQCB to be protective of water quality. Therefore, this impact is considered less than significant.	LTS	No mitigation is necessary.	LTS
4.9-6: Effects of Proposed Project Discharges on Total Aluminum Concentrations in Receiving Waters. The proposed WQCF upgrades would be designed and operated to comply with the NPDES permit effluent limits for total aluminum. Available science indicates that effluent limits substantially greater than the proposed discharge concentrations under the project would be sufficiently protective of the beneficial uses of the San Joaquin River. Because the project's discharge concentrations of aluminum would be substantially below discharge concentrations shown by available scientific studies to be protective of water quality, the project would result in less-than-significant aluminum impacts.	LTS	No mitigation is necessary.	LTS
4.9-7: Effects of Proposed Project Discharges on Electrical Conductivity Concentrations in Receiving Waters. Because the project would result in minor increases in EC in the San Joaquin River at full buildout (27 mgd) and effluent concentrations would be below established EC water quality objectives during agricultural and nonagricultural seasons, the	LTS	No mitigation is necessary.	LTS

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Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
project would not result in significant EC water quality impacts. Therefore, the project's near-field EC impacts would be less than significant.			
4.9-8: Effects of Proposed Project Discharges on Ammonia (as Nitrogen) Concentrations in Receiving Waters. The near-field modeling analysis indicates that projected, median ammonia concentrations in the San Joaquin River would be below the more stringent U.S. EPA ambient water quality criteria for ammonia. Concentrations would be lower than the chronic criterion of 0.62 mg/l during the June through September time period and substantially lower than the acute criterion of 5.62 mg/l during the October through May time period. Therefore, the project's near-field ammonia impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-9: Effects of Proposed Project Discharges on Arsenic (Dissolved) Concentrations in Receiving Waters. The project would be designed and operated to comply with the NPDES permit effluent limits for dissolved arsenic and projected dissolved arsenic concentrations would be substantially below adopted water quality objectives. Therefore, the project's near-field arsenic concentrations would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-10: Effects of Proposed Project Discharges on Copper (Dissolved) Concentrations in Receiving Waters. The project would be designed and operated to comply with the NPDES permit effluent limits for dissolved copper and would result in downstream dissolved copper concentrations that are substantially below adopted water quality objectives. Therefore, the project's near-field copper impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-11: Effects of Proposed Project Discharges on Cyanide (Total) Concentrations in Receiving Waters. The project would be designed and operated to comply with the NPDES permit effluent limits for total cyanide and would result in downstream cyanide concentrations that are substantially below adopted water quality objectives. Therefore, the project's near-field cyanide impacts would be less than significant.	LTS	No mitigation is necessary.	LTS

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Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.9-12: Effects of Proposed Project Discharges on Iron (Dissolved) Concentrations in Receiving Waters. Dissolved iron mass loading to the San Joaquin River is projected to be slight relative to existing in-stream loads. Projected dissolved iron concentrations in the San Joaquin River would be substantially below the Basin Plan objective of 300 µg/l and mass loadings would be minor compared to measured upstream dissolved iron concentration. The project would be designed and operated to comply with the NPDES permit effluent limits for dissolved iron would result in downstream dissolved iron concentrations that are substantially below adopted water quality objectives. Therefore, the project's near-field iron impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-13: Effects of Proposed Project Discharges on Manganese (Dissolved) Concentrations in Receiving Waters. Dissolved manganese mass loading to the San Joaquin River is projected to be slight relative to existing in-stream loads. Additionally, projected dissolved iron concentrations in the San Joaquin River are substantially below adopted Basin Plan objective. The project would be designed and operated to comply with the NPDES permit effluent limits for dissolved manganese would result in downstream dissolved iron concentrations that are substantially below adopted water quality objectives. Therefore, the project's near-field manganese impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-14: Effects of Proposed Project Discharges on Methylene Blue Active Substances (MBAS) Concentrations in Receiving Waters. The project would be designed and operated to comply with the NPDES permit effluent limits for MBAS, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. The proposed project is projected to produce treated effluent having an average total manganese concentration of 160 µg/l, which is well below the adopted Basin Plan objective. Therefore, the project's near-field MBAS impacts would be less than significant.	LTS	No mitigation is necessary.	LTS

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Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.9-15: Effects of Proposed Project Discharges on Nitrate (as Nitrogen) Concentrations in Receiving Waters. The project would be designed and operated to comply with the NPDES permit effluent limits for nitrate, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. Projected nitrate concentrations would be well below the adopted Basin Plan objective of 10 mg/l. Therefore, the project's near-field nitrate impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-16: Effects of Proposed Project Discharges on Nitrite (as Nitrogen) Concentrations in Receiving Waters. The project would be designed and operated to comply with the NPDES permit effluent limits for nitrite, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. Projected nitrite concentrations at the point of discharge and downstream of the WQCF outfall would be equal to or below adopted Basin Plan objectives. Therefore, the project's near-field nitrite impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-17: Effects of Proposed Project Discharges on Mercury (Total) Concentrations in Receiving Waters. The incremental change in total mercury concentration in the San Joaquin River due to an increase in proposed Project effluent would be slight and below the magnitude of change that could be reliably measured in the field. Additionally, projected, median total mercury concentrations in the San Joaquin River are well below the CTR Human Health criterion of 0.051 µg/L. The proposed project WWTP upgrades would be designed and operated to comply with the NPDES permit effluent limits for mercury, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. This impact is considered less than significant.	LTS	No mitigation is necessary.	LTS
4.9-18: Effects of Project Discharges on Pathogens in Receiving Waters. The project would improve treatment performance for pathogen removal in the treated effluent discharged to the San Joaquin River compared to the existing WQCF operations through the operation of a UV disinfection system. The project would be designed and operated to comply	LTS	No mitigation is necessary.	LTS

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Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
with the NPDES permit limits for total coliform bacteria. Consequently, discharge to the San Joaquin River under the project would contain pathogen levels sufficiently low to be protective of human health. Therefore, this impact is considered less than significant.			
4.9-19: Effects of Proposed Project Discharges on Dissolved Oxygen Concentrations in Receiving Waters. Dissolved oxygen (DO) concentrations in the San Joaquin River and Delta with buildout of the WQCF (27 mgd) would not differ substantially from those that would occur under future or existing baseline conditions. Any minor effects that may occur due to the proposed project would constitute a less-than-significant impact to water quality. This impact is considered less than significant.	LTS	No mitigation is necessary.	LTS
4.9-20: Effects of Proposed Project Discharges on Electrical Conductivity (EC) Concentrations in Receiving Waters. Modeling results for EC corresponding to critical and dry/ below normal water years, respectively, demonstrated that the incremental change in EC concentrations at the selected sites would be no greater than 2 µmho/cm with buildout of the WQCF (27 mgd). Further, EC levels at far-field monitoring locations would be substantially below adopted Basin Plan water quality objectives. Therefore, the project's far-field EC impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-21: Effects of Proposed Project Discharges on Dissolved Organic Carbon (DOC) Concentrations in Receiving Waters. Projected incremental changes in DOC concentrations at far-field monitoring locations would be less than 1 percent during critical water years and less than 3 percent during dry/below normal water years. These changes would not be substantial in relation to existing DOC concentration. Therefore, the project's far-field DOC impacts would be less than significant.	LTS	No mitigation is necessary.	LTS

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Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
4.9-22: Effects of Proposed Project Discharges on Nitrate (as Nitrogen) Concentrations in Receiving Waters. Modeling results for nitrate as nitrogen corresponding to critical and dry/ below normal water years, respectively, demonstrated that, for both water year types the calculated change in nitrate as nitrogen at the selected sites is estimated to be no greater than 0.05 mg/l with buildout of the WQCF (27 mgd). Median nitrate concentrations at far-field monitoring locations would all be substantially below adopted Basin Plan objectives. Therefore, the project's far-field nitrate impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.9-23: Construction and Operation of the Proposed Master Plan Facilities and Control of Stormwater Runoff. The proposed project would involve updating and implementing a stormwater pollution prevention plan to assure compliance with applicable stormwater discharge permits. These and related actions (e.g., implementation of construction BMPs) that would be taken as part of and/or in response to the proposed project would minimize the impact of construction and operational stormwater quality impacts. Therefore, the project would result in a less-than-significant impact stormwater quality impacts.	LTS	No mitigation is necessary.	LTS
4.10 Public Services and Utilities			
4.10-1: Impacts on Water Supplies. The proposed project would increase demand for potable and nonpotable water at the WQCF at rates that could be accommodated by existing and planned potable and nonpotable water supply facilities. Therefore, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.10-2: Increased Generation of Solid Waste. The proposed project would not substantially increase the amount of solid waste generated at the WQCF related to the total capacity of the Forward Landfill. Waste generated by the WQCF from implementation of the proposed project would be less than 0.1% of the Forward Landfill's permitted capacity. In addition, staff at the Forward Landfill have indicated that the landfill has sufficient capacity to accommodate increased solid waste	LTS	No mitigation is necessary.	LTS

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demands from the WQCF at project buildout. Therefore, the project's solid waste impact would be less than significant.			
4.10-3: Increased Demand for Electricity and Natural Gas. Implementation of the proposed project would increase demand for energy in the city. However, the energy demands created by the project would not be substantial in relation to the total energy currently supplied by PG&E in its northern and central California service area or total energy demands expected in the future, and proposed energy improvements would be required to comply with existing City, PG&E, and applicable Uniform Building Code requirements. Therefore, this impact would be less than significant.	LTS	No mitigation is necessary.	LTS
4.10-4: Increased Demand for Fire Protection and Police Services. Implementation of the proposed project would not require additional fire protection or police services. The City of Manteca police and fire departments would be able to serve the project and meet established performance standards. Therefore, the project's impacts on fire protection and police services would be less than significant.	LTS	No mitigation is necessary.	LTS
4.10-5: Impacts on Existing Utility Corridors. Implementation of the proposed project could potentially disrupt existing aboveground and underground utility facilities in the project area, resulting in interruption of service. This would be a potentially significant impact.	PS	**4.10-5: Impacts on Existing Utility Corridors.** PG&E owns and operates gas and electric facilities that are located within and adjacent to the proposed project area. To promote the safe and reliable maintenance and operation of utility facilities, the California Public Utilities Commission (CPUC) has mandated specific clearance requirements between utility facilities and surrounding objects or construction activities. To ensure compliance with these standards, the City of Manteca will coordinate with PG&E early in the development of project plans. Any proposed development plans will provide for unrestricted utility access and prevent easement encroachments that might impair the safe and reliable maintenance and operation of PG&E's facilities. The requesting party will be responsible for the costs associated with the relocation of existing PG&E facilities to accommodate the development of the proposed project. Because facilities relocations require long lead times and are not always feasible, the City will consult with PG&E as early in the planning stages as possible.	LTS

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		Relocations of PG&E's electric transmission and substation facilities (50,000 volts and above) could also require formal approval from CPUC. If required, this approval process could take up to 2 years to complete. The City will consult with PG&E for additional information and assistance in the development of its project schedule to reduce effects on utility service associated with project development.	
4.11 Transportation and Circulation			
4.11-1: Increased Vehicle Trips or Traffic Congestion During Construction. The project would generate up to 180 one-way construction-related vehicle trips per day associated with construction of the proposed WQCF improvements and up to 114 one-way construction-related vehicle trips associated with construction of proposed pipelines and pumping stations over the course of the planning period. Construction-related WQCF, pipeline, and pumping station trips would represent approximately 1.6%–7% of existing traffic volumes on area roadways. These trips would be temporary and would cease once project construction is complete, would not substantially degrade existing levels of service, and would not increase congestion at nearby intersections. Therefore, the project's construction-related traffic impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.11-2: Potential Increase in Long-Term Operational Traffic. The project would generate 20 additional one-way employee passenger vehicle trips per day and less than one truck haul trip per day (approximately two truck haul trips per week). These trips represent less than 1.0% of existing traffic volumes on local roadways and would not decrease the LOS of these roadways. Therefore, long-term operational traffic impacts would be less than significant.	LTS	No mitigation is necessary.	LTS
4.11-3: Potential for Inadequate Parking Capacity. Implementation of the proposed project would result in the creation of a small demand for additional parking spaces during the regular working shift at the WQCF. However, adequate space is available at the WQCF site for additional parking	LTS	No mitigation is necessary.	LTS

LTS = Less than Significant S = Significant PS = Potentially Significant SU = Significant and Unavoidable

Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
spaces, and additional parking spaces would be included in final project design. Adequate space also exists in the project area to adequately accommodate vehicles and equipment associated with construction of pumping stations, the outfall pipeline, and pipelines for the wastewater collection system and recycled-water distribution system. Therefore, the proposed project would not result in inadequate parking capacity. This impact would be less than significant.			
4.11-4: Increase in Hazards because of a Design Feature. No permanent design features are proposed that would increase hazards for pedestrians, bicyclists, or drivers. Standard construction practices (i.e., cones, signage, traffic controllers) would be employed during project construction to minimize any potential hazards. However, construction-related vehicle trips associated with construction of the proposed WQCF improvements, outfall pipeline, pumping stations, and pipelines for the wastewater collection system and recycled-water distribution system may block some roadways and result in the queuing of vehicles on area roadways. This could increase the potential for vehicle accidents and could temporarily increase response times for emergency service vehicles. Therefore, this impact would be potentially significant.	PS	**4.11-4: Increase in Hazards because of a Design Feature.** Before commencement of any construction activities, the City of Manteca Public Works Department will prepare and approve a construction management plan. The plan will identify the timing of construction and the timing of elements that would result in the full or partial blockage of local roadways. The plan will indicate where emergency vehicle access to project facilities would be provided, and will also outline the procedures for coordination with emergency service providers before project construction and road closures. The plan will also specify the measures that would be implemented to minimize traffic-related impacts, including construction parking during construction. These measures could include, but are not limited to, use of signage notifying travelers that they are entering a construction zone; and use of cones, flaggers, and guide vehicles to direct traffic through the construction zone. In addition, the plan will include, at a minimum, the following conditions: 1. Before beginning any construction activities, the City will determine the roadways that will receive project-related construction traffic for the transport of materials and equipment to the WQCF and those roadways in which new pipeline would be installed. 2. The City will document existing pavement conditions through photographs of roadways identified in item 1 above. The photographs will identify general views of pavement conditions as well as document specific locations of where there are current deficiencies in pavement conditions. These photos will be retained on file at the WQCF. 3. This City will monitor the condition of roadways identified in	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		item 1 above every 6 months to determine whether any pavement degradation (e.g., potholes, pavement separation) has occurred from preconstruction conditions. 4. Where roadways show evidence of degradation below acceptable standards as determined by the City Department of Public Works, the City will repair degraded sections to acceptable standards. 5. Lane closures will be identified including specific times of closure. All lane closures will be limited to the hours between 9 a.m. and 4 p.m. A copy of the plan will be submitted to local emergency response agencies and these agencies will be notified at least 14 days before the commencement of construction that would partially or fully obstruct local roadways. The City Public Works Department will ensure that project contractors adhere to the provisions of the plan and maintain a copy of the plan at project construction sites.	
4.12 Cultural Resources			
4.12-1: Damage to or Destruction of Documented Cultural Resources in Surveyed Areas. The entire project area, with the exception of a 3.35-mile portion of the pipeline route for the proposed wastewater collection system and a 1.5-mile portion of the pipeline alignment for the proposed recycled-water distribution system, has been surveyed for cultural resources. Archival and field research has demonstrated that there are no known archaeological or historical resources within the surveyed project area. Because there are no known recorded archaeological sites, features, or artifacts or historical resources within the surveyed portion of the project area, the project's impact on known archaeological and historical resources would be less than significant.	LTS	No mitigation is necessary.	LTS
4.12-2: Damage to or Destruction of Undiscovered Cultural Resources. Portions of the project area (including a 3.35-mile segment of the pipeline route for the proposed wastewater collection system and a 1.5-mile portion of the pipeline	PS	**4.12-2: Damage to or Destruction of Undiscovered Cultural Resources.** Before the beginning of any project construction activity that could affect the previously unsurveyed portions of the project site, qualified archaeologists shall survey all portions of the site that	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
alignment for the recycled-water distribution system) could not be surveyed because access to these areas was limited. CCIC records searches did not indicate presence of known cultural resources in these areas; however, because these areas could not be surveyed, the potential exists to uncover previously undiscovered resources during project construction. Furthermore, construction-related subsurface disturbances could potentially destroy or damage previously undiscovered prehistoric or historic cultural resources at the wastewater quality control facility (WQCF), pumping station sites, and side-bank outfall site, and along the pipeline alignments. Because these resources have the potential to represent "unique archaeological resources" or "historic resources" as defined by CEQA, this impact would be potentially significant.		were not examined during intensive surveys for the current effort, including unsurveyed portions of the pipeline alignment for the recycled-water distribution system (0.96 mile in the central portion of the project area between Swanson Road and West Center Street north of Yosemite Avenue, and 0.54 mile in the southwestern portion of the project area south of Woodward Avenue), pumping station sites, the side-bank outfall site, and approximately 3.35 miles of the pipeline alignment for the proposed wastewater collection system (2.05 miles in the southwestern portion of the project site near the intersection of Peach Avenue and Airport Way, and approximately 1.3 miles in the center of the western portion of the project area between Yosemite and Louise Avenues, and west of Airport Way). The survey shall be conducted during a time when the affected sites can be plowed and disked, so the natural ground surface can be examined for traces of prehistoric and/or historic-era cultural resources. Surveys of these areas are not necessary if it is determined that the areas would not be affected by project construction-related activity, including equipment staging or material stockpiling. Before the onset of project-related ground-disturbing activities (e.g., land clearing), all construction personnel shall be alerted to the possibility of uncovering buried cultural resources and shall be educated by a qualified archaeologist as to identification of archaeological artifacts. If an inadvertent discovery of cultural materials (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, structure/building remains) is made during project-related construction activities, ground disturbances in the area of the find shall be halted and a qualified professional archaeologist shall be notified regarding the discovery. The archaeologist shall determine whether the resource is potentially significant as per the CRHR and shall develop appropriate mitigation.	
4.12-3: Discovery of Human Remains during Construction. Although no evidence suggests that buried human remains would be encountered during project construction, the potential exists for buried human remains to be encountered and for construction activities to result in damage to or destruction of such remains. This impact would be potentially significant.	PS	**4.12-3: Discovery of Human Remains during Construction.** California law recognizes the need to protect interred human remains, particularly Native American burials and associated items of patrimony, from vandalism and inadvertent destruction. The procedures for the treatment of discovered human remains are contained in Sections 7050.5 and 7052 of the California Health and	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		Safety Code and PRC Section 5097. In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, all such activities within a 100-foot radius of the find shall be halted immediately and the City shall be notified. The City shall immediately notify the county coroner and a qualified professional archaeologist. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact the Native American Heritage Commission by phone within 24 hours of making that determination (Health and Safety Code Section 7050[c]). The City's responsibilities for acting after notification that Native American human remains were discovered are explained in detail in PRC Section 5097.9. The City of Manteca or its appointed representative and the professional archaeologist shall contact the Most Likely Descendant (MLD), as determined by the NAHC, regarding the remains. The MLD, in cooperation with the property owner and the lead agencies, shall determine the ultimate disposition of the remains.	
4.13 Fisheries and Aquatic Resources			
4.13-1: Potential for Thermal Plume below the Discharge Outfall to Block or Substantially Delay the Upstream Spawning Migrations of Fishes. A thermal plume currently exists in the San Joaquin River immediately downstream of the Manteca WQCF discharge outfall, but is not believed to block or substantially delay the upstream spawning migrations of fishes due to a relatively large zone of passage that is present during all months of the year, under all conditions. At full build-out (27 mgd capacity), the proposed project would result in increased plume size and changes to certain aspects of the plume's internal characteristics (e.g., temperature contours) and/or the frequency with which specific characteristics would occur, relative to the existing (permitted) condition. However, a viable zone of passage for all migrating fish species would be maintained under worst-case conditions with implementation of the proposed	LTS	No mitigation is necessary.	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
project. Based on these findings, the proposed project would have a less-than-significant impact on the upstream spawning migrations of adult fishes.			
4.13-2: Thermal Effects on Fish and Benthic Macroinvertebrates Exposed to the Plume While Moving Downstream Past the Discharge Outfall. At full build-out, the proposed project would result in a thermal plume of increased temperatures, relative to the ambient temperatures, across portions of the water column, under all conditions, that is larger than the thermal plume that currently exists (and permitted) downstream of the discharge outfall. The project-specific changes to the size and characteristics of this plume would be considerable, as would project-specific effects on the frequency with which specific plume characteristics occur. A zone of passage would remain along the west bank river margin of the water column where river temperatures are unaffected by discharges. When achievable, actively swimming young-of-the-year fishes emigrating from upstream rearing areas would select migration routes past the discharge outfall that avoid elevated temperatures and excessive temperature differentials. The macroinvertebrate communities inhabiting the sediments and drifting through the plume are generally tolerant of the absolute temperature regime and differences created by the proposed project, particularly for the relatively short period of time they would be drifting through the plume. However, passively drifting fish are typically transported past the discharge in the near-shore habitats and along the upper portion of the water column, both of which are noticeably affected by the effluent plume. Based on the findings for passively drifting fish being noticeably affected by the thermal plume, the proposed project would have a potentially significant impact on the populations and communities of fish moving downstream in the lower San Joaquin River and Delta.	PS	**4.13-2: Thermal Effects on Fish and Benthic Macroinvertebrates Exposed to the Plume While Moving Downstream Past the Discharge Outfall.** The City of Manteca will design, install, and operate a treated effluent cooling tower or an equivalent technology that cools treated effluent prior to discharge into the San Joaquin River. The cooling tower or equivalent technology will be designed to reduce the temperature of the treated effluent by up to 15°F such that the effluent discharge and associated size and intensity of the thermal plume will not result in adverse thermal affects to the health and/or condition of sensitive fish species and will comply with all California Thermal Plan Objectives, which have been established to be protective of beneficial uses. The reduction in temperature of the treated effluent will prevent the creation of a lethal zone or plume, defined as water temperatures that are at or above the lethal effects levels (i.e., >68°F) during time periods when the most sensitive fish species would be in the vicinity of the WQCF outfall (i.e., from January to May) and ambient background temperatures are at or below these lethal effects levels. Because the ambient water temperature of the San Joaquin River can exceed the >68°F lethal effects threshold during the later portion of the time period when sensitive species are present (e.g., April and May), the temperature of the treated effluent produced by the cooling tower or equivalent technology may be greater than ambient background river temperatures under these conditions and during these periods. This could result in conditions where the plume exceeds the lethal effects threshold; however, with implementation of the cooling tower or equivalent technology, the size and intensity of the plume will be minimized resulting in only short-term exposure (through reduced plume size) to marginally increased water temperatures. Because sensitive fish species have been documented (Moyle 2002, Bartholow and Henricksen 2004, Bjorn and Reiser 1991) to survive exposure to higher temperatures (beyond lethal effects thresholds) for short periods of time, substantial adverse impacts to fish would not occur.	LTS

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Table 2-2
Summary of Impacts and Mitigation Measures

Impacts	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
		Furthermore, the cooling tower or equivalent technology will be designed to cool treated effluent to meet all California Thermal Plan objectives that were established, in part, to be protective of beneficial uses including cold water fish habitat. The cooling tower or equivalent technology cooling capacity of 15°F would achieve an effluent temperature within 3°F to 4°F of the ambient river temperature. Before the design of the cooling tower or equivalent technology is finalized, the City of Manteca will obtain the approval of the RWQCB indicating that the cooling tower or equivalent technology design is adequate to address concerns regarding discharge of higher temperature treated effluent into the San Joaquin River. The cooling tower or equivalent technology will be constructed, installed, and operated in accordance with the approved final design prior to operating the WQCF at the expanded capacity (i.e., greater than 9.87 mgd ADWF).	
4.13-3: Population- or Community-level Effects to Fish or Macroinvertebrates from the Incremental Increase in Downstream Water Temperatures (Fully Mixed Condition). The proposed project would result in small incremental increases in the fully mixed San Joaquin River/Delta water temperatures downstream of the discharge outfall. Under all conditions above critical water year flow rates, the proposed project at full build-out condition would result in a fully mixed regime downstream of the discharge that is near equivalent to that under the existing permitted condition (<1% effluent contribution). These effluent contributions would result in negligible incremental increases in downstream water temperatures. Based on these findings, the proposed project would have a less-than-significant impact to fully mixed lower San Joaquin River/Delta water temperatures.	LTS	No mitigation is necessary.	LTS

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3 PROJECT DESCRIPTION

3.1 PROJECT LOCATION

Manteca is located at the northern end of the San Joaquin Valley in central California, at the junction of State Route (SR) 99 and SR 120, approximately 75 miles east of San Francisco and 55 miles south of Sacramento. The existing City of Manteca Wastewater Quality Control Facility (WQCF) is located approximately 2.5 miles west of downtown Manteca at 2450 West Yosemite Avenue (Exhibits 3-1 and 3-2). Improvements proposed as part of the WQCF and Collection System Master Plans Update Project would generally be located at the existing WQCF site and within existing or proposed right-of-way within the City of Manteca, as shown on Exhibit 3-2.

The WQCF occupies approximately 22 acres of a 210-acre City of Manteca (City)-owned site, which is bounded generally by Yosemite Avenue to the north, SR 120 to the south, Airport Way to the east, and both McKinley Avenue and the Union Pacific Railroad to the west. The proposed WQCF expansion and upgrades would primarily be located within the existing 22-acre WQCF site. A proposed treated effluent outfall pipeline would extend from the WQCF to a side-bank outfall structure at the San Joaquin River.

Proposed wastewater collection system improvements would generally be located along the perimeter of the city. Local roadways in the vicinity of the proposed wastewater collection system trunk sewers include Woodward Avenue, Lathrop Road, and Airport Way. As shown on Exhibit 3-3, the proposed project would result in the construction of three large diameter trunk sewers in and around the city. Trunk sewers in the north and south would collect wastewater from areas where future growth is expected, while a central trunk sewer would connect the City's existing wastewater collection system to the north trunk sewer. A proposed recycled water distribution system would primarily follow Woodward Avenue, Airport Way, and Center Street (Exhibit 3-3).

Agricultural land surrounds the WQCF site on all sides. Beyond that, land uses near the WQCF include residential development to the north, east, and west. Also located to the north is light industrial and commercial development. A "Big League Dreams" sports complex and commercial development is located to the south. Land uses along the proposed wastewater collection system and recycled water distribution system pipeline alignments include a mixture of commercial, residential, park and open space, and agricultural land uses.

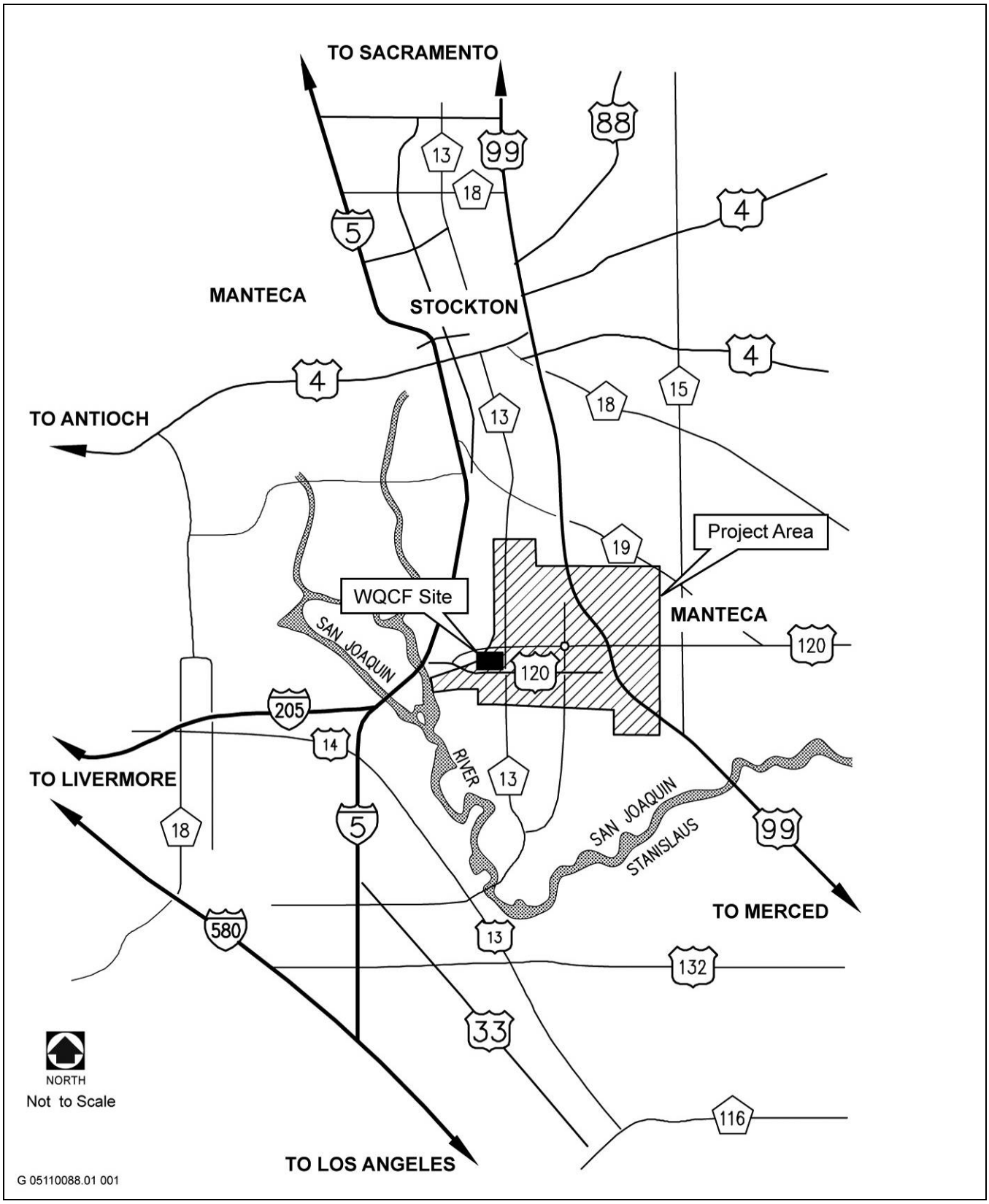
3.2 PROJECT PROPONENT

The City proposes to adopt the WQCF and Collection System Master Plans Update Project (project), which incorporates both the 2007 City of Manteca Wastewater Quality Control Facility Master Plan Update and the 2006 City of Manteca Wastewater Collection System Master Plan Update. The City would be the lead agency and project proponent, and the Manteca City Council would be the body that considers certification of the EIR and approval of the project.

3.3 PROJECT BACKGROUND AND HISTORY

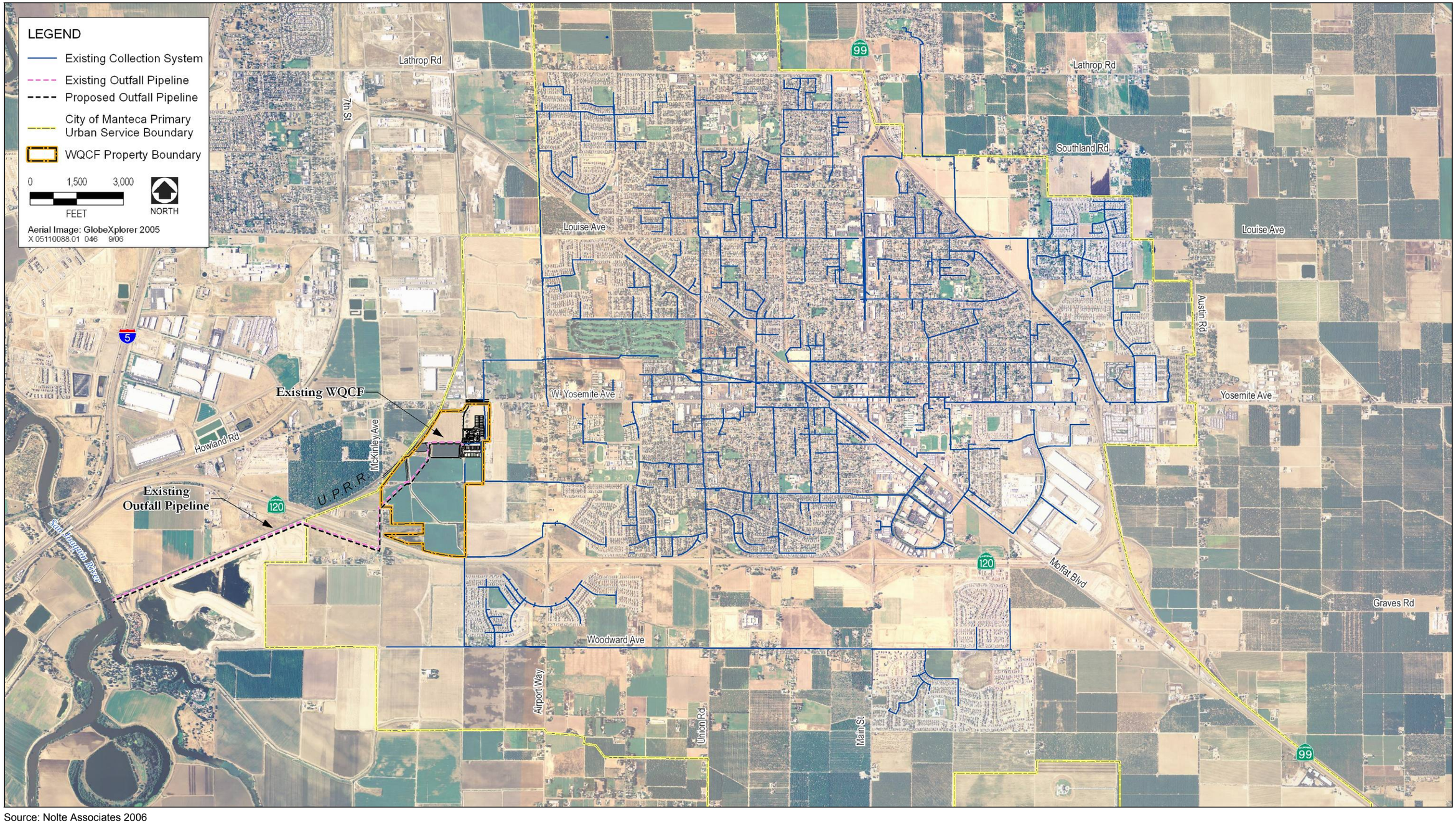
3.3.1 WASTEWATER QUALITY CONTROL FACILITY

The Manteca WQCF has expanded several times since operations began in 1959. From 1986 to 1988, a major expansion to the plant known as Phase I was constructed. The Phase I expansion project included the construction of secondary treatment facilities, anaerobic sludge digesters, sludge drying beds, a chlorine disinfection system, and an outfall to the San Joaquin River. Design capacity of the plant following the Phase I project was 5.45 million gallons per day (mgd) average dry-weather flow (ADWF). A Phase II expansion project was constructed in 1992–1993 and resulted in the addition of a primary sedimentation basin, a secondary clarifier, and four sludge drying beds, increasing capacity to 6.95 mgd ADWF.



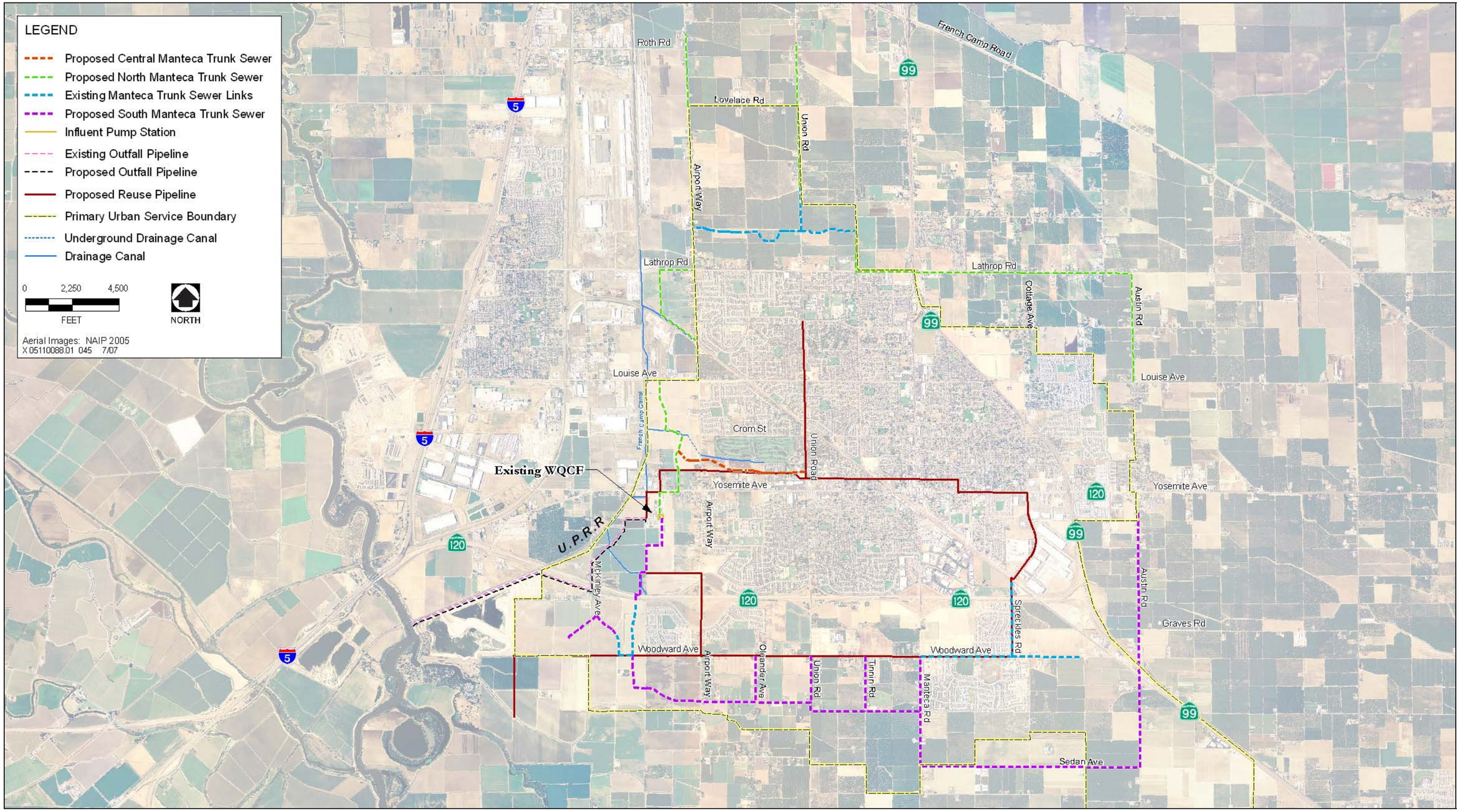
Sources: Nolte Associates 2007, adapted by EDAW in 2007

Regional Location Map **Exhibit 3-1**



Source: Nolte Associates 2006

Project Vicinity **Exhibit 3-2**



Source: Nolte Associates 2006

Proposed Project Components **Exhibit 3-3**

Additional WQCF capacity increases were considered in the 1995 *City of Manteca Wastewater Quality Control Facility Master Plan*. The 1995 WQCF Master Plan contemplated further expansion projects, including the Phase III and IV expansion projects (now referred to as the "Phase III improvements"). The Phase III improvements included the construction of nitrification facilities (increasing plant capacity from 6.95 to 7.5 mgd ADWF), improving primary and secondary treatment facilities including denitrification (increasing capacity from 7.5 to 9.87 mgd ADWF), and constructing wastewater filtration and ultraviolet (UV) disinfection facilities for tertiary treatment.

Several Phase III improvements have been completed. The City has divided Phase III improvements into four schedules: A, B, C, and D. Schedule A and B improvements have been completed. Schedule A improvements included two new aeration basins, three modified mechanisms for secondary clarifier sludge collection, two new centrifugal blowers, and a skid-mounted centrifugal dewatering system. Schedule B improvements included a new influent pump station, two aerated grit tanks, three primary sedimentation basins, five aeration basins, two secondary clarifiers, an odor control biofilter, and an expanded laboratory and administration building. Schedule C improvements, which are scheduled to begin construction in August 2007, include a sludge-control building, a mechanical dewatering facility, and a shop maintenance building. Schedule D improvements are currently being constructed at the WQCF. Schedule D improvements include a secondary effluent equalization pond, a filter-feed pump station, coagulation and flocculation facilities, tertiary filters, a chemical storage and handling facility, a UV disinfection system, an effluent pumping station, two odor control biofilters, recycled water pumping stations, a groundwater well, and a construction truck recycled water filling station. Schedule D improvements will allow for the off-line storage and timed discharge of treated effluent to the San Joaquin River.

Schedule D improvements are anticipated to be constructed and operational by September 2007 while Schedule C improvements are anticipated to be constructed and operational by December 2008. It is anticipated that Phase III improvements would satisfy the City's wastewater treatment capacity demands for the next 5–10 years, depending on the buildout rate of proposed development.

In support of a new general plan (the *City of Manteca General Plan 2023* [City general plan], adopted in October 2003) and an updated facilities plan (the 2003 *City of Manteca Public Facilities Implementation Plan*), the City developed the 2007 *City of Manteca Wastewater Quality Control Facility Master Plan Update*. The 2007 WQCF master plan discusses improvements needed to collect, treat, and discharge up to 27 mgd ADWF.

3.3.2 COLLECTION SYSTEM

In 1989, the City developed the *City of Manteca Sewer System Master Plan* to address the 10-year planning period from 1989 to 1999 using information from the City's 1988 general plan. A 1993 master plan known as the *Sewer Master Plan for the City of Manteca Public Facilities Implementation Plan*, addressed the 21-year planning period from 1993 to 2014 and focused on future growth areas. The 1993 sewer master plan proposed construction of north and south trunk sewers to accommodate new service areas, with central and southwest sewers connecting the two.

The City general plan identified areas to be developed within the City to the year 2023, and expanded the collection system service areas (to be served by the north and south trunk sewers) beyond the service areas identified in the 1993 Master Plan. As a result, the north and south trunk sewers would need to be enlarged to accommodate increased wastewater flows. To ensure that the City's collection system can adequately meet the development goals adopted in the 2003 General Plan, the City developed the *City of Manteca Wastewater Collection System Master Plan Update* in August 2006. This collection system master plan is also the subject of this EIR.

3.3.3 PROJECT SCOPE

The 2007 City of Manteca Wastewater Quality Control Facility Master Plan Update was finalized in January 2007, and the 2006 City of Manteca Wastewater Collection System Master Plan Update is in draft form, but with sufficient detail to allow environmental analysis. The master plans identify wastewater treatment and conveyance improvements to support development envisioned in the City general plan up to the secondary urban service boundary (buildout). City buildout is anticipated to occur by the year 2023. The Manteca WQCF and Collection System Master Plans Update Project considered in this EIR encompasses both the 2007 City of Manteca Wastewater Quality Control Facility Master Plan Update and the 2006 City of Manteca Wastewater Collection System Master Plan Update, as described further below.

3.4 PROJECT JUSTIFICATION

The purpose of the 2007 City of Manteca Wastewater Quality Control Facility Master Plan Update and the 2006 City of Manteca Wastewater Collection System Master Plan Update are to provide the City with direction and policy guidance for planning future wastewater collection system and treatment facilities that are essential for meeting changing environmental regulations and future growth demands. The overall goal of the two plans is to provide a phased program of recommended conveyance systems and treatment facilities to accommodate planned growth while maintaining treatment reliability, meeting applicable regulatory requirements, and optimizing costs. In December 2005, wastewater flows at the City of Manteca WQCF averaged approximately 6.0 mgd ADWF. The existing permitted capacity of the WQCF is 9.87 mgd ADWF. Expected buildout ADWF within the areas served by the City of Manteca WQCF is 27 mgd. As wastewater flows and loads increase, additional conveyance system capacity and treatment facilities would be required. Also, potentially more restrictive future discharge requirements may require removal of specific pollutants. The existing City WQCF and collection system capacity is insufficient to accommodate the projected buildout of 27 mgd ADWF.

3.5 PROJECT OBJECTIVES

The master planning process is intended to achieve the following primary objectives:

- provide sufficient conveyance and treatment capacity to meet projected growth within the City of Manteca's WQCF service area through the year 2023;
- provide for orderly and cost-effective expansion of City WQCF facilities and conveyance systems;
- comply with current water quality standards and provide flexibility to address changes in standards and regulations; and
- be sensitive to community concerns in relation to the planning, design, construction, and operation of City WQCF and collection system facilities and programs.

3.6 EXISTING TREATMENT PROGRAMS, PROCESSES, AND FACILITIES

3.6.1 WASTEWATER SERVICE AREA

The Manteca WQCF and collection system serves commercial and residential uses within the City of Manteca, a portion of the City of Lathrop, and one frozen food packager (Eckert Cold Storage). The WQCF is a combined biofilter and activated-sludge wastewater treatment plant that is permitted for treatment and discharge of 9.87 mgd ADWF of wastewater. In accordance with a contractual agreement between the cities of Manteca and Lathrop, 8.42 mgd (or 85.3%) of plant capacity is allocated to the City of Manteca and 1.45 mgd (or 14.7%) is allocated to the City of Lathrop.

The existing collection system generally serves the developed portions of the city, with major trunk sewers located in the core of the city (i.e., the central trunk sewer shed), which is approximately bound by SR 120 to the south, Austin Road to the east, Lathrop Road to the north, and Airport Way to the west. Several residential subdivisions located on the perimeter of the City or beyond the central trunk sewer shed have installed temporary wastewater pump stations and facilities to connect to the central trunk shed. Exhibit 3-2 shows the area served by the WQCF and collection system.

3.6.2 HISTORIC WASTEWATER FLOWS

Wastewater flows to the Manteca WQCF have steadily increased as the population and commercial and industrial activity in and around the city has grown. Average flows to the plant have increased from just over 4 mgd ADWF in 1991, 5.81 mgd ADWF in 2003, and 6.0 mgd ADWF in December 2005.

3.6.3 EXISTING WASTEWATER TREATMENT FACILITIES, PROCESSES, AND COLLECTION SYSTEM FACILITIES

SITE OVERVIEW

The existing collection system alignment is shown on Exhibit 3-2 and a detailed layout of the existing WQCF is shown in Exhibit 3-4. The existing WQCF consists of a preliminary, primary, and secondary treatment system; effluent storage and discharge facilities; disinfection facilities; a solids treatment system; and support facilities. The existing wastewater collection system consists of gravity flow pipes that are 6–60 inches in diameter, force mains that are 6–24 inches in diameter, and 13 wastewater pump stations.

WASTEWATER TREATMENT PROCESS OVERVIEW

The current WQCF is a combined biofilter and activated-sludge plant that treats wastewater using mechanical screening, primary treatment, secondary aeration, settling, chlorine disinfection, and dechlorination. The WQCF treats wastewater to a “secondary level” using a series of mechanical and biological systems to remove wastes. “Secondary level” means that organic wastes are removed by biological treatment with subsequent clarification and disinfection. Small concentrations of contaminants remain in the discharge. Processes employed at the WQCF include raw influent and effluent pumping, primary clarification, aeration and high-rate activated-sludge treatment, disinfection, solids thickening, anaerobic solids digestion, and mechanical dewatering. The treatment processes convert raw wastewater into treated effluent, which is discharged to 190 acres of City-owned agricultural land and the San Joaquin River. A simplified treatment process flow schematic is shown in Exhibit 3-5.

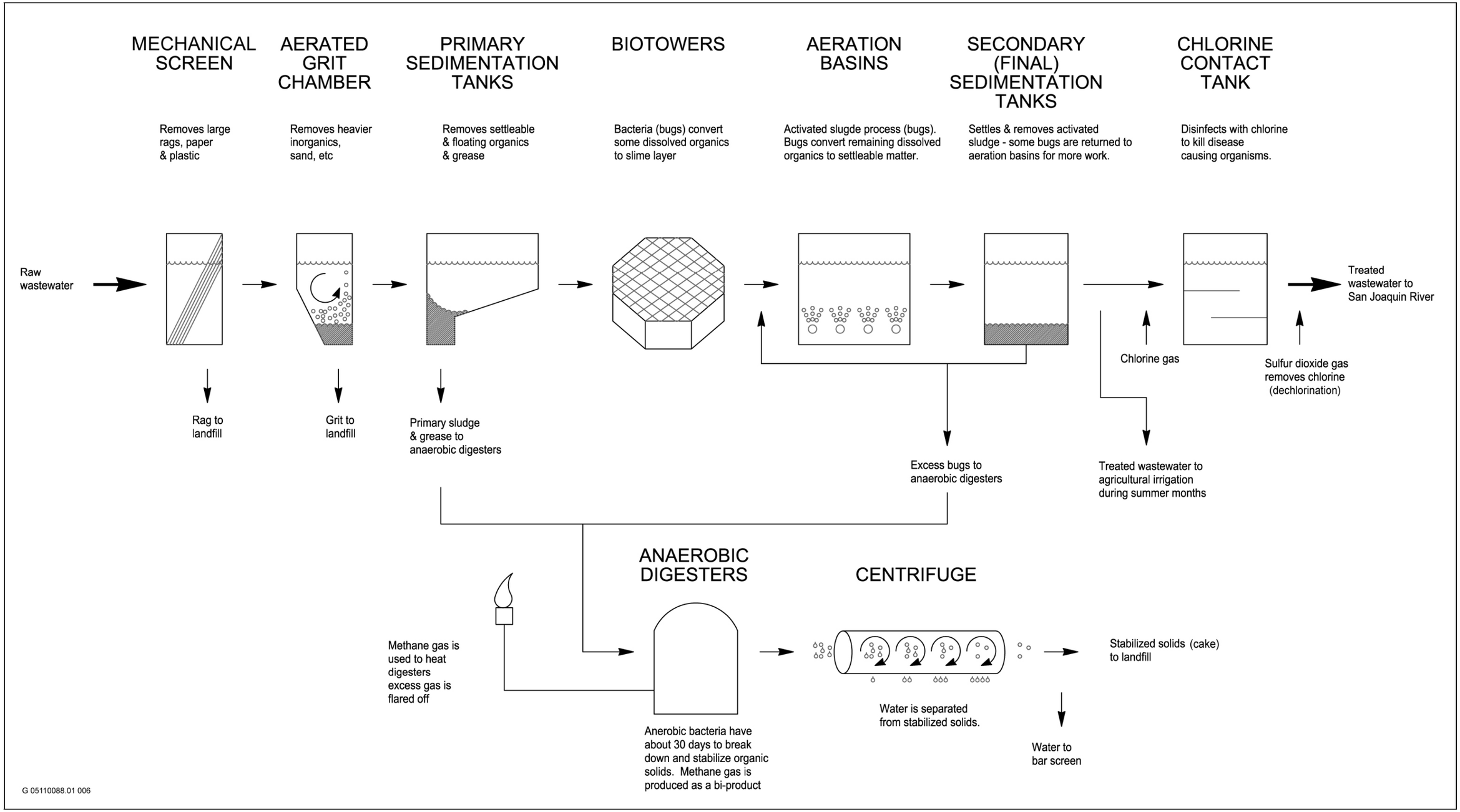
EXISTING LIQUID STREAM TREATMENT SYSTEM

Preliminary Treatment

Wastewater enters the WQCF either via a 54-inch influent trunk sewer (North Manteca Trunk Sewer), or an 18-inch force main (stage 2 force main). Both the trunk sewer and the force main terminate at the influent pump station wet well. The pump station includes two fine mechanical screens, a wet well, a dry well with four centrifugal pumps, and a flow meter. The two fine mechanical screens are designed to remove course solids and nonbiodegradable materials such as plastics. From the wet well, pumps lift screened wastewater to two parallel secondary treatment systems, designated the Northside Facilities (NSF) and the Southside Facilities (SSF).

Source: Nolte Associates 2006

Existing Facilities Site Plan **Exhibit 3-4**



Source: City of Manteca 2006

WQCF Process Flow Schematic **Exhibit 3-5**

Primary Treatment

Primary treatment in the NSF and the SSF is identical. Wastewater flows from the preliminary treatment system to the primary treatment system, where it undergoes a series of steps to remove solids from the wastewater stream. Once screened for large debris, the influent enters two aerated grit tanks, where air is injected into the influent to separate solids from the liquid. The purpose of the grit tanks is to remove relatively high-density inorganic particles from the wastewater stream. Twelve diffusers installed in each tank are supplied by low-pressure air blowers. Once separated from the wastewater, grit settles into the hoppers in the bottom of the grit tanks, where it is collected and periodically hauled to a landfill for disposal.

Flows from the grit chambers then enter the three, parallel, primary, sedimentation basins to remove settleable solids (primary sludge) and floatable scum such as oil and grease. Here, remaining solids are allowed to settle to the bottom of the basin, where they are collected, thickened, and then pumped to the anaerobic digesters.

Secondary Treatment

For the NSF, primary effluent is then sent through a biotower feed pump station and two biotowers with high-rate plastic media. The plastic media serves as a base for fixed-film treatment that removes solids and organics from the wastewater. From the biotowers, biotower effluent then flows to five aeration basins with parallel plug flow, each with a volume of approximately 300,000 gallons and equipped with fine bubble diffused air systems. In the basins, the effluent is infused with oxygen to provide a food source for microscopic organisms (which break down the effluent). Oxygen helps to speed up natural processes and causes the organisms to multiply, enlarge, and settle more quickly. The diffused air network is supplied by four multivane centrifugal blowers.

Within the aeration basins, removing additional organics is accomplished in a conventional activated-sludge process that is downstream of the plant's biotowers. Mixed liquor from the aeration basins is settled in three 85-foot diameter, 12-foot-deep secondary clarifiers, where suspended matter is removed by gravity and the effluent becomes clearer. Solids removed from the clarifiers are returned to the aeration basins or wasted to the solids handling facilities.

A similar arrangement exists for the SSF, although no biotowers are utilized. Five larger aeration basins, each with a volume of 420,000 gallons provide equivalent treatment to the NSF. Secondary clarification is accomplished in two 110-foot-diameter by 16-foot-deep secondary clarifiers.

Secondary effluent from both the NSF and SSF is routed by gravity toward the chlorine contact tanks while return activated sludge (RAS) and waste activated sludge (WAS) are pumped to the aeration basins and dissolved air flotation (DAF) thickeners, respectively.

Effluent Disinfection, Storage, and Disposal

Following secondary treatment, undisinfected secondary effluent is used to irrigate approximately 190 acres of City-owned cropland surrounding the WQCF. Secondary effluent not used to irrigate cropland is disinfected with chlorine gas and dechlorinated with sulfur dioxide, and then is discharged to the San Joaquin River via an existing side-bank outfall.

As a result of the Phase III Schedule B improvements (discussed above), effluent is nitrified and denitrified to address low dissolved oxygen concentration concerns. Ammonia in wastewater reduces dissolved oxygen in water, which leads to aquatic toxicity problems. To reduce ammonia, nitrification, or the process of converting nitrogen compounds (primarily ammonia) to nitrates and nitrites (from ammonia to nitric oxide or nitrogen dioxide), is used. To control nitrates, denitrification, or the process of converting the nitrate/nitrite to free nitrogen (nitrogen gas) is used. Although not normally harmful, in high concentrations, the nitrate/nitrite compounds can

be harmful to fish. By decreasing effluent ammonia levels, nitrification-denitrification increases dissolved oxygen concentrations in receiving waters to nontoxic levels.

The land outfall for river discharge consists of approximately 14,000 feet of 36-inch diameter pipe, which is routed from the chlorine contact tank along the westerly perimeter of the WQCF property. The outfall pipeline has a capacity range of 7.2 to 17.7 mgd under gravity flow conditions, depending on the water-surface elevations in the San Joaquin River. Effluent from the plant is routed through the pipeline to a side-bank outfall structure at the San Joaquin River. The outfall structure consists of a concrete junction manhole for maintenance access, a headwall structure with flap gate to prevent reverse flow, and a concrete spillway to the river edge. Riprap is provided at the bottom of the spillway for erosion protection as well as to dissipate energy during peak flows. The spillway is enclosed on three sides by concrete walls to prevent any spill and to direct flow to the river. The proposed project would expand this structure to accommodate a second parallel outfall pipe.

To comply with certain temperature requirements, treated effluent discharged to the San Joaquin River is only allowed when the river has a certain downstream flow condition. To address this operational constraint, Schedule D off-line storage improvements for the treated effluent will allow the WQCF to store effluent during certain river flow conditions. River flow data from an existing real-time in-stream flow meter, located at the Mossdale Bridge, monitors the flow within the river.

Treated effluent scheduled for land application bypasses the chlorine contact tank and is routed to a 10-acre balancing pond (designated as a secondary effluent storage pond). Effluent is released from the pond for flood irrigation of agricultural fields frequently during the growing season. Depending on the location of the agricultural field, unchlorinated secondary effluent either flows by gravity from the balancing pond or is pumped from the effluent irrigation pumping station.

The Central Valley Regional Water Quality Control Board has issued a discharge permit based on application of treated effluent to land at “hydraulic-agronomic” rates, with excess effluent permitted to flow to the San Joaquin River. The regional board specifically stated that flows to agricultural lands should be maximized to limit discharge to surface waters. The permit does not, however, restrict the number of days the WQCF can discharge to the river. As a goal, it is assumed that 6 months of the year (180 days) the plant will discharge to the river, and the rest of the year the effluent can be applied to land.

Septage Receiving

A number of haulers deliver septage waste to the WQCF daily. The 1,000–2,000-gallon tanker trucks discharge septage directly into the wet well of the influent pump station.

EXISTING SOLIDS STREAM TREATMENT SYSTEM

Solids stream processing areas include grit, screenings, and scum treatment, solids thickening, solids digestion, dewatering, storage, and disposal.

Screenings, Grit, and Scum

Screenings (i.e., large debris such as rags) are mechanically removed from the bar screens, dewatered, and disposed. Grit collected from the aerated grit tanks is conveyed to separators and a classifier where it is dewatered and disposed. Scum generated from the primary treatment process (i.e., floating debris and foam) is removed with skimmers from the primary sedimentation basins and pumped to the anaerobic digesters. Scum generated from the secondary treatment process is collected from the secondary clarifiers and pumped to the anaerobic digesters.

Solids Thickening and Digestion

Sludge removed in the secondary treatment process is thickened in two DAF units, where air is injected into the activated sludge to separate the solids from the liquid. The sludge is then sent to two anaerobic digesters where organic constituents within the solids are broken down ("digested") in the absence of oxygen (anaerobic). The purpose of the anaerobic digestion process is to reduce the mass of solids, stabilize the organic material, reduce the pathogen content of the solids, and produce a combustible gas that can be used for sludge heating and electricity generation.

Solids Dewatering and Disposal

A high-solids sludge centrifuge is then used to dewater the sludge. Dewatered "cake" from the centrifuge is discharged at a solids content of approximately 30–50% onto a solids handling conveyor and then discharged to a biosolids composting and storage area, where it is then trucked off-site to a local landfill for disposal. The conveyor discharge is located at a height that can accommodate truck loading. No biosolids are land-applied on-site.

SUPPORT WASTEWATER QUALITY CONTROL FACILITIES

Odor Control

A control system for wastewater odors was recently installed next to the influent pump station. The soil filter, or biofilter, uses bacteria to remove the majority of odor compounds without needing to use large quantities of chemicals. Foul air is blown through the bottom of the soil filter through a distribution system or perforated pipe, and as the air comes in contact with the bacteria, the bacteria consumes the hydrogen sulfide and other odor compounds.

Electrical Service and Power Distribution

The plant's normal power supply is provided by Pacific Gas and Electric Company (PG&E). Power is distributed throughout the plant via a 17-kilovolt (kV) feeder circuit that links all major unit processes.

Other Support Facilities

Operation of the Manteca WQCF is accomplished by 23 full-time personnel. The plant also serves as a staging location for two staff members dedicated to maintenance of the wastewater collection system. Two buildings at the WQCF house staff functions: the Operations and Maintenance Building and the Administration Building.

WASTEWATER COLLECTION SYSTEM OVERVIEW

The existing wastewater collection system consists of gravity flow pipes that are 6–60 inches in diameter, force mains that are 6–24 inches in diameter, and 13 wastewater pump stations. The majority of the collection system serves the core of the City (i.e., the central trunk sewer shed). The majority of the collection system within the central trunk sewer shed flows by gravity to the Union Road pump station (located at the intersection of Union Road and Center Street). Downstream of the Union Road pump station, wastewater flows to the WQCF by gravity via a 36-inch diameter sewer. The existing collection system alignment is shown on Exhibit 3-2.

3.7 PROPOSED WQCF AND COLLECTION SYSTEM MASTER PLAN CHARACTERISTICS

The proposed project would expand WQCF capacity from 9.87 to 27 mgd ADWF and construct new trunk sewers to accommodate growth planned for in the City general plan (2003), and construct a new recycled water

distribution system. The project includes treatment plant improvements for both river and land-based wastewater effluent disposal because of current and future probable water quality discharge requirements and projected flows.

The proposed project would construct treatment facilities to achieve compliance with water quality limitations including rapid mixing, flocculation tanks, and wastewater filters to address turbidity requirements and a tertiary UV light disinfection treatment system to address wastewater reuse requirements. The proposed project would reach buildout via a two-phase, incremental expansion, with capacity increasing from 9.87 to 17.5 mgd ADWF in the first phase (Phase IV) and then from 17.5 to 27 mgd ADWF in the second phase (Phase V). The proposed increase in capacity would be accommodated using the City's long-term effluent disposal strategy of on-site land application, urban landscape irrigation, and river discharge. The proposed project would also involve the incremental construction of three new trunk sewers and improvements to the existing collection system. These elements are described in greater detail below.

3.7.1 PROJECTED WASTEWATER FLOWS AND LOADS

WASTEWATER FLOWS

Future average daily WQCF flows are predicted using 2003 general plan land use information and wastewater generation factors established for specific land uses. Future maximum daily and peak hourly WQCF flows are projected using peaking factors based on WQCF flow data in 2003. Flows predicted for various land uses are then totaled to estimate the future contribution of the City of Manteca. Future average wastewater flows for Manteca and Lathrop are anticipated at 23 mgd and 4 mgd at buildout, respectively. The total projected average wastewater flow to the WQCF is 27 mgd at buildout (City of Manteca 2007).

Hydraulic peaking factors and hourly flow rates were estimated using 2003 WQCF flow data. The hydraulic peaking factor represents the ratio of maximum hourly flow to ADWF. For planning purposes, an hourly peaking factor of 2.19 was recommended, representing the greatest "average" peak hour condition observed. Based on these anticipated future average flows and peaking factors, future maximum day and peak hour flows were estimated. Future maximum daily flow and peak hourly flow (from both Manteca and Lathrop) are anticipated to be approximately 36.7 mgd and 59.2 mgd at buildout, respectively. Influent flow rates observed in 2003 and anticipated future flow rates are summarized in Table 3-1.

Table 3-1
Summary of Existing and Projected Wastewater Flows (Million Gallons per Day)

Parameter	2003	Buildout
Average Dry-Weather Flow	5.81	27.0
Maximum Daily Flow	7.86	36.7
Peak Hourly Flow	15.0	59.2

Source: Nolte Associates 2007

WASTEWATER LOADS

Wastewater loads are the amount or concentration of constituents present within the wastewater flow. Biochemical oxygen demand (BOD), total suspended solids (TSS), and ammonia are wastewater loading parameters that are measured in the influent and effluent to determine the WQCF's effectiveness in treating raw wastewater. Anticipated future loadings at buildout are summarized in Table 3-2.

Table 3-2

Summary of Anticipated Future Loadings at Buildout (27 Million Gallons per Day)		
Constituent	Loading	
	Average (Pounds per Day)	Peak (Pounds per Day)
Primary Treatment Processes		
BOD	78,400	114,000
TSS	70,000	133,500
Ammonia	7,600	10,000
Secondary Treatment Processes		
BOD	78,400	110,000[1]
TSS	70,000	119,000[1]
Ammonia	7,600	10,000[1]
WAS Thickening/Tertiary Filtration		
BOD	78,400	228,000[2]
TSS	70,000	279,000[2]
Ammonia	7,600	13,000[2]

Notes: BOD = biochemical oxygen demand; TSS = total suspended solids
[1] Maximum monthly or 95th percentile
[2] Maximum daily
Source: Nolte Associates 2007

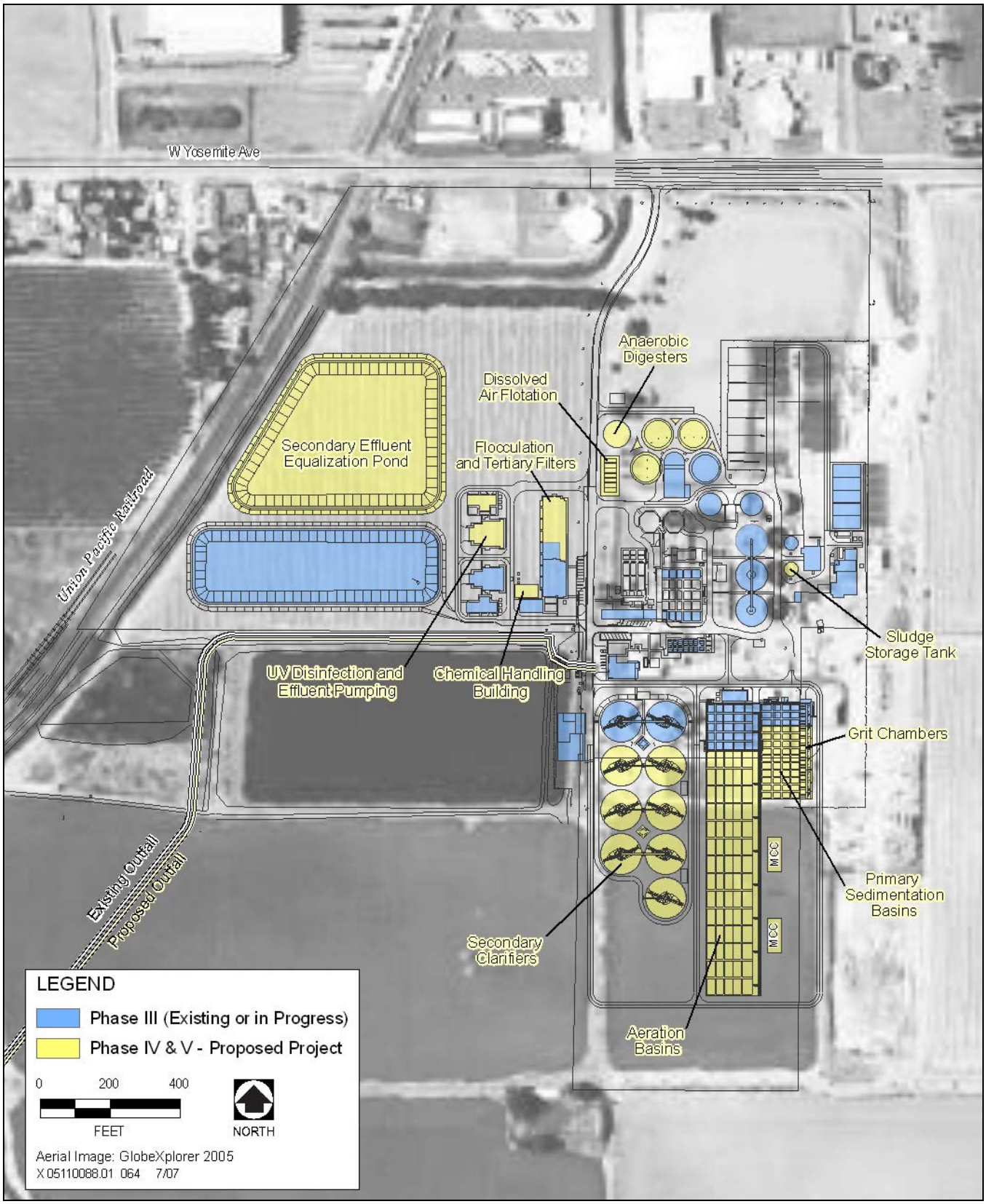
3.7.2 PROPOSED TREATMENT PLANT IMPROVEMENTS

As wastewater flows and loads increase, additional treatment facilities would be required. Additionally, more restrictive discharge requirements may require advanced treatment facilities for removal of specific pollutants.

Future capacity needs are based on wastewater flow and load projections. The WQCF and Collection System Master Plans define facilities that would be needed to accommodate projected flows and loads at City buildout (i.e., development to the secondary urban service boundary as defined in the 2003 general plan). The proposed project considers increasing the capacity of the WQCF by 17.13 mgd ADWF. This increase would provide an additional allocation of 2.52 mgd for the City of Lathrop and 14.61 mgd for the City of Manteca.

Existing treatment facilities have also been designed to be expanded incrementally as future wastewater flows and loads increase. Consequently, some existing facilities have available capacity for future flows and loads, while other facilities are near their existing capacity and must be expanded to accommodate increases in permitted flows or loads. These increments would be large enough to provide reasonable economy of scale and small enough to reduce the potential for idle facilities. By constructing the proposed master plan facilities in phases, the City can control the rate of facility expansion if actual growth rates are slower or faster than projected.

The recommended WQCF master plan site layout of existing and proposed facilities is shown in Exhibit 3-6, and the recommended pipeline alignments of the wastewater collection system master plan and recycled water



Source: Nolte Associates 2006

WQCF Master Plan Site Plan **Exhibit 3-6**

distribution system are shown in Exhibit 3-3. All WQCF improvements, with the exception of the parallel 48-inch outfall pipe and side-bank outfall structure, would be located on-site, within the existing WQCF boundaries. The specific schedule for construction of facilities would be determined by actual flow and load increases, permit conditions, and operational needs (Table 3-3). Proposed master plan facilities are described in more detail below.

Table 3-3
WQCF and Collection System Master Plans Update Projects[1]

Description	Phase IV Construction		Phase V Construction	
	Start	Completion	Start	Completion
Aerated Grit Tanks	10/2010	4/2012	4/2020	4/2022
Primary Sedimentation Basins	10/2010	4/2012	4/2020	4/2022
Aeration Basins	10/2010	4/2012	4/2020	4/2022
Secondary Clarifiers	10/2010	4/2012	4/2020	4/2022
Dissolved Air Flotation Units	10/2010	4/2012	4/2020	4/2022
Secondary Effluent Filters	10/2010	4/2012	4/2020	4/2022
Rapid Mixing and Flocculation Tanks	10/2010	4/2012	4/2020	4/2022
Ultraviolet Disinfection Channels and Effluent Pumps	10/2010	4/2012	4/2020	4/2022
Secondary Effluent Equalization Pond	10/2010	4/2012	-	-
Anaerobic Sludge Digesters, Heating, and Cogeneration Facilities	10/2010	4/2012	4/2020	4/2022
Sludge Dewatering Centrifuge	-	-	4/2020	4/2022
Outfall Pipeline (48-inch) and Side-Bank Structure	10/2010	4/2012	-	-
Chemical Handling Building	10/2010	4/2012	-	-
North Manteca Trunk Sewer	10/2010	4/2012	-	-
South Manteca Trunk Sewer	10/2010	4/2012	-	-
Central Manteca Trunk Sewer	10/2010	4/2012	-	-
Union Ranch Pump Station	10/2010	4/2012	-	-
Southwest Manteca Pump Station	10/2010	4/2012	-	-
Tara Park Pump Station (Interim)	10/2010	4/2012	-	-
Recycled Water Distribution System	10/2010	4/2012		

Note:
[1] Estimated based on master plan and recent planning estimates.
Source: Nolte Associates 2006

PROPOSED LIQUID STREAM TREATMENT FACILITIES

Primary Treatment

The proposed project would construct seven aerated grit tanks and 10 primary sedimentation basins at the SSF. The grit tanks would remove relatively high-density inorganic particles (e.g., sand) from the wastewater. Once separated from the wastewater, grit will settle into the hoppers in the bottom of the tanks. Grit collected in the hoppers will be discharged to a grit classifier by gravity for further concentration and washing of light organic material trapped with the grit. Concentrated and washed grit discharged from the classifier will be conveyed into a dumpster and periodically hauled to a landfill for disposal. Wash water from the classifier will be discharged into the plant drain system and returned to the influent pump station.

The purpose of the primary sedimentation basins is to remove settleable solids and floatable scum. This is accomplished by providing a quiescent environment where particles with densities greater than water can settle

and those with densities less than water will float to the surface. To mitigate potential odors, the basins will be covered and odor control will be accomplished by routing foul air to a biofilter (City of Manteca 2007).

Secondary Treatment

Seven new aeration basins, each rated for an average flow rate of 2.5 mgd, are also proposed at the SSF. The proposed basins would include five zones separated by baffle walls. The baffle walls create a serpentine flow pattern, which reduces the potential for hydraulic short-circuiting. The basins would be operated in a plug flow fashion with an initial anoxic zone, followed by four aerated zones. Carbonaceous BOD removal and nitrification would be accomplished in the aerated zones. Nitrified wastewater would be recirculated back to the first anoxic zone for nitrate removal. Without aeration, the first zone in each basin would become anoxic. Under anoxic conditions, nitrate produced in the aerated zones would be reduced to nitrogen gas to achieve the required degree of total nitrogen removal. Internal recirculation pumps will be sized for a flow rate of 11.5 mgd for each aeration basin to accommodate peak flow rates.

Mixed liquor from the aeration basins would be conveyed to seven new secondary clarifiers that are 110 feet in diameter for sludge separation before filtration and disinfection. The secondary clarifiers are sized based on recommended overflow rates and solids loading rates for nitrifying activated sludge systems.

A RAS pumping station consisting of seven RAS pumps (six duty and one standby) would provide RAS pumping. The total design RAS flow of approximately 27 mgd is equal to 70% of the peak design flow of 38.4 mgd. If necessary, the standby RAS pump is available to increase the total RAS flow rate to 31.5 mgd.

WAS would be conveyed to seven DAF units for thickening before anaerobic digestion. WAS would be directed to the DAF units from the discharge side of the RAS pumps. Under average conditions, the RAS pumps would provide sufficient pressure to convey WAS to the DAF units without supplemental pumping. However, under periods of increasing wasting, booster pumps would be required to convey the WAS to the DAF units. Six inline booster pumps will be used for this purpose, and a seventh would be in place for redundancy (City of Manteca 2007).

Effluent Filtration, Disinfection, and Disposal

Nine effluent filters would be installed to remove the remaining TSS in the secondary effluent. Filters would be of a cloth disk type designed to comply with the turbidity requirements of Title 22 wastewater reuse criteria. Filtration would increase the downstream disinfection efficiency by removing the suspended solid particles that are disinfection obstacles.

To achieve Title 22 turbidity requirements, chemical addition before filtration may be necessary, especially during high solids loading conditions. Therefore, chemical addition facilities would be necessary to add coagulants and polymers to the effluent before the filters. Two rapid mixing tanks and six flocculation tanks would be constructed to provide efficient mixing of chemicals and to form larger sized flocs that are easily filterable.

To comply with the Title 22 reuse criteria for unrestricted reuse, filtered effluent must also be disinfected. For reasons of worker safety, environmental protection, and operational flexibility, a low-pressure high-intensity UV light disinfection system, including four new UV channels, would be installed. The system would include effluent pumps to convey tertiary-treated wastewater through a new parallel outfall.

The WQCF currently disposes of treated effluent via land application to City-owned property surrounding the WQCF or discharge to the San Joaquin River. At plant buildout, the City proposes to discharge treated effluent through a combination of on-site land application, urban landscape irrigation, and discharge to the San Joaquin River. On-site land application would involve the disposal of approximately 0.73 mgd of wastewater on 190 acres

of City-owned land. Urban landscape irrigation would involve the discharge of approximately 3.28 mgd of wastewater to 817 acres of irrigable City-owned urban land, including parks, schools, cemeteries, and golf courses. All other treated effluent (22.99 mgd) would flow by gravity or be pumped through the existing outfall pipe and a newly constructed outfall pipe to the San Joaquin River. Table 3-4 summarizes proposed treated effluent disposal methods for the WQCF at plant buildout (City of Manteca 2007).

Table 3-4
Treated Effluent Disposal Methods at Buildout

Disposal Option	Average Discharge Rate (Million Gallons per Day)	Percentage of Total Discharge
On-Site Land Application	0.73	3%
San Joaquin River Discharge	22.99	85%
Urban Landscape Irrigation	3.28	12%
Total	**27.00**	**100%**

Source: Nolte Associates 2007

The City is currently permitted to discharge 8.11 mgd to the San Joaquin River under National Pollutant Discharge Elimination System (NPDES) Permit No. CA0081558. The permit allows the monthly average discharge to increase to 9.87 mgd in February 2009, provided that additional water quality requirements are satisfied by the WQCF. Completion of Schedule D improvements would achieve these water quality requirements. An approximately 14,000-foot-long by 48-inch-diameter outfall pipeline would be constructed parallel to and south of the existing outfall to accommodate increased flows. The pipe would be routed from the UV disinfection facility along the westerly perimeter of the WQCF property to a side-bank outfall structure at the San Joaquin River (Exhibit 3-3). The outfall structure would consist of a concrete junction manhole for maintenance access, a headwall structure with flap gate to prevent reverse flow, and a concrete spillway to the river edge. Riprap would be provided at the bottom of the spillway for erosion protection and to dissipate energy during peak flows. The spillway would be enclosed on three sides by concrete walls to prevent any spill and to direct flow to the river. The proposed project would expand the existing outfall structure to accommodate a second parallel outfall pipe (Richard, pers. comm., 2006a).

To allow for off-line storage and timed discharge, a new secondary effluent equalization pond is proposed for construction north of the existing equalization pond.

The City evaluated the potential uses and demand for urban landscape irrigation using wastewater effluent in the 2005 WQCF master plan update. The WQCF master plan identified large irrigation users such as parks, schools, golf courses, and cemeteries throughout the City as potential customers and considered 94 potential sites with an irrigated area of 711 acres (at buildout). To meet California Department of Health Services' requirements for landscape irrigation using unrestricted wastewater effluent, tertiary treatment, and additional disinfection facilities are necessary.

With the construction of the Phase III tertiary filtration system (Schedule D project), the potential use of reclaimed water increased significantly. Two projects currently planned for reclaimed wastewater are a water truck fill station for construction site dust control and Big League Dreams softball playing field irrigation. Additional projects including golf course irrigation and other types of landscape irrigation are anticipated by the year 2010. Recycled wastewater effluent water distribution pipelines would be constructed in stages to supply recycled water to areas within the city (Exhibit 3-3). Recycled water storage facilities and a pump station may also be required. Extension of the delivery network to other large, existing, landscape areas would likely occur from 2010 to 2015 (Richard, pers. comm., 2006b).

PROPOSED SOLIDS STREAM TREATMENT FACILITIES

Solids Thickening and Digestion

Wastewater sludge generated in the primary sedimentation basins and activated-sludge process would be anaerobically digested in five new anaerobic digesters. Sizing of the new digesters is based on solids loading and hydraulic detention time criteria. The sludge heating process in the new digesters would be similar to the heating process for the existing digesters. Sludge would be drawn off the digester mixing pipeline with a booster pump, conveyed through a spiral heat exchanger, and discharged back into the mixing pipeline.

Solids Dewatering and Disposal

Anaerobically digested sludge would be dewatered in a new high-solid centrifuge unit. The new unit would be installed in a new dewatering building designed to accommodate two 100-horsepower centrifuges with space for one additional centrifuge unit in the future. Dewatered cake from the centrifuges would be discharged at a solids content of approximately 30–50% onto a solids handling conveyor. The conveyor would discharge cake outside the building to a biosolids composting and storage area.

PROPOSED SUPPORT WASTEWATER QUALITY CONTROL FACILITIES

A chemical handling, storage, and metering facility would be required to support the tertiary filtration process as coagulant and polymer may be needed occasionally for filter aids (Exhibit 3-6). The equipment in the facility would include four bulk tanks and one day tank for coagulant, metering pumps, space for four polymer tanks or totes, and a polymer dilution unit. All tanks and pumps would be installed indoors to prevent damage from sunlight and temperature extremes.

Cogeneration

Solids removed during the wastewater treatment process (i.e., sludge) are stabilized through anaerobic digestion before dewatering and disposal off-site. Methane gas produced during anaerobic digestion is currently either used as a fuel to heat WQCF digesters and maintain sludge temperatures, or is flared under controlled conditions. As an alternative to flaring, digester gas can be scrubbed, blended with natural gas, and routed to an engine generator for electricity production. This electricity could off-set electrical deliveries from PG&E. One cogeneration unit (engine generator) is currently installed at the WQCF but has not yet been brought on-line. Operation of the initial cogeneration unit is anticipated in 2007. Ultimately, three cogeneration units would be installed at WQCF buildout (Richard, pers. comm., 2006a).

3.7.3 PROPOSED WASTEWATER COLLECTION SYSTEM IMPROVEMENTS

The proposed project would incrementally add new trunk sewer segments to meet the development goals adopted in the *City of Manteca General Plan 2023*. Building upon the existing collection system, a trunk sewer gravity collection system would convey wastewater to an influent pump station located at the WQCF. Interim pump stations would be constructed as needed and then gradually phased out as the trunk sewers are completed.

The principal objective of the trunk sewer network is to maximize the area of gravity sewer service within the city. Completion of the trunk sewer system would largely eliminate permanent pumping stations within the city with the exception of areas at the limits of the service boundaries. Currently, only one permanent pumping station is anticipated: Southwest Manteca (at the westerly terminus of Woodward Avenue). Several interim pumping stations may be needed depending on the completion schedule of the north and south Manteca trunk sewers. Both the interim and permanent pumping stations would be wet-well/dry-well or submersible configurations, and would be predominantly below grade. The above-grade profile would be limited to an access structure, emergency generator, paved parking area and security fencing. Landscaping would be provided as a visual buffer along with

sound attenuation features such as generator housing structures. Pumping station sites would typically be one-quarter acre or less. Interim and permanent pumping stations would be designed for service lives of 10 and 50 years respectively (Richard, pers. comm., 2006b).

The proposed project would construct three large diameter trunk sewers to collect wastewater from the north, central, and south sections of the City (Exhibit 3-3). The north and south trunk sewers would collect flow from areas where future growth is expected, while the central trunk sewer would connect the existing collection system to the north trunk sewer. The proposed north trunk sewer would include 40 sewer segments that are 18–60 inches in diameter, while the south trunk sewer would include 50 sewer segments that are 8–60 inches in diameter. Measuring 6,442 feet (approximately 1.22 miles), the central trunk sewer would include 12 sewer segments that are 36 inches in diameter, and would eliminate the need for the existing Union Road pump station (City of Manteca 2006).

The proposed project also includes several minor improvements to existing sewer lines. Hydraulic modeling and a review of historical records found no major deficiencies in the existing collection system; however, several minor problems were identified, including pipeline obstructions and miscellaneous flow problems. To address these problems, the proposed project includes a total of 11 collection system improvement projects, such as rehabilitating manholes and eliminating sagging pipelines. These improvements would generally be located within the existing collection system network.

3.7.4 CONSTRUCTION

Construction of the proposed WQCF and Collection System Master Plan project would require approximately 80 construction personnel (30 for WQCF improvements, 30 for trunk sewer construction, and 20 for pump station construction). The precise number of construction workers would depend on the type of facilities being constructed, the number of simultaneous construction jobs, and the construction schedule. In general, construction activities for the WQCF, wastewater collection system, and recycled water distribution system would include site preparation, grading, excavation, trenching, backfilling, building construction, and pipeline installation. Equipment typically used for construction activities includes scrapers, earthmovers, dozers, cranes, compacters, graders, dump trucks, delivery trucks, loaders, and jackhammers. The quantities of each type of construction equipment would vary depending on the type of facility being constructed.

On average, approximately 60 employee vehicle round trips per day and approximately 10 construction-related truck round trips per day would be required during WQCF and Collection System Master Plan project construction.

Both the interim and permanent pumping stations would be predominantly below grade, and construction of each station would likely occur over an 18-month period.

Collection system and outfall pipeline would be constructed in 12-foot segments, and construction would typically occur within a 25-foot wide corridor in public right-of-way within either existing or future paved streets.

3.7.5 OPERATIONS

STAFFING

The expanded WQCF would continue to be operated by City personnel. As required by law, operators are licensed by the State Water Resources Control Board (SWRCB). Typical WQCF operation involves flow routing; starting, stopping and adjusting pumps, blowers and other equipment; hosing down basins and equipment; reading flow meters and taking water samples for testing; performing laboratory tests and documenting results; and maintaining and repairing equipment. Currently, staffing at the WQCF consists of approximately 23 people, including supervisors, operators, laboratory personnel, and maintenance staff. Because the WQCF operates 24

hours per day, 7 days per week, staff work in shifts. At any given time, a minimum of two operators are needed to run the WQCF. Approximately 10 additional staff would be needed to operate the WQCF at plant buildout. The proposed project would also increase the number of staff dedicated to collection system maintenance from two to six.

WQCF OPERATION

On average, operation of the existing WQCF requires approximately 23 employee vehicle round trips per day and approximately five maintenance and delivery truck round trips per day. Operation of an expanded WQCF would require (on average) approximately 33 employee vehicle round trips per day and approximately five maintenance and delivery truck round trips per day.

3.8 PROJECT SCHEDULE

An implementation schedule for the proposed project is presented in Table 3-3. The timing of planned improvements is based on projected wastewater flows and loads, regulatory requirements, operational needs, and design criteria. Generally, WQCF and collection system expansion is phased in 5–10-year increments over the planning period. These expansions are large enough to provide reasonable economy of scale yet small enough to reduce the potential for idle facilities. Therefore, if the City's growth rate is slower than projected, the construction of the next increment of treatment capacity can be delayed until it is needed.

3.9 INTENDED USES OF THIS ENVIRONMENTAL IMPACT REPORT

This EIR is intended to be used by the City and other permitting agencies to fulfill the requirements of CEQA. The City will use the EIR to consider approval of the proposed project. Additionally, the EIR will be used as an informational document for other agencies that do not have a specific permitting role for the project, but that may have an interest in the project.

3.10 REQUIRED APPROVALS AND PERMITS

Implementation of the proposed project would require approval by the Manteca City Council as the lead agency. Other permitting agencies with permitting approval or review authority over portions of the project may include:

- Central Valley RWQCB—NPDES General Construction Stormwater Permit, General Order for Dewatering, NPDES Waste Discharge Permit
- San Joaquin Valley Air Pollution Control District—Authority to Construct and Permit to Operate
- California Department of Health Services—rules concerning the use of wastewater effluent for urban irrigation purposes
- California Department of Transportation—Encroachment Permit for State Highways
- Reclamation Board of the State of California—Encroachment Permit for an Adopted Flood Control Plan, Channel Reconfiguration Permit
- U.S. Bureau of Reclamation—Canal Crossing Permit

4 AFFECTED ENVIRONMENT, THRESHOLDS OF SIGNIFICANCE, ENVIRONMENTAL IMPACTS, AND MITIGATION MEASURES

Sections 4.1 through 4.13 of this DEIR present a discussion of existing conditions, environmental impacts associated with implementation of the project, mitigation measures to reduce the level of impact, and residual impacts (i.e., the remaining impacts after implementation of any proposed mitigation measures). Issues evaluated in these sections consist of a full range of environmental topics originally identified for review in the notice of preparation (NOP) prepared for the City of Manteca Wastewater Quality Control Facility and Collection System Master Plans Update Project. The NOP is included as Appendix A. Sections 4.1 through 4.13 each include the following components.

- **Environmental Setting:** This subsection presents the existing environmental conditions on the project site and in the surrounding area as appropriate, in accordance with California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines) Section 15125. The discussions of the environmental setting focus on information relevant to the issue under evaluation.

- **Regulatory Background:** This subsection presents information on the laws, regulations, plans, and policies that relate to the issue area being discussed. Regulations originating from the local, state, and federal levels are each discussed as appropriate.

- **Environmental Impacts:** This subsection identifies the impacts of the proposed project on the existing environment, in accordance with State CEQA Guidelines Sections 15125 and 15143. Before presenting an evaluation of impacts, the section describes the analysis methodology used, and the thresholds of significance used to identify impacts are then listed. Project impacts are identified alphanumerically and sequentially throughout this section. For example, impacts in Section 4.4 are identified as 4.4-1, 4.4-2, and so on. An impact statement precedes the discussion of each impact and provides a summary of the impact and its level of significance. The discussion that follows the impact statement includes the evidence on which a conclusion is made regarding the level of impact. The discussions of cumulative impacts and growth-inducing impacts are presented in Chapter 5 and Chapter 6, respectively.

- **Mitigation Measures:** This subsection identifies potentially feasible mitigation measures to reduce significant and potentially significant impacts of the proposed project, in accordance with State CEQA Guidelines Section 15002(a)(3), Section 15021(a)(2), and Section 15091(a)(1). Each mitigation measure is identified alphanumerically to correspond with the number of the impact being reduced by the measure. For example, Impact 4.3-1 would be mitigated by Mitigation Measure 4.3-1. This subsection also describes whether the mitigation measures would reduce impacts to less-than-significant levels. Any significant and unavoidable impacts are identified in this subsection, and are also summarized in Chapter 6.

- **Level of Significance after Mitigation:** This section identifies any significant impacts that would remain significant following implementation of the mitigation measures.

4.1 LAND USE AND AGRICULTURAL RESOURCES

This section evaluates the environmental impacts of the proposed project on existing land uses and agricultural resources. A description of the existing site characteristics and setting is followed by an analysis focused on the relationship between the project and existing plans and policies, and the relationship with existing on-site and adjacent land uses. Mitigation is recommended to reduce project impacts where feasible.

4.1.1 ENVIRONMENTAL SETTING

The approximately 22-acre City of Manteca Wastewater Quality Control Facility (WQCF) and the majority of the proposed wastewater collection system and recycled-water distribution system pipelines would be located within the City's primary urban service boundary (Exhibit 3-3). The portion of the proposed outfall pipeline paralleling the Union Pacific Railroad west of McKinley Avenue would be located outside the primary urban service boundary. Sections of the proposed wastewater collection system sewers would be located outside the primary urban service boundary, including sections of the proposed north Manteca trunk sewer north of Lathrop Road and east of Main Street, and sections of the proposed south Manteca trunk sewer south of Woodward Avenue and along Austin Road. The *City of Manteca General Plan 2023* (City general plan) and the City of Manteca Zoning Ordinance (1992) guide land uses within city limits. Land use activities on the WQCF site are guided by the *City of Manteca Wastewater Quality Control Facility Master Plan Update* (City of Manteca 2007).

EXISTING LAND USES

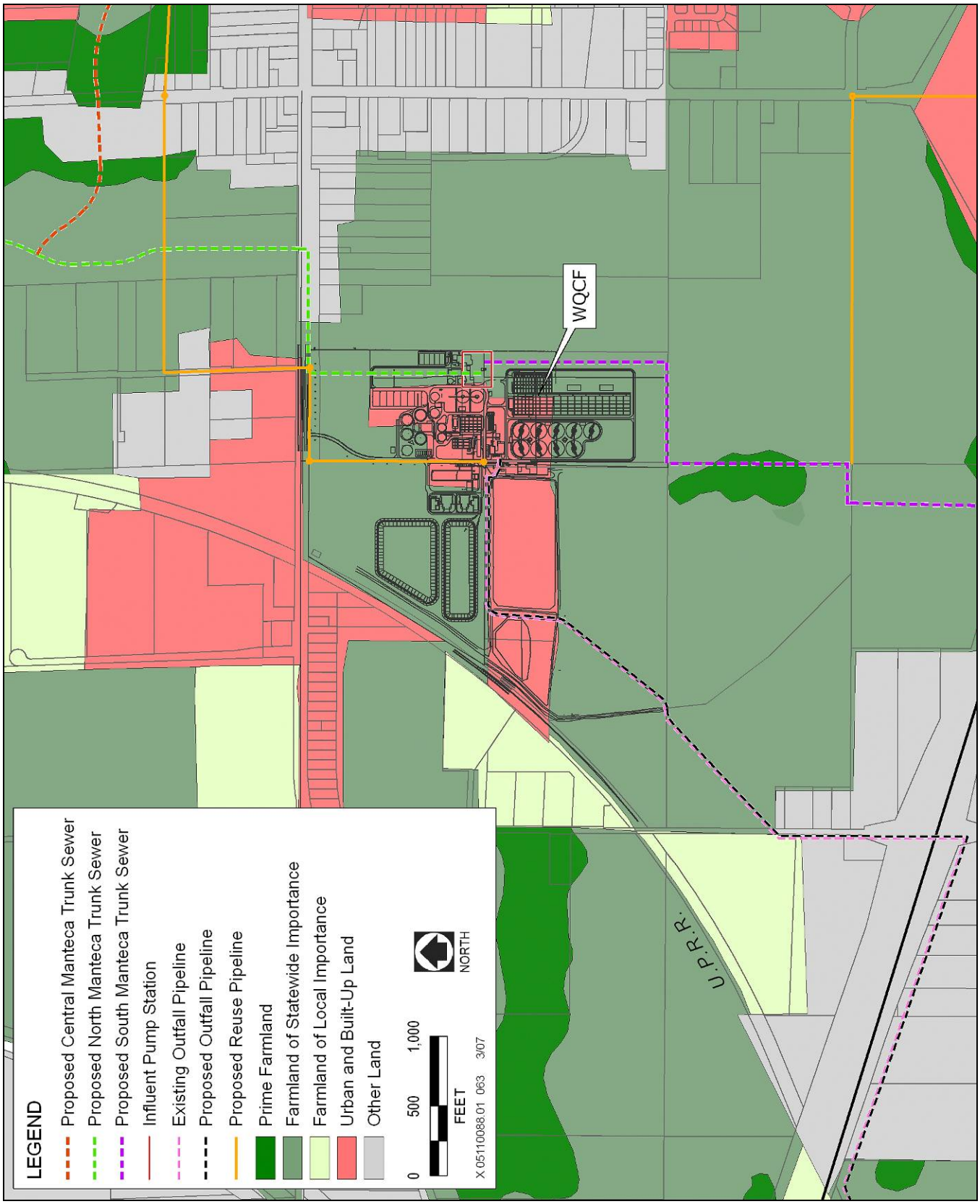
WQCF Property

The WQCF site is located near the western boundary of the city, approximately 500 feet south of Yosemite Avenue between Airport Way and McKinley Avenue. The WQCF site is located within a larger 210-acre City-owned property that is bounded by Yosemite Avenue to the north, State Route (SR) 120 to the south, Airport Way to the east, and McKinley Avenue and the Union Pacific Railroad to the west (Exhibit 3-2). Existing land uses on the 210-acre property include various wastewater treatment plant facilities on the 22-acre WQCF site (see Section 3.6, "Existing Treatment Programs, Processes, and Facilities," and Exhibit 3-4 for a detailed description of existing WQCF facilities). Agricultural fields dominate the remainder of the WQCF property where treated effluent from the WQCF is land-applied for irrigation. The WQCF site is surrounded on all sides by agricultural fields.

Both the City general plan and City zoning designation for the WQCF property is Public/Quasi-Public (PQP). According to the general plan, this designation provides for government-owned facilities (such as wastewater quality control and related facilities), public and private schools, institutions, civic uses and public utilities, and quasi-public uses such as hospitals and churches (City of Manteca 2003a). In addition, a large portion of the developed portion of the 210-acre WQCF property is designated by the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP) as Urban and Built-Up Land, while the remaining lands are designated Farmland of Statewide Importance (Exhibit 4.1-1). Because the 210-acre City-owned property is not under Williamson Act contract, the proposed project would not conflict with a Williamson Act contract (see "Regulatory Setting" below for a discussion of agricultural regulatory standards).

WQCF Adjacent Areas

Lands surrounding the 210-acre WQCF property are used for agricultural production, residential housing, active recreation, and commercial development. Commercial development is located directly north of the WQCF along Yosemite Avenue, and the "Stadium Center" shopping center is approximately 2,000 feet to the south between Daniels Street and SR 120. A "Big League Dreams" recreational facility is located approximately 600 feet to the



Sources: FMMP 2004, Nolte 2006

Important Farmland **Exhibit 4.1-1**

south. Residential housing is located beyond the agricultural lands surrounding the WQCF site along Yosemite Avenue, McKinley Avenue, Airport Way, and SR 120. These areas consist primarily of single-family homes.

Wastewater Collection System, Recycled-Water System, and Outfall Pipeline Areas

As discussed in Chapter 3, "Project Description," implementation of the proposed project would result in construction of a wastewater collection system consisting of three trunk sewers, a new 14,000-foot effluent outfall pipeline, and a recycled-water distribution system. Proposed project implementation would also result in the construction of several permanent and interim wastewater pumping stations. The collection system, recycled-water system, and outfall pipelines would be installed below grade throughout the project area, and would be primarily located along roadways within existing City right-of-way. Land uses along proposed pipeline alignments include a variety of residential, commercial, open space, agricultural, and industrial uses, including Medium Density Residential, Low Density Residential, High Density Residential, Open Space, General Commercial, Light Industrial, and Commercial Mixed Use general plan land use designations (Exhibit 4.1-2). Permanent and interim pumping stations would be located within or adjacent to residential subdivisions, would typically be one-quarter acre or less, and would be mainly below grade (as described in Section 4.2, "Visual Resources"). Design features and landscaping would allow the pumping stations to visually blend and inconspicuously integrate with surrounding land uses.

REGULATORY SETTING

The land use planning and zoning authority of local jurisdictions in California are set forth in the state's planning laws. The WQCF property is under the planning jurisdiction of the City. A summary of land use policies and policies and goals related to agricultural land uses is provided below.

Federal Plans, Policies, Regulations, and Laws

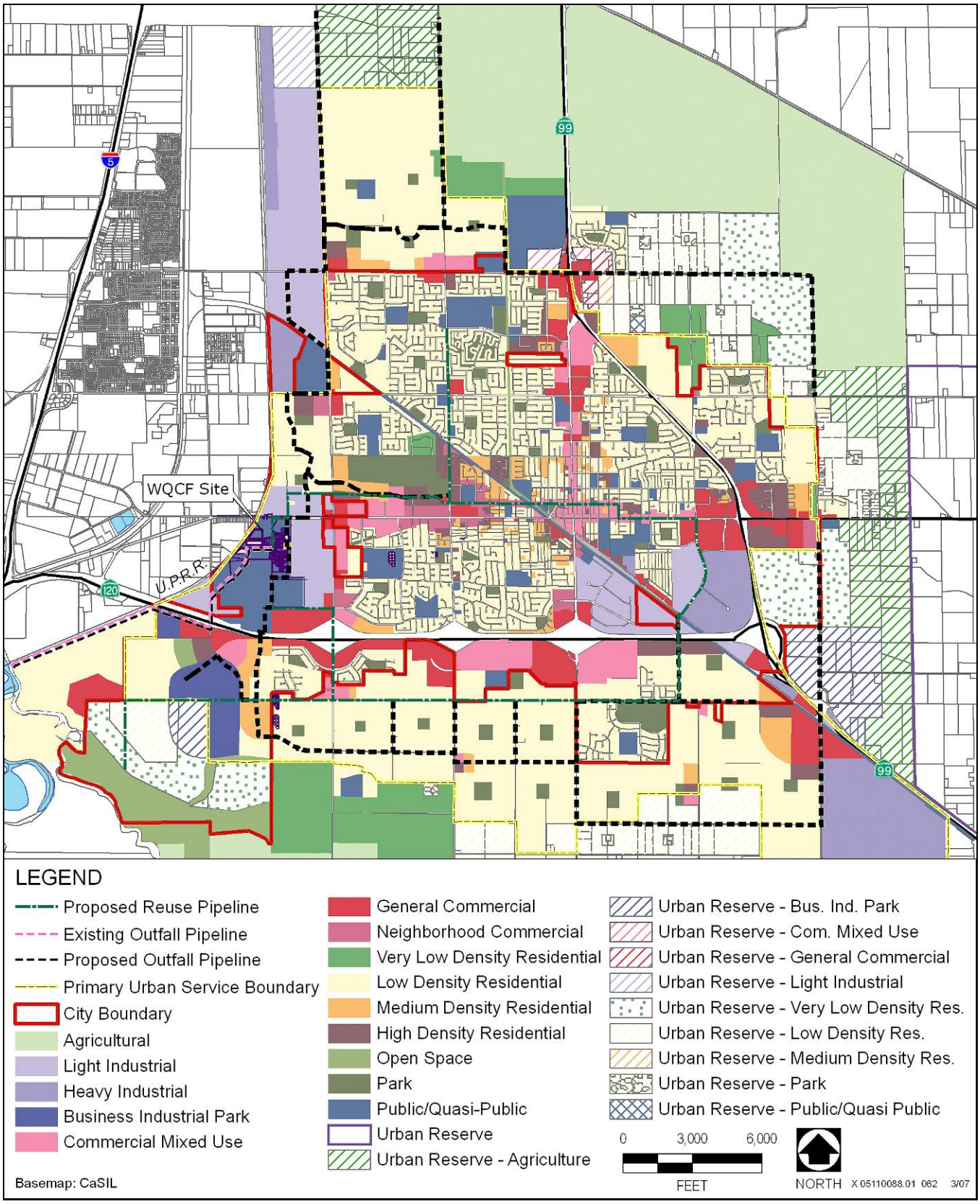
No federal plans, policies, regulations, or laws are applicable to the proposed project.

State Plans, Policies, Regulations, and Laws

Planning and Zoning Laws

California Government Code (GC) Section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of a city or county and of any land outside its boundaries that, in the city's or county's judgment, bears relation to its planning. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city's or county's vision for the area. The general plan is a long-range document that typically addresses the physical character of an area over a 20-year period. Finally, although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals.

The State Zoning Law (GC Section 65800 et seq.) establishes that zoning ordinances, which are laws that define allowable land uses within a specific district, are required to be consistent with the general plan and any applicable specific plans. When amendments to the general plan are made, corresponding changes in the zoning ordinance may be required within a reasonable time to ensure the land uses designated in the general plan would also be allowable by the zoning ordinance (GC Section 65860[c]).



Sources: City of Manteca 2003, Nolte 2006

Manteca General Plan Land Use Designations **Exhibit 4.1-2**

Farmland Mapping and Monitoring Program

The FMMP was established in 1982 to continue the Important Farmland mapping efforts begun in 1975 by the U.S. Soil Conservation Service (SCS). The intent of the SCS (renamed the U.S. Natural Resources Conservation Service [NRCS] in 1998) was to produce agricultural resource maps based on soil quality and land use across the nation. The California Department of Conservation sponsors the FMMP and is also responsible for establishing agricultural easements in accordance with Public Resources Code Sections 10250–10255 (CDC 2006a).

As part of the nationwide agricultural land use mapping effort, the SCS/NRCS developed a series of definitions known as Land Inventory and Monitoring (LIM) criteria. The LIM criteria classified the land's suitability for agricultural production. Suitability included both the physical and chemical characteristics of soils as well as the actual land use. Important Farmland maps are derived from the SCS/NRCS soil survey maps using the LIM criteria and are available by county. Important Farmland maps classify land into one of the following eight categories: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-Up Land, Other Land, and Water.

The Important Farmland map for San Joaquin County designates the WQCF site as Urban and Built-Up Land, while the greater WQCF property is designated Farmland of Statewide Importance (Exhibit 4.1-1). Farmland of Statewide Importance is described as "Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date." Urban and Built-Up land is described as "Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. This land is used for residential, industrial, commercial, construction, institutional, public administration, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes." (CDC 2006b.) The Important Farmland map for San Joaquin County also designates portions of the proposed wastewater collection system, recycled-water distribution system, and outfall pipeline alignments as Prime Farmland and Farmland of Statewide Importance (City of Manteca 2003b).

Williamson Act

The California Land Conservation Act of 1965, also known as the Williamson Act, is designed to preserve agriculture and open space lands by discouraging their premature and unnecessary conversion to urban uses. The act enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments which are much lower than normal because they are based on farming and open space uses as opposed to full market value. Small portions of the wastewater collection system and recycled-water distribution system pipeline alignments south of Woodward Avenue traverse lands under Williamson Act contract (City of Manteca 2003b).

Regional and Local Plans, Policies, Regulations, and Ordinances

City of Manteca Right to Farm Ordinance

Chapter 8.24 of Manteca Municipal Code is a "Right to Farm" Ordinance intended to protect agricultural productivity in the City. The Ordinance states:

> It is the policy of this City to preserve, protect, and encourage the use of viable agricultural land for the production of food and other agricultural products. When nonagricultural land uses extend into or approach agricultural areas, conflicts often arise between such land uses and agricultural operations. Such conflicts often result in the involuntary curtailment or cessation of agricultural

operations, and discourage investment in such operations. This chapter is intended to reduce the occurrence of conflicts between nonagricultural and agricultural land uses within the City.

City of Manteca Agricultural Mitigation Fee Program

In June 2005, the Manteca City Council adopted Ordinance No. 1304, adding Chapter 13.42 to the Manteca Municipal Code, which established the agricultural mitigation fee program. This was done in conjunction with the settlement of the lawsuit regarding the South County Surface Water Project, in which the Cities of Lathrop, Manteca, and Tracy agreed to implement the program to mitigate for the loss of Important Farmland due to the conversion to urban uses. Under the program, the fees collected are used to acquire farmland conservation easements or farmland deed restrictions. The current fee is $2,000 per acre, and is adjusted each year.

City of Manteca General Plan

The WQCF site is located within the incorporated City of Manteca and is thus subject to the City general plan. The 210-acre WQCF property is designated by the City general plan as PQP. Areas surrounding the WQCF property are designated as Light Industrial to the north, east, and west; General Commercial and Commercial Mixed Use to the south and east; and Low Density and Medium Density Residential to the south and east. Land uses along proposed pipeline alignments include a variety of residential, commercial, open space, and industrial land uses (Exhibit 4.1-2).

The City general plan includes the following policies related to land use and farmland that are relevant to this analysis.

Section 2, Land Use Element

- **Policy LU-P-38:** The City shall designate adequate land, appropriately located for quasi-public uses such as hospitals, churches, private school facilities, and utility uses.

- **Policy LU-P-39:** In determining appropriate locations for public and quasi-public uses, the City shall consider, among other things, proximity to major streets, the cost to develop access to public facilities, and the safety of pedestrians and motorists.

- **Policy LU-P-40:** Development shall be managed to ensure that adequate public facilities and services, as defined in the Public Services and Facilities Element, are planned and provided.

Section 8, Resource Conservation Element

- **Policy RC-P-20:** The City shall provide an orderly and phased development pattern so that farmland is not subjected to premature development pressure.

- **Policy RC-P-30:** The City of Manteca will participate in a countywide program to mitigate the conversion of Prime Farmland and Farmlands of Statewide Importance to urban uses.

City of Manteca Zoning Ordinance and Map

The purpose of the City of Manteca Zoning Ordinance (1992) is to protect and to promote the public health, safety, peace, comfort, convenience, prosperity, and general welfare; to provide a precise guide for the physical development of the city consistent with the goals and policies of the general plan; to foster workable relationship among land uses; to promote the stability of existing land uses that conform with the general plan; to ensure that public and private lands are ultimately used for the purposes which are most appropriate and most beneficial from the standpoint of the city as a whole; to facilitate the appropriate location of community facilities and institutions; and to safeguard and enhance the appearance of the city. The 210-acre WQCF property is designated by the City

of Manteca Zoning Map (2005) as PQP. Areas surrounding the WQCF property are designated as Light Industrial (M-1) to the north, east, and west; General Commercial (C-G) and Community Commercial (C-C) to the south and east; and Single Family Residential (R-1) to the south and east. Zoning designations along proposed pipeline alignments include a variety of residential, commercial, open space, and industrial designations.

4.1.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

The focus of this land use analysis is on land use impacts, including those related to agricultural resources, which would result from implementation of the project. Evaluation of potential land use and agricultural impacts of the project was based on a review of the planning documents pertaining to the project study area, including the City general plan and EIR, City zoning ordinance, the California Department of Conservation Important Farmland Map for San Joaquin County, consultation with appropriate agencies, and field review of the project site and surroundings.

Specific impacts and policy, plan, or regulatory consistency issues adopted for the purpose of avoiding or mitigating an environmental effect associated with other resource and issue areas are addressed in each technical section of this DEIR as appropriate (see policies pertaining to these resources in each technical section). The project's consistency with an adopted habitat conservation plan (HCP) is discussed in Section 4.5, "Terrestrial Biological Resources." Therefore, these issues are not discussed further in this analysis.

The WQCF site is not subject to a Williamson Act contract. However, portions of the wastewater collection system, recycled-water distribution system, and effluent outfall pipeline alignments would traverse lands subject to Williamson Act contracts. Collection system, recycled-water distribution system, and outfall pipelines and pumping stations would be installed below grade throughout the project area, and would be primarily located along roadways within existing City right-of-way or within existing or future residential subdivisions. Therefore, pipeline construction would not conflict with existing zoning for a Williamson Act contract, and this issue is not discussed further in this analysis.

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines. The proposed project would result in significant land use or agricultural impacts if it would:

- physically divide an established community;
- convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to nonagricultural use;
- conflict with existing zoning for agricultural use; or
- involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to nonagricultural use.

IMPACT ANALYSIS

IMPACT 4.1-1 Land Use and Agricultural Resources—Potential for Division of an Established Community. *The project would not develop a new use that would extend into an established community or interfere with existing vehicular or pedestrian traffic moving from one side of an established community to another. The project would result in the construction of wastewater treatment facilities on City-owned land and underground pipelines primarily within City right-of-way. Interim and permanent pumping stations would be integrated with new or existing residential subdivisions. Therefore, this impact would be* ***less than significant****.*

Project implementation would expand existing wastewater treatment facilities on the 210-acre City-owned WQCF property, result in the construction of a new wastewater collection system, recycled-water distribution system, and outfall pipelines, and result in the construction of new pumping stations to meet existing and future wastewater conveyance and treatment demands.

Expansion of wastewater treatment facilities would occur entirely within the 210-acre, City-owned WQCF property. Both the City general plan and zoning designations for the WQCF property are PQP. According to the general plan, this designation allows for government-owned facilities (such as wastewater quality control and related facilities), public and private schools, institutions, civic uses and public utilities, and quasi-pubic uses such as hospitals and churches. The WQCF site is isolated from other urban development by agricultural lands that make up the WQCF property, and is located at the urban fringe of the City of Manteca and away from urban development. Therefore, the WQCF site is not located within an established community.

Land uses along proposed pipeline alignments include a variety of residential, commercial, open space, agricultural, and industrial land uses. The wastewater collection system, recycled-water distribution system, and outfall pipelines and sewage pumping stations would be located within established and new communities. However, pipelines would not conflict with existing land uses because pipelines would be installed below grade, and would be primarily located along roadways within existing City right-of-way. Permanent and interim pumping stations also would not conflict with existing land uses because pipelines would be located within or adjacent to residential subdivisions, would typically be one-quarter acre or less, and would be mainly below grade. For above-grade components, design features and landscaping would allow the pumping stations to visually blend and integrate with surrounding residential and commercial development.

Because the project would not divide an established community (because no communities are located on the WQCF property); the wastewater collection system, recycled-water distribution system, and outfall pipelines would be below grade; and pumping stations would be mainly below grade and integrated into residential subdivisions, the project would not divide an established community and this impact would be **less than significant**.

IMPACT 4.1-2 Land Use and Agricultural Resources—Potential Conflicts with Existing Land Uses in or Adjacent to the Project Area. *WQCF improvements would be constructed within and near the existing WQCF footprint on City-owned property. The wastewater collection system, recycled-water distribution system, and outfall pipelines associated with the proposed project would be installed below grade and would have no effect on adjacent land uses. Interim and permanent pumping stations would be mainly below grade and would be integrated with surrounding land uses. Therefore, the project would not result in land use conflicts between the project area and adjacent land uses. This impact would be* ***less than significant****.*

The areas in and adjacent to the proposed project area support a variety of land uses, including existing and developing residential, commercial, industrial, agricultural, and open space land uses. WQCF improvements would be constructed within and near the existing WQCF footprint on City-owned property. The existing WQCF footprint is surrounded on all sides by agricultural lands. The proposed wastewater collection system, recycled-

water distribution system, and outfall pipelines would be installed below grade, and would have no effect on adjacent land uses because they would not be visible and would not interfere with day-to-day activities in these areas. However, the proposed wastewater collection system, recycled-water distribution system, and effluent outfall pipeline construction would permanently convert approximately 27 acres of Important Farmland to nonagricultural use, and this impact is considered in Impact 4.1-3 below. Interim and permanent pumping stations would be located within or adjacent to residential subdivisions and commercial development and would be mainly below grade. Covering an area of typically less than one-quarter acre, the above-grade profile would be limited to an approximately 8-foot-high access structure, an emergency generator, a small paved parking area, and security fencing. Landscaping and other design features would allow the pumping stations to visually blend and integrate with surrounding residential and commercial development. Therefore, adequate and appropriately located land is available for public uses, and implementation of the proposed project would be consistent with City general plan land use policies (Policies LU-P-38, LU-P39, and LU-P-40).

Because proposed WQCF improvements would be constructed on City-owned property surrounded by agricultural lands; the wastewater collection system, recycled-water distribution system, and outfall pipelines would be constructed underground; and interim and permanent pumping stations would be relatively small and integrated with surrounding land uses; the proposed project would be compatible with nearby land uses and would not result in land use conflicts between the project area and adjacent land uses. This impact would be **less than significant**.

IMPACT **4.1-3** Land Use and Agricultural Resources—Conversion of Important Farmland to Nonagricultural Use. *Implementation of the proposed project would result in the conversion of approximately 41 acres of Prime Farmland and Farmland of Statewide Importance to nonagricultural use. Conversion of agricultural land would be considered a* ***significant*** *impact.*

The 210-acre WQCF property is designated by the California Department of Conservation FMMP as Urban and Built-up Land and Farmland of Statewide Importance. While the proposed project would result in the orderly and phased expansion of wastewater treatment facilities onto agricultural lands surrounding the WQCF site (Policy RC-P-20), it would permanently convert approximately 14 acres of Farmland of Statewide Importance to nonagricultural use.

The California Department of Conservation FMMP also designates portions of the proposed wastewater collection system, recycled-water distribution system, and effluent outfall pipeline alignments as Prime Farmland and Farmland of Statewide Importance (City of Manteca 2003b). Although wastewater collection system, recycled-water distribution system, and effluent outfall pipelines would be installed below grade, permanent access corridors would be established along pipeline alignments for maintenance activities. Because access corridors would be established and maintained for pipeline maintenance activities, construction of the proposed wastewater collection system, recycled-water distribution system, and effluent outfall pipelines would permanently convert approximately 27 acres of existing Important Farmland (including 22 acres of Farmland of Statewide Importance and 5 acres of Prime Farmland) to nonagricultural use. Wastewater pumping stations would be constructed in developed areas.

Because implementation of the proposed project would result in the direct conversion of approximately 36 acres of Farmland of Statewide Importance and approximately 5 acres of Prime Farmland to nonagricultural land use by expanding wastewater treatment facilities onto agricultural lands surrounding the WQCF site and establishing access corridors along pipeline alignments, this impact would be **significant**.

4.1.3 MITIGATION MEASURES

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

4.1-1: Potential for Division of an Established Community.

4.1-2: Potential Conflicts with Existing Land Uses in or Adjacent to the Project Area.

The following mitigation measure is recommended for the significant impact of Impact 4.1-3.

Mitigation Measure 4.1-3: Conversion of Important Farmland to Nonagricultural Use.

The City will pay the required City agricultural mitigation fee to help offset the conversion of Important Farmland. Consistent with Chapter 13.42 of the Manteca Municipal Code, a $2,000 agricultural mitigation fee will be assessed for every acre of Important Farmland that would be developed as part of the proposed project. A total of $82,000 ($2,000 multiplied by 41 acres) will be made available to acquire farmland conservation easements and/or farmland deed restrictions. Consistent with goals of the City's Right to Farm ordinance, this mitigation measure would reduce the occurrence of conflicts between nonagricultural and agricultural land uses from development pressure by preserving agricultural lands located within the project vicinity.

Implementation of this mitigation measure would substantially reduce significant impacts associated with the conversion of approximately 41 acres of Important Farmland on the WQCF site and along pipeline alignments because funding conservation easements would provide assistance to public and private sectors in protecting other farmland from the pressures of development. The agricultural mitigation fee would be used to specifically purchase farmland easements and/or farmland deed restrictions to partially offset project impacts; however, approximately 41 acres of Important Farmland would still be unavoidably lost. In addition, no new farmland would be made available, and the productivity of existing farmland would not be improved as a result of this mitigation measure. Thus, full compensation for losses of Important Farmland would not be achieved. No other feasible mitigation is available. Impact 4.1-3 (Conversion of Important Farmland to Nonagricultural Use) would remain **significant and unavoidable** after mitigation.

4.1.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

While the above mitigation measure would substantially reduce the project's agricultural resource impact, this measure would not eliminate the project's impact on Important Farmland (Impact 4.1-3) to a less-than-significant level. Therefore, this impact would remain significant and unavoidable.

4.2 VISUAL RESOURCES

This section describes the existing visual characteristics of the project area and evaluates the visual effects of the project. The analysis considers existing scenic resources and the potential visibility of project facilities from surrounding areas, including both the physical characteristics of the project and lighting and glare. The descriptions of the existing visual setting are accompanied by exhibits that provide photographs of representative views taken during a site visit in August 2006 (Exhibits 4.2-2 through 4.2-6). Photograph locations are shown in Exhibit 4.2-1.

4.2.1 ENVIRONMENTAL SETTING

VISUAL CHARACTER OF THE PROJECT AREA

The project area consists of the 22-acre wastewater quality control facility (WQCF) site, several alignments for the wastewater collection system and recycled-water distribution system pipeline (see Exhibit 3-3 in Chapter 3, "Project Description"), an outfall pipeline alignment and outfall structure at the San Joaquin River, and several potential pumping station sites throughout the city.

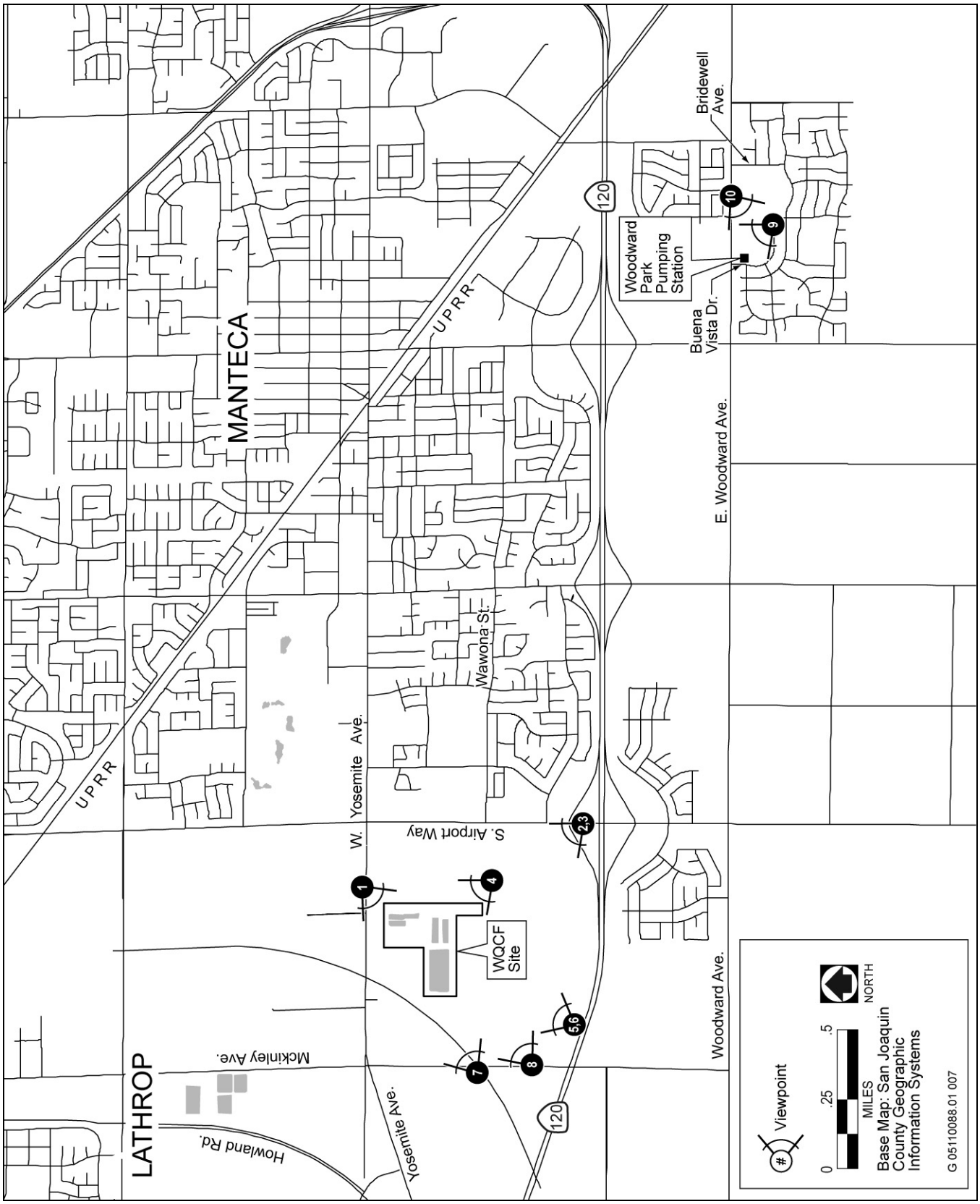
The city of Manteca is centrally located in the Central Valley near the northern end of the San Joaquin Valley, in San Joaquin County. Because the topography of Manteca is relatively flat, views of the cityscape and surrounding landscape are available only from the ground-level perspective and are limited to localized views rather than broad landscape views. Therefore, views of the project area from surrounding areas would be limited to those areas that have direct, unobstructed sight lines to project sites, or certain isolated locations that are at a slightly higher elevation than project sites and the surrounding area.

VISUAL CHARACTER OF THE WQCF SITE

The WQCF site is located near the western boundary of the city of Manteca, approximately 500 feet south of West Yosemite Avenue between South Airport Way and McKinley Avenue. The WQCF site is located within a greater 210-acre City-owned property that is bounded by West Yosemite Avenue to the north, State Route (SR) 120 to the south, and McKinley Avenue and the Union Pacific Railroad (UPRR) tracks to the west (see Exhibit 3-2 in Chapter 3, "Project Description"). The WQCF site includes 22 acres of flat land developed with industrial-type facilities including large warehouse-type buildings, administrative buildings, treatment towers, human-made ponds, large tanks, and other industrial wastewater treatment structures. Flat agricultural fields dominate the remainder of the WQCF property.

The topography of the WQCF site is generally flat with an elevation of 25 feet above mean sea level. The site is generally a rural tract of land located adjacent and west of the developing urban core of the City. Views from local roadways near the WQCF site generally consist of flat row crops, orchards, wastewater treatment structures, high-voltage power lines, and fallow land. West Yosemite Avenue and South Airport Way are local roadways that provide east-west and north-south access to the WQCF site. South Airport Way provides access to SR 120. SR 120 is a highly traveled roadway that provides access to SR 99 to the east and Interstate 5 (I-5) to the west.

Lands surrounding the 210-acre WQCF property are also flat and are used for agricultural production, residential subdivisions, active recreation, and commercial development. Commercial development is located directly north of the WQCF along West Yosemite Avenue, and the "Stadium Center" shopping center is approximately 2,000 feet to the south on SR 120. This 52-acre shopping center development consists of approximately 500,000 square feet of retail buildings located on the northwest corner of SR 120 and Airport Way. The shopping center is anchored by a Kohl's department store and includes six additional small to midsize box stores, three buildings for smaller shops, and seven pads for restaurants. A "Big League Dreams" recreational sports complex is located approximately 600 feet to the south. This 38-acre sports complex consists of a six baseball/softball fields, a multisport covered pavilion, a restaurant, multiple concession buildings, batting cages, sand volleyball courts, and children's playgrounds.



Source: Adapted by EDAW in 2007

Representative Viewpoint Locations **Exhibit 4.2-1**

Viewpoint 1 – View of the WQCF site looking southwest from West Yosemite Avenue. Two digester tanks and the octagonal biotowers are clearly visible in the middle ground.

Viewpoint 2 – View of the WQCF site looking northwest from the SR 120 overpass on South Airport Way. New construction associated with the Stadium Center shopping center can be seen in the foreground, and several WQCF structures are visible in the background.

Representative Photographs **Exhibit 4.2-2**

Viewpoint 3 – View of the WQCF site looking northwest from the SR 120 overpass on South Airport Way. New construction associated with the Stadium Center shopping center can be seen in the foreground and several WQCF structures (including digesters and octagonal biotowers) are visible in the background.

Viewpoint 4 – View of the WQCF site looking northwest from the northeast corner of the Big League Dreams parcel north of the Stadium Center shopping center. A cornfield is visible in the foreground and digesters, octagonal biotowers, and other WQCF structures are visible in the background.

Representative Photographs **Exhibit 4.2-3**

Viewpoint 5 – View of the WQCF site looking northeast from SR 120. Grassland areas can be seen in the foreground with the WQCF barely visible in the background.

Viewpoint 6 – View of the WQCF site looking northeast from SR 120. Grassland areas can be seen in the foreground with WQCF structures visible in the background.

Representative Photographs **Exhibit 4.2-4**

Viewpoint 7 – View of the WQCF site looking east from McKinley Avenue and the Union Pacific Railroad tracks. The WQCF is barely visible in the background.

Viewpoint 8 – View of the WQCF site looking northeast from McKinley Avenue. The WQCF is barely visible in the background.

Representative Photographs **Exhibit 4.2-5**

Viewpoint 9 – View of the Woodward Park pumping station looking northwest from Buena Vista Drive. The pumping station includes a tan brick structure and a small white structure surrounded by green fencing.

Viewpoint 10 – View of the Woodward Park pumping station looking southwest from Woodward Avenue. The pumping station includes a tan brick structure and a small white structure surrounded by green fencing.

Representative Photographs **Exhibit 4.2-6**

Residential housing is located beyond the agricultural lands surrounding the WQCF site along West Yosemite Avenue, McKinley Avenue, South Airport Way, and SR 120. These areas consist primarily of single-family homes. The general character of the surrounding area is described below.

- **North:** West Yosemite Avenue, a two- to four-lane roadway, is located immediately north of and perpendicular to the WQCF property. Commercial development and several residences are located along West Yosemite Avenue. Row crops, commercial warehouse buildings, and a few residences are visible from the WQCF site.

- **East:** Areas to the east of the WQCF site include row crops and an orchard. Rural residences along West Yosemite Avenue and South Airport Way are visible in the background.

- **South:** Row crops, an orchard, high-voltage power lines, and a recreational softball complex are located south of the WQCF site. Traffic along SR 120 and Coast Ranges can be seen in the background.

- **West:** Areas to the west of the WQCF site include row crops, the UPRR tracks, and scattered residences along McKinley Avenue. High-voltage power lines, traffic along SR 120, and the Coast Ranges are visible in the distant background.

REPRESENTATIVE VIEWPOINTS

Views of the WQCF site from surrounding areas are limited because of the relatively flat surrounding topography and the presence of existing row crops, orchards, other vegetation, and commercial and residential buildings. Distant views of the site are obstructed by surrounding orchard trees, row crops, residential and commercial development.

Open views of the WQCF site are generally limited to roadways in the project area. Representative off-site areas with views of the project site can be defined by four viewpoints. These viewpoints represent areas where publicly accessible direct views of the site were available (Exhibit 4.2-1). Implementation of the proposed project would also result in the construction of several influent pumping stations. Specific pumping station locations are not known at this time, but the pumping stations would be similar in appearance to the existing facility at Woodward Park. Therefore, views of the Woodward Park pumping station constitute representative views for the pumping stations proposed as part of this project.

The analysis presented below describes anticipated visual changes of the project sites from key, representative viewpoints. The general nature of existing views of the WQCF site and Woodward Park pumping station from the key representative viewpoints is described below.

Views from West Yosemite Avenue (Viewpoint 1)

A public access road connects the WQCF site to West Yosemite Avenue, located approximately 500 feet north of the site. West Yosemite Avenue is a two- to four-lane street running in an east-west direction. Views of the northern portion of the WQCF site from West Yosemite Avenue are mostly blocked by existing residences, commercial buildings, and vegetation. However, brief views of the site are available to motorists traveling along West Yosemite Avenue. From this viewpoint, row crops are visible in the foreground, and several WQCF structures including digester tanks and biotowers are visible in the background (Exhibit 4.2-2, Viewpoint 1).

Views from South Airport Way (Viewpoints 2, 3, and 4)

South Airport Way is located approximately 2,000 feet east of the WQCF site and is a well-traveled roadway providing direct access to SR 120. From the northern portion of the South Airport Way SR 120 overpass, the WQCF site is visible in the distant background beyond the Stadium Center shopping center, orchards, and row crops (Exhibits 4.2-2 and 4.2-3, Viewpoints 2 and 3). New construction associated with the Stadium Center

shopping center dominates the foreground, while orchards and abandoned agricultural land dominate the middleground views from this viewpoint. WQCF structures located in the southern, eastern, and northern portion of the WQCF site including aeration basins, digesters, and biotowers are clearly visible in the background (Exhibit 4.2-3, Viewpoint 3). Views of the WQCF are obstructed by commercial development, residences, and vegetation from nonelevated segments of South Airport Way. From the northeast corner of the Big League Dreams parcel located north of the Stadium Center shopping center and approximately 600 feet south of the WQCF site, WQCF structures are clearly visible in the background, and row crops dominate the foreground views (Exhibit 4.2-3, Viewpoint 4).

Views from SR 120 (Viewpoints 5 and 6)

SR 120 is located approximately 2,500 feet south of the WQCF site. Unobstructed views of the site are available along the highway segment west of the Stadium Center shopping center. In general, motorists and passengers traveling in either direction along SR 120 have direct views of WQCF structures located throughout the WQCF site. Foreground and middleground views are dominated by roadside grassland, abandoned agricultural fields, and active row crops. Several gray WQCF structures are barely visible in the distant background to the east of a tall row of trees (Exhibit 4.2-4, Viewpoints 5 and 6). Where views are available, they would be for short durations as motorists pass the site.

Views from McKinley Avenue (Viewpoints 7 and 8)

McKinley Avenue is located approximately 2,000 feet west of the WQCF site. Views of the WQCF site are mostly obstructed along McKinley Avenue, except for a few areas where row crops extend from the site to McKinley Avenue. Views of the project site are obstructed by orchards, residences, and vegetation. Foreground and middleground views of the WQCF site from the McKinley Avenue UPRR crossing are dominated by two sets of railroad tracks and agricultural fields. WQCF structures are barely visible in the background (Exhibit 4.2-5, Viewpoint 7). From a viewpoint south of the UPRR crossing, agricultural fields are visible in the foreground and middleground, with the WQCF site barely visible in the background (Exhibit 4.2-5, Viewpoint 8).

Views from East Woodward Avenue and Buena Vista Drive (Viewpoints 9 and 10)

East Woodward Avenue is located in the southeast portion of the city, south of SR 120 and east of Manteca Road. The existing Woodward Park pumping station is located near the intersection of East Woodward Avenue and Buena Vista Drive. The pumping station is located on the edge of a neighborhood park and is surrounded by the Woodward West and Emerald Glen subdivisions. Views of the pumping station from Buena Vista Drive and Woodward Avenue consist of open parkland in the foreground, and tan and white pumping station structures in the background. A green fence and several small evergreen trees surrounding the pumping station structures are also visible, and visually blend with the facility and the surrounding residences (Exhibit 4.2-6, Viewpoints 9 and 10).

LIGHT AND GLARE

A small amount of lighting currently exists on the WQCF site. Existing nighttime lighting sources at the site consist of emergency and other WQCF facility lighting. Nearby overhead pole lights associated with the Big League Dreams softball complex also contribute a significant amount of nighttime lighting to the project area. In general, dominant nighttime lighting sources in the project area originate from the Big League Dreams complex, the WQCF site, commercial development on West Yosemite Avenue, SR 120, and the Stadium Center shopping center.

REGULATORY SETTING

Federal Plans, Policies, Regulations, and Laws

No federal plans, policies, regulations, or laws are applicable to the proposed project.

State Plans, Policies, Regulations, and Laws

The California Department of Transportation (Caltrans) manages the California Scenic Highway Program. The goal of this program is to preserve and protect scenic highway corridors from changes that would affect the aesthetic value of the land adjacent to highways.

There are no state-designated highways or eligible routes or roadways in the project area. The nearest state-designated highway segment is I-5 from SR 152 to SR 205, approximately 15 miles southwest of the project area (Caltrans 1999). Views of the project area from this segment of I-5 are not available because of the extended distance to the site and intervening topography. Neither SR 99, located in the eastern part of the project area, nor SR 120, located south of the WQCF site, are state-designated scenic highways.

Regional and Local Plans, Policies, Regulations, and Ordinances

The *City of Manteca General Plan 2023* (City general plan) outlines goals and policies associated with aesthetic resources. The following policies from the Community Design Element are relevant to this analysis.

- **Policy CD-P-44:** Provide minimal levels of street, parking, building, site, and public area lighting to meet safety standards and provide direction.
- **Policy CD-P-45:** Provide directional shielding for all exterior lighting to minimize the annoyance of direct or indirect glare.
- **Policy CD-P-46:** Provide automatic shutoff or motion sensors for lighting features in newly developed areas.

4.2.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

This visual impact analysis is based on a field survey and review of representative viewpoints of the WQCF site and Woodward Park pumping station in relation to the surrounding vicinity. The elements of the project were compared to existing views of the WQCF site and Woodward Park pumping station to determine how the project would change foreground, middleground, and background views where appropriate. In addition, the project was reviewed for its overall visual impacts using the standards of quality, consistency, and symmetry typically used for a visual assessment. The visual impacts were compared against the thresholds of significance discussed below.

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines. The proposed project would result in significant visual resources impacts if it would:

- have a substantial adverse effect on a scenic vista,
- substantially degrade the existing visual character or quality of the site and its surroundings,
- cause a substantial inconsistency between the project and guidelines in the City general plan, or

- create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

IMPACT ANALYSIS

IMPACT 4.2-1 Visual Resources—Impacts on a Scenic Vista. *No views on or near the WQCF site or potential pumping station sites would be considered a scenic vista. Therefore, development of the project would not alter or obscure views of a scenic vista. This impact would be* ***less than significant****.*

A scenic vista is generally considered a view of an area that has remarkable scenery or a resource that is indigenous to the area. The WQCF site, roadways for the pipeline alignments for the proposed collection system and recycled-water distribution system, and subdivisions where potential pumping station sites would be located do not include any aesthetic resources that would be considered a scenic vista because they consist primarily of existing WQCF structures and agricultural lands that are relatively common in other areas of the city and are not unique to the surrounding visual setting. Further, because on-site agricultural activities and WQCF structures have altered the natural landscape, the WQCF site does not provide views of the indigenous natural landscape. Although the current land uses provide views of an agricultural landscape that is representative of the region, the WQCF site does not contain resources that are exemplary of the agricultural history of the area (i.e., historic structures or landmarks) (see Section 4.12, "Cultural Resources"). Potential pumping station sites would be one-quarter acre or less and located in developed areas of the city. In addition, pumping stations would be predominantly below grade.

The proposed pipeline alignments, WQCF, and pumping station sites are generally flat and many are screened by orchard trees, vegetation, and residential and commercial development. Although some views of the distant Coast Ranges are available from the WQCF site, no areas that would qualify as a scenic vista are located near the project sites. Therefore, there is little opportunity for project activities to obscure views of scenic vistas that may be located outside the proposed pipeline alignments, WQCF, and pumping station sites. Because the project would not have a substantial adverse affect on a scenic vista, this would be a **less-than-significant** impact.

IMPACT 4.2-2 Visual Resources—Damage to Scenic Resources within a State Scenic Highway. *No state scenic highways are located within the vicinity of the project area. Therefore, implementation of the project would not result in damage to scenic resources along a state scenic highway. This impact would be* ***less than significant****.*

A scenic resource is generally a resource, landmark, or area that has been noted for its outstanding scenic qualities and is thereby protected because of those qualities. A scenic resource within a state scenic highway is a resource that is noted for its outstanding scenic qualities and is visible from a state-designated scenic highway. There are no scenic state-designated highways or eligible routes, or scenic roadways designated by the City of Manteca or San Joaquin County, in the immediate project area. The nearest state-designated scenic highway is a segment of I-5 approximately 17 miles southwest of the project area; the designation is from the San Joaquin County line north to SR 205. Because of the large distance between this state-designated scenic highway segment and the project area, the WQCF and pumping station sites are not visible from this scenic highway segment. Therefore, the project would have a **less-than-significant** impact on scenic resources within a state-designated highway.

IMPACT 4.2-3 Visual Resources—Impacts on Existing Visual Character. *Implementation of the proposed project would result in an increase in the number of structures at the WQCF site and would result in the construction of pumping stations and a side-bank outfall structure. WQCF facilities would be similar in size and mass to existing structures and would appear to blend with existing facilities at the WQCF. Pumping station and side-bank outfall facilities would also be similar in size and mass to existing facilities and would appear to blend with existing residences and outfall structures. Therefore, the project would not substantially alter the existing visual character of the project area. This would be a* ***less-than-significant*** *impact.*

The project would result in the construction of a parallel outfall pipeline, a side-bank outfall structure, three large-diameter wastewater collection system pipeline alignments, a recycled-water-distribution pipeline system, and an expanded WQCF. In addition, the project would result in the construction of several wastewater pumping stations.

Pipelines constructed as part of the proposed project (including the collection system sewers, recycled-water distribution system, and the outfall pipeline) would be underground and would not be visible and would not degrade or substantially change the visual character of the project area. The new side-bank outfall structure would be similar in size and mass to the existing outfall structure.

Although specific wastewater pumping station locations are not known at this time, pumping stations would be similar in appearance to the existing facility at Woodward Park. Permanent pumping stations would be constructed in the Union Ranch development north of Lathrop Road and at the westerly terminus of Woodward Avenue near the Tara Park development in southwest Manteca, and interim pumping stations may be constructed in other developed subdivisions depending on the completion schedule of the wastewater collection system pipelines. Pumping stations would be predominantly below grade, and landscaping and fencing would be provided and would allow the pumping stations to visually blend with residential surroundings (Exhibit 4.2-6, Viewpoints 9 and 10).

WQCF site structures would be similar in size and mass to existing on-site facilities. In general, off-site views of the treatment facilities would not substantially change from existing conditions. The facilities would still be visible in the distance, but would appear to be denser because of the increased number of buildings on-site and would blend in with existing facilities because residences, commercial buildings, row crops, orchards, and other vegetation would continue to serve as a visual screen from some viewpoints.

Because pipelines associated with the proposed project would be underground and would not be visible and would not degrade or substantially change the visual character of the project area, the new side-bank outfall structure would be similar in size and mass to the existing structure, pumping stations would visually blend with residential surroundings, and WQCF site structures would be similar in size and mass to existing on-site facilities, the project's visual impacts would be **less than significant**.

IMPACT 4.2-4 Visual Resources—Impacts of Construction-Related Nighttime Lighting. *Project construction could, at times, continue past dusk. High-intensity lighting may be used to illuminate construction sites associated with the WQCF site, pumping stations, parallel outfall pipeline, and pipeline alignments. This lighting could be visible to nearby residences and could contribute to skyglow in the surrounding area. Although construction-related lighting would be temporary, it could result in intrusive glare in areas adjacent to project construction sites. This would be a* ***potentially significant*** *construction-related lighting impact.*

Lighting associated with construction activities could potentially affect sensitive visual receptors located in the vicinity of the project. If construction activities continue past dusk, high-intensity lighting would be required to illuminate construction sites. This would be a substantial additional source of lighting beyond the existing lighting at the WQCF site, pumping station sites, and along pipeline alignments. Existing nighttime lighting sources at the WQCF site consist of emergency and other facility lighting. Although nearby overhead pole lighting associated with the Big League Dreams recreational softball complex and the Stadium Center shopping area also contribute a significant amount of nighttime lighting to the WQCF area, construction lighting may be needed during periods when lighting is not needed at the softball complex and shopping area. Therefore, project construction lighting could be visible at the WQCF site and nearby residences to the north, east, and west. Because construction lighting could be visible to residences near the WQCF site, pumping station sites, and along pipeline alignments, and could result in intrusive glare in adjacent residential areas during nighttime hours, this would be a **potentially significant** construction-related lighting impact.

IMPACT 4.2-5 Visual Resources—Increase in Operational Nighttime Lighting. *The project would increase the use of lighting during nighttime hours at the WQCF and proposed pump stations. However, the proposed lighting would be similar in function and design to existing on-site lighting or nearby subdivision lighting sources and would blend with existing sources so as not to substantially increase the amount of nighttime illumination in these areas. Further, proposed lighting sources would meet the City's lighting standards adopted for the purpose of minimizing nighttime light and glare. This would be a* ***less-than-significant*** *impact.*

Permanent lighting may be necessary for nighttime operations at the WQCF and pumping stations. Facilities would be illuminated by overhead pole lights or low-intensity emergency lighting. Lighting would be similar in function and design to existing light sources for the WQCF and Woodward Park pumping station. New lighting sources would blend with existing sources so as not to result in a substantial increase in the amount of nighttime illumination at the WQCF site. Project lighting would be designed and installed in accordance with City general plan policies concerning minimum lighting levels, directional shielding, and automatic shutoff features (Policies CD-P-44, CD-P-45, and CD-P-46). Because lighting would be similar in function and design to existing light sources for the WQCF and Woodward Park pumping station, new lighting sources would blend with existing sources, and new lighting would be designed and installed in accordance with City general plan lighting policies, impacts related to construction-related nighttime lighting would be **less than significant**.

4.2.3 MITIGATION MEASURES

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

4.2-1: Impacts on a Scenic Vista.

4.2-2: Damage to Scenic Resources within a State Scenic Highway.

4.2-3: Impacts on Existing Visual Character.

4.2-5: Increase in Operational Nighttime Lighting.

The following mitigation measure is recommended for the potentially significant impact of Impact 4.2-4.

Mitigation Measure 4.2-4: Impacts of Construction-Related Nighttime Lighting.

If construction activity occurs after dusk and nighttime lighting is required to illuminate any construction sites associated with the proposed project, the City will ensure that all construction lights are directed away from adjacent development and that all construction lighting is shielded to minimize glare. Implementation of this mitigation measure would reduce impacts of construction-related lighting to **less-than-significant** levels.

4.2.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of Mitigation Measure 4.2-4, the project's potential construction-related lighting impacts would be reduced to a less-than-significant level because the City would ensure that all nighttime lighting sources would be directed away from sensitive receptors and shielded to prevent glare.

4.3 AIR QUALITY

This section includes a description of existing air quality, a summary of applicable regulations, and analyses of potential short-term and long-term air quality impacts of the proposed project. The methods of analysis for short-term construction, long-term regional (operational), local mobile source, odor, and toxic air contaminant (TAC) emissions are consistent with the recommendations of the San Joaquin Valley Air Pollution Control District (SJVAPCD). Mitigation measures are recommended, as necessary, to reduce significant air quality impacts.

4.3.1 ENVIRONMENTAL SETTING

The project site is located in San Joaquin County, which is within the San Joaquin Valley Air Basin (SJVAB). The SJVAB also comprises all of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties, and the valley portion of Kern County. Ambient concentrations of air pollutants are determined by the amount of emissions released by pollutant sources and the atmosphere's ability to transport and dilute such emissions. Natural factors which affect transport and dilution include terrain, wind, atmospheric stability, and the presence of sunlight. Therefore, existing air quality conditions in the area are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources, as discussed separately below.

TOPOGRAPHY, METEOROLOGY, AND CLIMATE

The SJVAB, which occupies the southern half of the Central Valley, is approximately 250 miles long and, on average, 35 miles wide. The SJVAB is a well-defined climatic region with distinct topographic features on three sides. The Coast Range, which has an average elevation of 3,000 feet, is located on the western border of the SJVAB. The San Emigdio Mountains, which are part of the Coast Range, and the Tehachapi Mountains, which are part of the Sierra Nevada, are both located on the south side of the SJVAB. The Sierra Nevada forms the eastern border of the SJVAB. The northernmost portion of the SJVAB is San Joaquin County. There is no topographic feature delineating the northern edge of the basin. The SJVAB can be considered a "bowl" open only to the north.

The SJVAB is basically flat with a downward gradient in terrain to the northwest. Air flows into the SJVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Sacramento–San Joaquin Delta (Delta) from the San Francisco Bay Area. The mountains surrounding the SJVAB create a barrier to airflow, which leads to the entrapment of air pollutants when meteorological conditions are unfavorable for transport and dilution. As a result, the SJVAB is highly susceptible to pollutant accumulation over time.

The inland Mediterranean climate type of the SJVAB is characterized by hot, dry summers and cool, rainy winters. The climate is a result of the topography and the strength and location of a semipermanent, subtropical high-pressure cell. During summer, the Pacific high-pressure cell is centered over the northeastern Pacific Ocean, resulting in stable meteorological conditions and a steady northwesterly wind flow. Upwellings of cold ocean water from below to the surface, because of the northwesterly flow, produce a band of cold water off the California coast. Daily summer high temperatures often exceed 100ºF, averaging in the low 90s in the north and high 90s in the south. In the entire SJVAB, daily summer high temperatures average 95ºF. Over the last 30 years, temperatures in the SJVAB averaged 90ºF or higher for 106 days a year, and 100ºF or higher for 40 days a year. The daily summer temperature variation can be as high as 30ºF (SJVAPCD 2002). In winter, the Pacific high-pressure cell weakens and shifts southward, resulting in wind flow offshore, the absence of upwelling, and storms. Average high temperatures in the winter are in the 50s, but lows in the 30s and 40s can occur on days with persistent fog and low cloudiness. The average daily low temperature in the winter is 45ºF (SJVAPCD 2002).

Temperature and solar radiation are particularly important in the chemistry of ozone formation, which is a photochemical reaction requiring sunlight. Generally, the higher the temperature, the more ozone is formed,

because reaction rates increase with temperature. However, extremely high temperatures can "lift" or "break" an inversion layer, allowing dispersal of these pollutants.

The vertical dispersion of air pollutants in the SJVAB is limited by the presence of persistent temperature inversions. Because of expansion-related cooling of the atmosphere, air temperature usually decreases with altitude, and a reversal of this atmospheric state, where the air temperature increases with height, is termed an inversion. Inversions can exist at the surface, or at any height above the ground. The height of the base of the inversion, the level to which pollutants can mix vertically, is known as the "mixing height."

There are two principal types of inversions that occur in the SJVAB: surface or radiation inversions, and subsidence inversions. Surface inversions are formed when the ground surface becomes cooler than the air above it during the night; the inversion is dissipated when heat from the sun warms the ground, which in turn heats the lower layers of air, which rise to break up the inversion layer. Summer radiation inversion mixing heights are usually encountered 2,000–2,500 feet above the valley floor; during the winter, radiation inversion heights are typically 500–1,000 feet above the valley floor.

Subsidence inversions occur as air is pushed downward by, for example, the movement of air over mountain ranges, or by differential pressure changes in the atmosphere. As this air moves downward, its pressure increases, causing its temperature to increase. The warm layer of air created by this phenomenon will descend to some relatively static elevation above the ground, creating a low inversion layer. This type of inversion is quite persistent, because heat from the ground does not reach the inversion base to break it up. This is common in high-pressure areas along the coast.

Precipitation and fog tend to reduce or limit the concentrations of some pollutants. Clouds and fog block the solar radiation needed for ozone generation, reduce the concentrations of water-soluble carbon monoxide (CO), and reduce concentrations of particulate matter. A majority of the precipitation in the SJVAB occurs as rainfall during winter storms. The rare occurrence of precipitation during the summer is in the form of convective rain showers. The amount of precipitation in the SJVAB decreases from north to south primarily because the Pacific storm track often passes through the northern portion of the SJVAB, while the southern portion remains protected by the Pacific high-pressure cell. Stockton in the north receives about 20 inches of precipitation per year, Fresno in the center receives about 10 inches per year, and Bakersfield at the southern end of the valley receives less than 6 inches per year. Average annual rainfall for the entire SJVAB is approximately 9.25 inches on the valley floor (SJVAPCD 2002).

Between winter storms, high pressure and light winds allow cold moist air to pool on the SJVAB floor, which creates strong low-level temperature inversions and very stable air conditions leading to the famous tule fog. The formation of natural fog is caused by local cooling of the atmosphere until it is saturated (dew point temperature). Conditions favorable to fog formation are also conditions favorable to high concentrations of CO and respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}); ozone levels are low during these periods because of the lack of sunlight. Maximum CO concentrations tend to occur on clear, cold nights when a strong surface inversion is present and large numbers of fireplaces are in use. A secondary peak in CO concentrations occurs during morning commute hours when a large number of motorists are on the road and the surface inversion has not yet broken.

Aside from the correlation between conditions that contribute to fog formation and those that contribute to high wintertime pollutant concentrations, fog itself can influence airborne pollutant concentrations. The water droplets in fog can act as a sink for CO and oxides of nitrogen (NO_X), lowering pollutant concentrations. At the same time, fog helps in the formation of secondary particulates such as ammonium sulfate. These secondary particulates are believed to be a significant contributor to winter-season violations of the particulate matter standards.

Summer is considered the ozone season in the SJVAB. This season is characterized by poor air movement in the mornings and by longer daylight hours, which provide a plentiful amount of sunlight to fuel photochemical

reactions between reactive organic gases (ROG) and NO_X. These photochemical reactions, in turn, result in ozone formation. During the summer, wind speed and direction data indicate that summer wind usually originates at the north end of the San Joaquin Valley and flows in a south-southeasterly direction through Tehachapi Pass and into the Southeast Desert Air Basin (SJVAPCD 2002).

EXISTING AIR QUALITY CONDITIONS—CRITERIA AIR POLLUTANTS

Concentrations of the following air pollutants: ozone, CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable and fine particulate matter (PM_{10} and $PM_{2.5}$), and lead are used as indicators of ambient air quality conditions. Because these are the most prevalent air pollutants known to be deleterious to human health, and because there is extensive documentation available on health-effects criteria for these pollutants, they are commonly referred to as "criteria air pollutants."

A brief description of each criteria air pollutant, including source types, health effects, and future trends, is provided below along with the most current attainment area designations and monitoring data for the project area and vicinity.

Ozone

Ozone is a photochemical oxidant, a substance whose oxygen combines chemically with another substance in the presence of sunlight, and the primary component of smog. Ozone is not directly emitted into the air, but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that results from the combustion of fuels. A highly reactive molecule, ozone readily combines with many different components of the atmosphere. Consequently, high levels of ozone tend to exist only while high ROG and NO_X levels are present to sustain the ozone formation process. Once the precursors have been depleted, ozone levels rapidly decline. Because these reactions occur on a regional scale, ozone is considered a regional pollutant.

Ozone located in the upper atmosphere (stratosphere) acts in a beneficial manner by shielding the earth from harmful ultraviolet radiation that is emitted by the sun. However, ozone located in the lower atmosphere (troposphere) is a major health and environmental concern. Meteorology and terrain play a major role in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and clear skies provide the optimum conditions for formation. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. Therefore, ozone is a regional pollutant that often affects large areas. In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport, meteorology, and atmospheric chemistry (Godish 1991).

The adverse health effects associated with exposure to ozone pertain primarily to the respiratory system. Scientific evidence indicates that ambient levels of ozone affect not only sensitive receptors, such as asthmatics and children, but healthy adults as well. Exposure to ambient levels of ozone ranging from 0.10 to 0.40 part per million (ppm) for 1–2 hours has been found to significantly alter lung functions by increasing respiratory rates and pulmonary resistance, decreasing tidal volumes (the amount of air inhaled and exhaled), and impairing respiratory mechanics. Ambient levels of ozone above 0.12 ppm are linked to symptomatic responses that include such symptoms as throat dryness, chest tightness, headache, and nausea. In addition to the above adverse health effects, evidence also exists relating ozone exposure to an increase in permeability of respiratory epithelia; such increased permeability leads to an increased response of the respiratory system to challenges, and a decrease in the immune system's ability to defend against infection. (Godish 1991).

Emissions of ozone precursors ROG and NO_X have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning fuels. The ozone problem in the SJVAB ranks among the most severe in the state. Peak levels have not declined as much as the number of days that standards are exceeded has declined. From 1985 to 2004, the maximum peak 8-hour indicator decreased by only 2%. The number of days when the national 8-hour standard has been exceeded has been quite variable over the years. This variability has resulted in part from the influence of meteorology as well as changes to the monitoring network. The monitoring network was not as extensive during the 1980s as it has been during the last 14 years. For this reason, the period of 1990–2005 provides a better indication of trends. During this period, there was an 8% decrease in the 3-year average of the number of exceedance days of the national 8-hour standard (ARB 2006a).

Carbon Monoxide

CO is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels, primarily from mobile (transportation) sources. In fact, 77% of the nationwide CO emissions are from mobile sources. The other 23% consists of CO emissions from wood-burning stoves, incinerators, and industrial sources.

CO enters the bloodstream through the lungs by combining with hemoglobin, which normally supplies oxygen to the cells. However, CO combines with hemoglobin much more readily than oxygen does, resulting in a drastic reduction in the amount of oxygen available to the cells. Adverse health effects associated with exposure to CO concentrations include such symptoms as dizziness, headaches, and fatigue. CO exposure is especially harmful to individuals who suffer from cardiovascular and respiratory diseases (EPA 2006a).

The highest concentrations are generally associated with cold, stagnant weather conditions that occur during the winter. In contrast to problems caused by ozone, which tends to be a regional pollutant, CO problems tend to be localized.

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2 (EPA 2006a). The combined emissions of NO and NO_2 are referred to as NO_X and reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local NO_X emission sources.

Inhalation is the most common route of exposure to NO_2. Because NO_2 has relatively low solubility in water, the principal site of toxicity is in the lower respiratory tract. The severity of the adverse health effects depends primarily on the concentration inhaled rather than the duration of exposure. An individual may experience a variety of acute symptoms, including coughing, difficulty with breathing, vomiting, headache, and eye irritation during or shortly after exposure. After a period of approximately 4–12 hours, an exposed individual may experience chemical pneumonitis or pulmonary edema with breathing abnormalities, cough, cyanosis, chest pain, and rapid heartbeat. Severe, symptomatic NO_2 intoxication after acute exposure has been linked on occasion with prolonged respiratory impairment with such symptoms as chronic bronchitis and decreased lung functions (EPA 2006a).

Sulfur Dioxide

SO_2 is produced by such stationary sources as coal and oil combustion, steel mills, refineries, and pulp and paper mills. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. SO_2 is a respiratory irritant with constriction of the bronchioles occurring with inhalation of SO_2 at 5 ppm or more. On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration

rather than duration of the exposure is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis.

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires and natural windblown dust, and particulate matter formed in the atmosphere by condensation and/or transformation of SO_2 and ROG (EPA 2006a). Fine particulate matter ($PM_{2.5}$) includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less (ARB 2006a).

The adverse health effects associated with PM_{10} depend on the specific composition of the particulate matter. For example, health effects may be associated with metals, polycyclic aromatic hydrocarbons (PAH), and other toxic substances adsorbed onto fine particulate matter (referred to as the "piggybacking effect"), or with fine dust particles of silica or asbestos. Generally, adverse health effects associated with PM_{10} may result from both short-term and long-term exposure to elevated concentrations and may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations to the immune system, carcinogenesis, and premature death (EPA 2007a). $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and may contain substances that are particularly harmful to human health.

Direct emissions of PM_{10} remained relatively unchanged between 1975 and 2005 and are projected to remain unchanged through 2020. PM_{10} emissions in the SJVAB are dominated by emissions from areawide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, waste burning, and residential fuel combustion. Direct emissions of $PM_{2.5}$ decreased from 1975 to 2005 and are projected to continue decreasing through 2020. $PM_{2.5}$ emissions in the SJVAB are dominated by emissions from the same areawide sources as PM_{10} (ARB 2006a).

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, as discussed in detail below, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the U.S. Environmental Protection Agency (EPA) set national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. EPA banned the use of leaded gasoline in highway vehicles in December 1995 (EPA 2006a).

As a result of EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector have declined dramatically (95% between 1980 and 1999), and levels of lead in the air decreased by 94% between 1980 and 1999. Transportation sources, primarily airplanes, now contribute only 13% of lead emissions. A National Health and Nutrition Examination Survey reported a 78% decrease in the levels of lead in people's blood between 1976 and 1991. This dramatic decline can be attributed to the move from leaded to unleaded gasoline (EPA 2006a).

The decrease in lead emissions and ambient lead concentrations over the past 25 years is California's most dramatic success story with regard to air quality management. The rapid decrease in lead concentrations can be attributed primarily to phasing out the lead in gasoline. This phase-out began during the 1970s, and subsequent California Air Resources Board (ARB) regulations have virtually eliminated all lead from gasoline now sold in

California. All areas of the state are currently designated as attainment for the state lead standard (EPA does not designate areas for the national lead standard). Although the ambient lead standards are no longer violated, lead emissions from stationary sources still pose "hot spot" problems in some areas. As a result, ARB identified lead as a TAC.

Monitoring Station Data and Attainment Area Designations

Criteria air pollutant concentrations are measured at several monitoring stations in the SJVAB. There are three stations in San Joaquin County, two in Stockton and one in Tracy. The Hazelton Street station in Stockton, approximately 10 miles north of the project site measures ozone, NO_2, PM_{10}, and $PM_{2.5}$. Table 4.3-1 summarizes the air quality data from this station for the most recent 3 years, 2003 through 2005. The data is not necessarily representative of the project site, because of the distance from the monitor to the site.

Table 4.3-1
Summary of Annual Ambient Air Quality Data (2004–2006)—Hazelton Station

	2004	2005	2006
Ozone			
Maximum concentration (1-hr/8-hr, ppm)	0.096/0.080	0.099/0.086	0.109/0.92
Number of days state standard exceeded (1-hr)	1	3	6
Number of days national standard exceeded (1-hr/8-hr)	0/0	0/1	0/3
Nitrogen Dioxide (NO_2)			
Maximum concentration (1-hr, ppm)	0.079	0.087	0.072
Number of days state standard exceeded (1-hr)	0	0	0
Annual Average (ppm)	0.017	0.017	0.018
Fine Particulate Matter ($PM_{2.5}$)			
Maximum concentration ($\mu g/m^3$) National/California[1]	41/41	63/70	47/53
Number of days national standard exceeded (measured[2])	0	0	0
State annual average ($\mu g/m^3$)	13.2[3]	12.5	13.1
Respirable Particulate Matter (PM_{10})			
Maximum concentration ($\mu g/m^3$)	176/61	79/84	82/85
Number of days state standard exceeded (calculated[2])	18	46	63
Number of days national standard exceeded (calculated[2])	1	0	0

Notes:
ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter
[1] State and national statistics may differ for the following reasons: State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. State statistics are based on *local* conditions National statistics are based on *standard* conditions. State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
[2] Measured days are those days that an actual measurement was greater than the level of the state daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.
[3] The state annual standard was exceeded in 2004 and 2006.
Source: ARB 2007a

Both ARB and the U.S. Environmental Protection Agency (EPA) use this type of monitoring data to designate areas according to attainment status for criteria air pollutants established by the agencies. The purpose of these designations is to identify those areas with air quality problems and thereby initiate planning efforts for

improvement. The three basic designation categories are nonattainment, attainment, and unclassified. Unclassified is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. In addition, the California designations include a subcategory of the nonattainment designation, called nonattainment-transitional. The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment. The most current attainment designations for the San Joaquin County portion of the SJVAB are shown in Table 4.3-2 for each criteria air pollutant. On July 6, 2006, the EPA proposed redesignation for the SJVAB as a PM_{10} attainment area, based on the attainment of the national standard in the 2003 through 2005 period. The EPA finalized approval of the attainment designation on October 17, 2006 (SJVAPCD 2006a).

Wastewater Quality Control Facility Emissions

The Manteca Wastewater Quality Control Facility (WQCF) emissions of criteria pollutants for 2004 are shown in Table 4.3-3. This is the latest data available from ARB (ARB 2006b).

Table 4.3-3
WQCF Criteria Pollutant Emissions—2004

Pollutant	Emissions (Tons per Year)
Reactive Organic Gases	0.07
Oxides of Nitrogen	0.54
Carbon Monoxide	0.18
Sulfur Dioxide	0.58
Respirable Particulate Matter	<0.01
Fine Particulate Matter	<0.01

Source: City of Manteca 2004

EXISTING AIR QUALITY CONDITIONS—TOXIC AIR CONTAMINANTS

Concentrations of TACs, or in federal parlance, hazardous air pollutants (HAPs), are also used as indicators of ambient-air-quality conditions. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the *California Almanac of Emissions and Air Quality* (ARB 2006a), the majority of the estimated health risk from TACs can be attributed to relatively few compounds, the most important being PM from diesel-fueled engines (diesel PM). Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present.

Table 4.3-2
Ambient Air Quality Standards and San Joaquin County Attainment Status Designations

Pollutant	Averaging Time	California		National Standards [1]		
		Standards [2,3]	Attainment Status [4]	Primary [3,5]	Secondary [3,6]	Attainment Status [7]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	N (Severe)	-[9]	-	-
	8-hour	0.07 ppm[8] (137 µg/m^3)	–	0.08 ppm (157 µg/m^3)	Same as Primary Standard	N(Serious)
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	A[11]	35 ppm (40 mg/m^3)	–	U/A
	8-hour	9 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)		
Nitrogen Dioxide (NO_2)[15]	Annual Arithmetic Mean	0.03 ppm (56 µg/m^3)	–	0.053 ppm (100 µg/m^3)	Same as Primary Standard	U/A
	1-hour	0.18 ppm (338 µg/m^3)	A	–		–
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	–	0.030 ppm (80 µg/m^3)	–	U
	24-hour	0.04 ppm (105 µg/m^3)	A	0.14 ppm (365 µg/m^3)	–	
	3-hour	–	–	–	0.5 ppm (1300 µg/m^3)	
	1-hour	0.25 ppm (655 µg/m^3)	A	–	–	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	N	–[12]	Same as Primary Standard	Attainment[13]
	24-hour	50 µg/m^3		150 µg/m^3		
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	N	15 µg/m^3	Same as Primary Standard	N
	24-hour	–	–	35 µg/m^3 [14]		
Lead[10]	30-day Average	1.5 µg/m^3	U	–	–	–
	Calendar Quarter	–	–	1.5 µg/m^3	Same as Primary Standard	
Sulfates	24-hour	25 µg/m^3	A	**No National Standards**		
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)	U			
Vinyl Chloride[10]	24-hour	0.01 ppm (26 µg/m^3)	U/A			

Table 4.3-2
Ambient Air Quality Standards and San Joaquin County Attainment Status Designations

Pollutant	Averaging Time	California		National Standards [1]		
		Standards [2,3]	Attainment Status [4]	Primary [3,5]	Secondary [3,6]	Attainment Status [7]
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U			

[1] National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.

[2] California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[3] Concentration expressed first in units in which it was promulgated [i.e., parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$)]. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Unclassified (U): a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): a pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): a pollutant is designated nonattainment if there was a least one violation of a state standard for that pollutant in the area.
Nonattainment/Transitional (NT): is a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the standard for that pollutant.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Nonattainment (N): any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[8] This concentration effective May 17, 2006.

[9] The 1-hour ozone NAAQS was revoked on June 15, 2005.

[10] ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[11] Designation for San Joaquin County; the designation is different for one or more other counties in the SJVAB

[12] The EPA has revoked the annual standard for PM_{10}; the revocation will be effective December 18, 2006.

[13] On October 17, 2006, the EPA finalized redesignation to Attainment.

[14] The 24-hour standard for $PM_{2.5}$ has been reduced from 65 $\mu g/m^3$ to 35 $\mu g/m^3$, effective December 18, 2006.

[15] The CAAQS were amended on February 22, 2007, to lower the 1-hour standard to 0.18 ppm and establish a new annual standard of 0.03 ppm. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law, expected later this year.

Sources: SJVAPCD 2006a, 2006b; ARB 2006c, 2007b; EPA 2006b

Unlike the other TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. However, ARB has made preliminary concentration estimates based on a PM exposure method. This method uses the ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies to estimate concentrations of diesel PM. In addition to diesel PM, the TACs for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene.

Diesel PM poses the greatest health risk among these 10 TACs. Based on receptor modeling techniques, ARB estimated the diesel PM health risk in the SJVAB in 2000 to be 390 excess cancer cases per million people. Since 1990, the health risk of diesel PM in the SJVAB has been reduced by 50%. Overall, levels of most TACs, except for para-dichlorobenzene and formaldehyde, have gone down since 1990 (ARB 2006a).

EXISTING AIR QUALITY CONDITIONS—ODORS

Odors are generally regarded as an annoyance rather than a health hazed. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

The existing WQCF is a source of odors as a result of the biological processes that occur within the treatment process. Persons who have been bothered by the odors from the WQCF, as well as from many other sources in the wastewater collection (sewer) system, have telephoned complaints to the WQCF staff. A history of complaints from the WQCF logs from May 04, 2001 through July 08, 2005 shows a total of 44 calls. The years and nature of these calls are summarized in Table 4.3-4. Of the three calls in 2005, one was related to composting in a park not near the WQCF, one was related to the sludge drying beds, and one to the equalization ponds.

Persons with odor complaints may also contact the SJVAPCD. The SJVAPCD reported one call received in recent years. The call was in June 2003, during same the period of 8 complaints received at the WQCF (SJVAPCD 2006c).

Table 4.3-4 Odor Complaints to WQCF—2001–2005		
Period and Year	Number	Comments
May–June 2001	5	1 call may have been WQCF source
March–October 2002	14	9 of 14 calls were likely WQCF source
May–September 2003	17	11 of 17 calls were likely WQCF source; 8 calls from a short period in June
January–July 2004	5	1 call likely WQCF source
April–July 2005	3	2 calls WQCF source
Source: City of Manteca 2006		

REGULATORY SETTING

Air quality within San Joaquin County is regulated by EPA, ARB, SJVAPCD, San Joaquin County, and the City of Manteca. Each of these agencies develops rules, regulations, policies, and/or goals to comply with applicable legislation. Although EPA regulations may not be superseded, both state and local regulations may be more stringent.

Federal Plans, Policies, Regulations, and Laws

At the federal level, EPA has been charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments made by Congress were in 1990.

The CAA required EPA to establish NAAQS. As shown in Table 4.3-2, EPA has established primary and secondary NAAQS for the following criteria air pollutants: ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The primary standards protect the public health and the secondary standards protect public welfare. The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA must review all state SIPs to determine whether they conform to the mandates of the CAA and the amendments thereof, and to determine whether implementing them will achieve air quality goals. If EPA determines a SIP to be inadequate, a Federal Implementation Plan (FIP) that imposes additional control measures may be prepared for the nonattainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may cause sanctions to be applied to transportation funding and stationary air pollution sources in the air basin.

State Plans, Policies, Regulations, and Laws

ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required ARB to establish CAAQS (Table 4.3-2). ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the state endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and areawide emission sources, and provides districts with the authority to regulate indirect sources.

Among ARB's other responsibilities are overseeing local air district compliance with California and federal laws, approving local air quality plans, submitting SIPs to EPA, monitoring air quality, determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

Local Plans, Policies, Regulations, and Ordinances

San Joaquin Valley Air Pollution Control District

SJVAPCD seeks to improve air quality conditions in San Joaquin County through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of SJVAPCD includes preparing plans and programs for the attainment of ambient air quality standards, adopting and enforcing rules and regulations, and issuing permits for stationary sources. SJVAPCD also inspects stationary sources, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements other programs and regulations required by the CAA, CAAA, and CCAA.

In January 2002, SJVAPCD released a revision to the previously adopted guidelines document. This revised *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAI) (SJVAPCD 2002) is an advisory document that provides lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents. The guide contains the following applicable components:

- criteria and thresholds for determining whether a project may have a significant adverse air quality impact;
- specific procedures and modeling protocols for quantifying and analyzing air quality impacts;
- methods available to mitigate air quality impacts; and
- information for use in air quality assessments that will be updated more frequently such as air quality data, regulatory setting, climate, and topography.

Air Quality Attainment Plans

SJVAPCD prepares and submits Air Quality Attainment Plans (AQAPs) in compliance with the requirements set forth in the CCAA. The CCAA also requires a triennial assessment of the extent of air quality improvements and emission reductions achieved through the use of control measures. As part of the assessment, the attainment plans must be reviewed and, if necessary, revised to correct for deficiencies in progress and to incorporate new data or projections. As a nonattainment area, the region is also required to submit rate-of-progress milestone evaluations in accordance with the CAAA. These milestone reports include compliance demonstrations that the requirements have been met for the nonattainment area. The air quality attainment plans and reports present comprehensive strategies to reduce emissions of ROG, NO_X, and PM_{10} from stationary, area, mobile, and indirect sources. Such strategies include the adoption of rules and regulations; enhancement of CEQA participation; implementation of a new and modified indirect-source review program; adoption of local air quality plans; and stationary-, mobile-, and indirect-source control measures. Table 4.3-5 summarizes SJVAPCD's most current AQAPs.

Table 4.3-5 Summary of San Joaquin Valley Air Pollution Control District Air Quality Plans			
Pollutant	Plan Title	Date	Status
Ozone	*Extreme Ozone Attainment Demonstration Plan, San Joaquin Valley Air Basin Plan Demonstrating Attainment of Federal 1-Hour Ozone Standards*	October 2004, Amended October 2005	Adopted by SJVAPCD and ARB in October 2004. Submitted to EPA in November 2004[1].
	Draft Staff Report, 8-Hour Ozone Reasonably Available Control Technology—State Implementation Plan (RACT SIP) Analysis	April 2006	Adopted by SJVAPCD in August 17, 2006.
	8-Hour Ozone Attainment Demonstration Plan for the San Joaquin Valley	–	In progress. Due to EPA by June 2007.
Carbon Monoxide (CO)	*2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for the Federal Planning Areas*	July 2004	Adopted by ARB July 2004.
Respirable and Fine Particulate Matter (PM_{10} and $PM_{2.5}$)	*2006 PM_{10} Plan. San Joaquin Valley Strategy for Meeting Federal Air Quality Requirements for Particulate Matter 10 Microns and Smaller*	February 2006	Adopted by SJVAPCD February 2006. Submitted to EPA.
	$PM_{2.5}$ Plan	–	In progress. Due to EPA April 2008.
	Natural Events Action Plan for High Wind Events in the San Joaquin Valley	February 2006	Adopted by SJVAPCD February 2006. Submitted to ARB.

Notes:
[1] Effective June 15, 2005, EPA revoked in full the national 1-hour ozone ambient air quality standard, including associated designations and classifications.
ARB = California Air Resources Board
EPA = U.S. Environmental Protection Agency
SJVAPCD = San Joaquin Valley Air Pollution Control District
Source: SJVAPCD 2006b

Rules and Regulations

As mentioned above, SJVAPCD adopts rules and regulations. All projects are subject to SJVAPCD rules and regulations in effect at the time of construction. Specific rules applicable to the construction of the proposed project may include, but are not limited to:

- Regulation VIII—Fugitive Dust PM_{10} Prohibitions

  Rules 8011–8081 are designed to reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, and landfill operations.

  If a nonresidential project is 5.0 or more acres in area, or a residential project is 10.0 or more acres in area, or the project will include moving, depositing, or relocating more than 2,500 cubic yards per day of bulk materials on at least 3 days, a Dust Control Plan must be submitted as specified in Section 6.3.1.of Rule 8021. Construction activities shall not commence until SJVAPCD has approved the Dust Control Plan.

If a nonresidential project is 1.0 to less than 5.0 acres, or a residential project is 1.0 to less than 10.0 acres, an owner/operator must provide written notification to SJVAPCD at least 48 hours prior to his/her intent to begin any earthmoving activities as specified in Section 6.4.2.of Rule 80217.

- Rule 2201—New and Modified Stationary Source Review Rule

  This rule applies to all new stationary sources and all modifications of existing stationary sources. They are subject to SJVAPCD permit requirements if, after construction, they emit or may emit one or more affected pollutant.

- Rule 3135—Dust Control Plan Fee

  This rule requires the applicant to submit a fee in addition to a Dust Control Plan. The purpose of this fee is to recover SJVAPCD's cost for reviewing such plans and conducting compliance inspections.

- Rule 4101—Visible Emissions

  This rule prohibits emissions of visible air contaminants to the atmosphere and applies to any source operation that emits or may emit air contaminants.

- Rule 4102—Nuisance

  This rule applies to any source operation that emits or may emit air contaminants or other materials. In the event that such emissions create a public nuisance, the owner/operator could be in violation and be subject to SJVAPCD enforcement action.

- Rule 4103—Open Burning

  This rule regulates the use of open burning and specifies the types of materials that may be open burned. Agricultural material shall not be burned down when the land use is converting from agriculture to nonagricultural purposes (e.g., commercial, industrial, institutional, or residential uses). Section 5.1 of this rule prohibits the burning of trees and other vegetative (nonagricultural) material whenever the land is being developed for nonagricultural purposes.

- Rule 4601—Architectural Coatings

  This rule limits volatile organic compounds from architectural coatings by specifying architectural coatings storage, clean up, and labeling requirements.

- Rule 4641—Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations

  This rule applies to the manufacture and use of the aforementioned asphalt types for paving and maintenance operations.

- Rule 4901—Wood Burning Fireplaces and Wood Burning Heaters

  This rule limits residential fuel combustion and associated PM emissions as follows:

  - No person shall install a wood burning fireplace in a new residential development with a density greater than two dwelling units per acre.

  - No person shall install more than two EPA Phase II Certified wood burning heaters per acre in any new residential development with a density equal to or greater than three dwelling units per acre.

- No person shall install more than one wood burning fireplace or wood burning heater per dwelling unit in any new residential development with a density of equal to or less than two dwelling units per acre.

- Rule 4902—Residential Water Heaters

  This rule establishes a maximum NO_X emission rate of 40 nanograms per Joule of heat output for natural-gas-fired water heaters with a rated heat input less than or equal to 75,000 Btu/hr.

- Rule 9510—Indirect Source Review

  This rule (ISR) requires the applicants for certain development projects to submit an application to SJVAPCD when applying for the development's last discretionary approval. The rule requires developers to mitigate emissions at the project site to the extent feasible and to pay a mitigation fee to the SJVAPCD for a percentage of the remaining emissions. The ISR rule became effective March 1, 2006.

City of Manteca

City of Manteca General Plan

The *City of Manteca General Plan 2023*, adopted in October 2003, includes an air quality element (City of Manteca 2003). The following policies and implementation measures are applicable to the proposed project:

- Air Quality- Land Use

  Policy AQ-P-3: Segregate and provide buffers between land uses that typically generate hazardous or obnoxious fumes and residential or other sensitive land uses.

- Air Quality- Dust and Other Airborne Particulate Materials

  Policy AQ-P-7: New construction will be managed to minimize fugitive dust and construction vehicle emissions.

City of Manteca Municipal Code

The purpose of Chapter 17.13 of the City of Manteca Municipal Code, Performance Standards, is to provide necessary control measures to protect the community from hazards and nuisances and to establish limits and procedures for measuring the nuisances. The general statement of the section is, "Land or buildings shall not be used or occupied in a manner creating any dangerous injurious, noxious, fire, explosive or other hazard; noise, vibration, smoke, dust, order or form of air pollution; heat, cold, dampness, electrical or other disturbance; glare, refuse or wastes; other substances, conditions or elements which would adversely affect the surrounding area" (City of Manteca 1992).

With respect to air quality, Section 17.13.040G specifies, "Smoke, Fumes, Gasses, Dust, Particulate Matter. No emission shall be permitted at any point which would violate current regulations for such emission as established by federal and state air quality standards." Section 17.13.040G specifies that no emission of odors shall be permitted in such quantities as to be readily detectable when diluted in the ratio of one volume of odorous air to four volumes of clean air. Any process which may involve the creation or emission of any odors shall be provided with a secondary safeguard system, so that control will be maintained if the primary safeguard system should fail.

Section 17.13,030 specifies the point of measurement for the odor standard. Measurements necessary for enforcement of performance standards shall be taken at the lot line of the establishment or use in any district, except in the M-1 and M-2 districts measurements shall be taken at the district boundary of five hundred feet to the exterior wall of the establishment or use, whichever is less.

Toxic Air Contaminants

Air quality regulations also focus on TACs. In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. This contrasts with the criteria air pollutants for which acceptable levels of exposure can be determined and for which the ambient standards have been established (Table 6-3). Instead, EPA and ARB regulate HAPs and TACs, respectively, through statutes and regulations that generally require the use of the maximum or best available control technology for toxics (MACT and BACT) to limit emissions. These in conjunction with additional rules set forth by SJVAPCD establish the regulatory framework for TACs.

Federal Hazardous Air Pollutant Programs

EPA has programs for identifying and regulating HAPs. Title III of the CAAA directed EPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP may differ for major sources than for area sources of HAPs. Major sources are defined as stationary sources with potential to emit more than 10 tons per year (tpy) of any HAP or more than 25 tpy of any combination of HAPs; all other sources are considered area sources. The CAAA called on EPA to promulgate emissions standards in two phases. In the first phase (1992–2000), EPA developed technology-based emission standards designed to produce the maximum emission reduction achievable. These standards are generally referred to as requiring MACT. For area sources, the standards may be different, based on generally available control technology. In the second phase (2001–2008), EPA is required to promulgate health risk–based emissions standards where deemed necessary to address risks remaining after implementation of the technology-based NESHAP standards.

The CAAA also required EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

State and Local Toxic Air Contaminant Programs

TACs in California are primarily regulated through the Tanner Air Toxics Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). AB 1807 sets forth a formal procedure for ARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before ARB can designate a substance as a TAC. To date, ARB has identified more than 21 TACs and adopted EPA's list of HAPs as TACs. Most recently, diesel PM was added to the ARB list of TACs.

Once a TAC is identified, ARB then adopts an Airborne Toxics Control Measure for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate BACT to minimize emissions.

The Hot Spots Act requires that existing facilities that emit toxic substances above a specified level prepare a toxic-emission inventory, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

ARB has adopted diesel-exhaust control measures and more stringent emission standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators). In February 2000, ARB adopted a new public-transit bus fleet rule and emission standards for new urban buses. These new rules and standards provide for more stringent emission standards for some new urban bus engines, beginning with 2002 model year engines; zero-emission bus demonstration and purchase requirements applicable

to transit agencies; and reporting requirements, under which transit agencies must demonstrate compliance with the public-transit bus fleet rule. Upcoming milestones include the low-sulfur diesel fuel requirement and tighter emission standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide. Over time, the replacement of older vehicles will result in a vehicle fleet that produces substantially lower levels of TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1,3-butadiene, diesel PM) have been reduced significantly over the last decade, and will be reduced further in California through a progression of regulatory measures (e.g., Low Emission Vehicle/Clean Fuels and Phase II reformulated gasoline regulations) and control technologies. With implementation of ARB's Risk Reduction Plan, it is expected that diesel PM concentrations will be reduced by 75% in 2010 and 85% in 2020 from the estimated year-2000 level. Adopted regulations are also expected to continue to reduce formaldehyde emissions from cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced.

ARB published the *Air Quality and Land Use Handbook: A Community Health Perspective*, which provides guidance concerning land use compatibility with TAC sources (ARB 2005a). While not a law or adopted policy, the handbook offers advisory recommendations for the siting of sensitive receptors near uses associated with TACs, such as freeways and high-traffic roads, commercial distribution centers, rail yards, ports, refineries dry cleaners, gasoline stations, and industrial facilities, to help keep children and other sensitive populations out of harm's way. A number of comments on the handbook were provided to ARB by air districts, other agencies, real estate representatives, and others. The comments included concern over whether ARB was playing a role in local land use planning, the validity of relying on static air quality conditions over the next several decades in light of technological improvements, and support for providing information that can be used in local decision making.

At the local level, air pollution control or management districts may adopt and enforce ARB control measures. Under SJVAPCD Regulations II and VII, all sources that possess the potential to emit TACs are required to obtain permits from the district. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new-source review standards and air toxics control measures. SJVAPCD limits emissions and public exposure to TACs through a number of programs. SJVAPCD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

Sources that require a permit are analyzed by SJVAPCD (e.g., health risk assessment) on the basis of their potential to emit toxics. If it is determined that the project would emit toxics in excess of SJVAPCD's threshold of significance for TACs, as identified below, sources must implement the best available control technology for TACs (T-BACT) to reduce emissions. If a source cannot reduce the risk below the threshold of significance, even after T-BACT has been implemented, SJVAPCD will deny the permit required by the source. This helps to prevent new problems and reduces emissions from existing older sources by requiring them to apply new technology when retrofitting with respect to TACs. It is important to note that SJVAPCD's air quality permitting process applies to stationary sources; properties that are exposed to elevated levels of nonstationary type sources of TACs, and the nonstationary type sources themselves (e.g., on-road vehicles), are not subject to air quality permits. Further, for reasons of feasibility and practicality, mobile sources (cars, trucks, etc.) are not required to implement T-BACT, even if they do have the potential to expose adjacent properties to elevated levels of TACs. Rather, emissions controls on such sources (e.g., vehicles) are subject to regulations implemented on the federal and state levels.

Odors

SJVAPCD has determined some common types of facilities that have been known to produce odors, including wastewater treatment facilities, chemical manufacturing plants, painting/coating operations, feed lots/ dairies, composting facilities, landfills, and transfer stations. Any actions related to odors are based on citizen complaints to local governments and SJVAPCD. According to SJVAPCD, significant odor problems occur when there is

more than one confirmed complaint per year averaged over a 3-year period or when there are three unconfirmed complaints per year averaged over a 3-year period (SJVAPCD 2002).

Two situations increase the potential for odor problems. The first occurs when a new odor source is located near existing sensitive receptors. The second occurs when new sensitive receptors are developed near existing sources of odor. In the first situation, SJVAPCD recommends operational changes, add-on controls, process changes, or buffer zones where feasible to address odor complaints. In the second situation, the potential conflict is considered significant if the project site is at least as close as any other site that has already experienced significant odor problems related to the odor source. For projects locating near a source of odors where there is no nearby development that may have filed complaints, and for odor sources locating near existing sensitive receptors, SJVAPCD requires the determination of potential conflict to be based on the distance and frequency at which odor complaints from the public have occurred in the vicinity of a similar facility (SJVAPCD 2002). SJVAPCD has adopted Rule 4102, as identified above, that applies to odor emissions. In addition, San Joaquin County Ordinance 9-1025.4 (Odor) and the City of Manteca Ordinance 17.13.040G and 17.13,030 apply to odor emissions.

4.3.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Project-generated construction-related emissions of criteria air pollutants (e.g., PM_{10}) and ozone precursors (ROG and NO_X) were assessed in accordance with SJVAPCD-recommended methodologies from the following: SJVAPCD's GAMAQI, (SJVAPCD 2002), a comment letter submitted by SJVAPCD for the proposed project (SJVAPCD 2006d), correspondence between EDAW and SJVAPCD staff, and SJVAPCD's web site. Where quantification was required, emissions were modeled using SJVAPCD-recommended emission factors and methodologies. For instance, construction-related emissions of ROG and NO_X were modeled using URBEMIS2002 Version 8.7.0 (ARB 2005b). Construction-related emissions of fugitive PM_{10} dust were qualitatively assessed in accordance with SJVAPCD recommendations.

Project-generated operation-related emissions of criteria air pollutant and ozone precursors were assessed based on the assumption that the increase in operations (e.g., flow rate) at the WQCF would be directly proportional to the increase in stationary source emissions. Emissions from area and mobile sources were modeled using URBEMIS2002 Version 8.7.0 (ARB 2005b).

Determinations of significance for short-term construction-related and long-term operation-related emissions were based on the comparison of project-generated emissions to SJVAPCD thresholds.

All other air quality impacts (i.e., long-term operation-related local CO, odor, and TAC emissions) were assessed in accordance with ARB and SJVAPCD-recommended methodologies. Such methodologies include the use of SJVAPCD's screening level procedures and a qualitative assessment for the exposure of sensitive receptors to odor and TAC emissions.

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines and SJVAPCD (SJVAPCD 2002). The proposed project would result in significant air quality impacts if it would:

- conflict with or obstruct implementation of the applicable air quality plan,
- violate any air quality standard or contribute substantially to an existing or projected air quality violation,

- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable NAAQS or CAAQS (including releasing emissions which exceed quantitative thresholds for ozone precursors),
- expose sensitive receptors to substantial pollutant concentrations, or
- create objectionable odors affecting a substantial number or people.

As stated in Appendix G, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the above determinations. Thus, as identified by SJVAPCD, implementation of the proposed project would result in significant air quality impacts if (SJVAPCD 2002):

- SJVAPCD-recommended control measures beyond compliance with Regulation VIII-Fugitive Dust Prohibition are not incorporated into project design or implemented during project construction;
- construction-related emissions of ROG or NO_X exceed the SJVAPCD-recommended mass emissions threshold of 10 tpy;
- long-term operational (regional) emissions of ROG or NO_X exceed the SJVAPCD-recommended mass emissions threshold of 10 tpy;
- long-term operational (local) mobile-source emissions of CO violate or contribute substantially to a violation of the NAAQS or CAAQS;
- exposure of sensitive receptors to a substantial incremental increase in TAC emissions (e.g., stationary or mobile-source) that exceed 10 chances per million for excess cancer risk and/or a hazard Index of 1 for noncancer risk at the Maximally Exposed Individual (MEI); or
- sensitive receptors would be located near an existing odor source where one confirmed complaint per year averaged over a three year period, or three unconfirmed complaints per year averaged over a three year period has been experienced by existing receptors as close as the project to the odor source; or by existing receptors in the vicinity of a similar facility considering distance, frequency, and odor control, where there is currently no nearby development and for proposed odor sources near existing receptors.

IMPACT ANALYSIS

IMPACT 4.3-1 Air Quality—Generation of Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors. *Modeled short-term project-generated emissions from construction equipment for projects constructed during Phase 1 (2008 to 2010 based on construction projections presented in Table 3-4) would exceed SJVAPCD's significance threshold of 10 tpy and project applicable SJVAPCD-required and other control measures for fugitive dust are not currently part of the project description. Project-generated, construction- related emissions of criteria air pollutants and precursors could violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, especially considering the nonattainment status of San Joaquin County, and/or conflict with air quality planning efforts. As a result, this impact would be a* ***significant.***

Construction-related emissions are described as "short-term" or temporary in duration and have the potential to represent a significant impact with respect to air quality, especially fugitive PM_{10} dust emissions. Fugitive PM_{10} dust emissions are primarily associated with site preparation and vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and vehicle miles traveled (VMT) by construction vehicles on- and off-site. Ozone precursor emissions of ROG and NO_X are primarily associated with gas and diesel equipment exhaust and the application of architectural coatings.

Construction-related activities associated with the proposed WQCF, outfall, and collection systems would result in project-generated emissions of criteria air pollutants (e.g., PM_{10}) and precursors (e.g., ROG and NO_X) from site preparation (e.g., excavation, grading, pavement breaking, and clearing); off-road equipment, material transport, and worker commute exhaust emissions; paving; application of architectural coatings; and other miscellaneous activities.

Worst-case project-generated, construction-related emissions of criteria air pollutants and precursors were modeled in accordance with SJVAPCD-recommended methodologies (SJVAPCD 2002 and 2006a). Exact project-specific data (e.g., construction equipment types and number requirements, and maximum daily acreage disturbed) were not available at the time of this analysis. Project-generated emissions were modeled based on general information provided in the project description (Refer to Table 3-4), and default and SJVAPCD-recommended model settings and parameters attributable to the construction period and site location. In order to reasonably estimate worst-case conditions, project-generated emissions were modeled based on the following assumptions:

- Construction of the proposed project is anticipated to occur in two, 2-year phases; Phase 1 beginning in June 2008, and Phase 2 in June 2018 (Refer to Table 3-4);
- At the WQCF site, all grading would take place at the start of each 2-year phase. Extensive grading would not be required because all improvements would be within the existing site, which is relatively flat and clear.
- All of the wastewater collection system pipeline installation would occur within Phase 1. To achieve this, there would be three separate construction teams; one each for the north trunk sewer, south trunk sewer, and a third for the outfall and central trunk sewer. At an average installation rate of 100 to 125 feet per day, the north and south trunk sewers would take 2 years to complete.
- At an average installation rate of 100 feet per day, the outfall and central trunk sewer project would take 9 months to complete and is assumed to occur during Phase 1.

Emissions of Ozone Precursors

With respect to ozone precursors, worst-case project-generated, construction-related emissions of ROG and NOx were modeled using the URBEMIS 2002 Version 8.7 computer program as recommended by the SJVAPCD (SJVAPCD 2002 and 2006a) based on the assumptions outlined above. Table 4.3-6 summarizes the modeled emissions for each year of Phase 1 and Phase 2. Construction-related air quality effects were determined by comparing these modeling results with applicable SJVAPCD significance thresholds. Refer to Appendix B for detailed modeling input parameters and results.

Table 4.3-6
Summary of Modeled Short-Term Project-Generated Emissions from Construction Equipment (Unmitigated)

Phase/Year/Mode	Worst-Case Emissions (Tons Per Year)		
	ROG	NO_X	PM_{10}[1]
Phase 1, Year 1 (2008-2009)			
WQCF	0.16	1.12	0.32
Collection System and Outfall	2.19	13.48	0.96
Total	2.35	**14.60**	1.28
Phase 1, Year 2 (2009-2010)			
WQCF	0.28	0.73	0.03
Collection System	1.58	9.42	0.59

	Total	1.86	**10.15**	0.62
Phase 2, Year 1 (2018-2019)				
WQCF		0.16	1.03	0.32
Phase 2, Year 2 (2019-2020)				
WQCF		0.27	0.69	0.03
SJVAPCD Significance Threshold		**10**	**10**	**-1**

[1] SJVAPCD has not identified a mass emissions threshold for construction-related PM_{10} exhaust emissions and are shown here for information only. Fugitive PM10 dust emissions are discussed separately below. Refer to Appendix B for detailed assumptions and modeling output files.

Source: Data modeled by EDAW 2006.

Based on the modeling conducted, construction-related activities associated with year 1 of Phase 1 could result in project-generated emissions of approximately 2.35 tpy of ROG and 14.60 tpy of NO_X, and for year 2, 1.86 tpy of ROG and 10.15 tpy of NO_X (Refer to Table 4.3-5). With respect to Phase 2, year 1 could result in project-generated emissions of approximately 0.16 tpy of ROG and 1.03 tpy of NO_X, and for year 2, 0.27 tpy of ROG and 0.69 tpy of NO_X (Refer to Table 4.3-5). Modeled short-term project-generated emissions from construction equipment for both years of Phase 1 would exceed SJVAPCD's significance threshold of 10 tpy. Project-generated emissions of NO_X could contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, especially considering the nonattainment status of San Joaquin County, and/or conflict with air quality planning efforts. As a result, this impact would be **significant.**

Although the above analysis represents an intensive construction schedule for the proposed project, no calculations were made for installation of the recycled water distribution system. The design and schedule for this system has not been defined at this point. If the initial elements of the recycled water distribution system were planned for installation during the June 2008 – May 2010 Phase 1 period, then there would be additional NO_X emissions.

Fugitive PM_{10} Dust Emissions

SJVAPCD does not require a quantitative analysis of construction-related fugitive PM_{10} dust emissions and relies on a project's compliance with Regulation VIII (Fugitive Dust Prohibition). Though the proposed project would be required by law to comply with Regulation VIII (Fugitive Dust Prohibition), project applicable SJVAPCD-required control measures are not currently part of the project description. In addition, no other SJVAPCD-recommended control measures beyond compliance with Regulation VIII are included. Project-generated fugitive PM_{10} dust emissions could violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, especially considering the nonattainment status of San Joaquin County, and/or conflict with air quality planning efforts. As a result, this impact would be **significant.**

IMPACT 4.3-2 Air Quality—Generation of Long-Term Operation-Related (Regional) Emissions of Criteria Air Pollutants and Precursors. *Operation-related activities would not result in project-generated emissions of ROG or NO_X that exceed SJVAPCD's significance threshold of 10 tpy. Thus, project-generated, operation-related emissions of criteria air pollutants and precursors would not violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, or conflict with air quality planning efforts. As a result, this impact would be a* ***less-than-significant****..*

Operation-related activities would result in long-term regional emissions of criteria air pollutants (e.g., PM_{10}) and precursors (e.g., ROG and NO_X) from stationary-, area-, and mobile-source emissions, as discussed separately below.

Stationary Source Emissions

The latest data available from ARB for emissions of criteria pollutants and precursors associated with existing operations at the WQCF are shown in Table 4.3-3 above and reiterated below in Table 4.3-7 for the purposes of this discussion. Proposed improvements to the WQCF are in principal the expansion of the facilities and equipment to increase the capacity of the existing treatment processes. Therefore, it is reasonable to assume that the increase in stationary source emissions would be proportional to the proposed increase in wastewater flow and plant capacity. The 2004 average flow rate is estimated at 6 mgd, and the proposed maximum flow rate at completion of the proposed project is 27 mgd. Increases in stationary source emissions, shown in Table 4.3-6, are conservative; increases attributable to the proposed project would be less than shown because the base flow rate for this project would occur at the completion of Phase III improvements (i.e., 9.87 mgd). As shown in Table 4.3-6, increases in stationary source emissions of ROG and NO_X would be less than 1 tpy.

Table 4.3-7
Summary of Modeled Project-Generated Operation-Related (Regional) Emissions of Criteria Air Pollutant and Precursor Emissions

Pollutant	Emissions (Tons per Year)						
	Stationary Source			Area Source	Mobile Source	Total Increase	SJVAPCD Significance Threshold[2]
	2004[1]	2020	Net Increase				
ROG	0.07	0.31	0.24	0.05	0.04	0.33	10
NO_X	0.54	0.81	0.63	0.15	0.02	0.80	10
CO	0.18	2.43	1.89	0.12	0.23	2.24	-
SO_2	0.58	2.61	2.03	0	0	2.03	-
PM_{10}	<0.01	0.02	0.02	0	0.07	0.09	-
$PM_{2.5}$	<0.01	0.02	0.02	[3]	[3]	[3]	-

[1] Refer to Table 4.3-3.
[2] SJVAPCD has not adopted significance thresholds for CO, SO_2, PM_{10}, or $PM_{2.5}$.
[3] URBEMIS does not calculate $PM_{2.5}$; values would be less than PM_{10} values.
Source: Data modeled by EDAW 2006.

Area and Mobile Source Emissions

Project-generated operation-related (regional) emissions of criteria air pollutants and precursors from area sources would include usage of natural gas and the application of architectural coatings. Emissions from mobile sources would include employee commute, material transport/delivery, and maintenance vehicle trips.

As described in Section 4.11 "Transportation and Circulation", the proposed project would generate 20 one-way employee passenger vehicle trips per day and less than one truck haul trip per day from the increase in the number of employees traveling to and from the WQCF, delivery of additional supplies, removal of additional sludge, and routine maintenance and inspection activities. SJVAPCD has defined project sizes by land use type for which it has been determined, based on conservative assumptions that such would not result in emissions above the recommended significance thresholds. The proposed project would be defined as a small project (e.g., generates less than 1,000 trips per day) for which no quantitative analysis would be required. However, because there would be stationary source emissions associated with the proposed project, as discussed above, area and mobile source emissions were modeled to ensure total emissions were accurately accounted for and compared in total to SJVAPCD's significance thresholds.

Regional area- and mobile-source emissions of criteria air pollutants and precursors associated with implementation of the proposed project were estimated using URBEMIS 2002 Version 8.7.0 computer program, as recommended by SJVAPCD. Regional area- and mobile-source emissions were estimated based on proposed land use types and sizes identified in Section 3, "Project Description," the increase in trip generation from the

traffic analysis prepared for this project, and default and SJVAPCD-recommended model settings and parameters attributable to construction period and site location.

Table 4.3-7 summarizes the modeled project-generated, operation-related (regional) emissions of criteria air pollutants and precursors from area and mobile sources. Refer to Appendix B for detailed modeling input parameters and results.

Total Emissions

Based on the modeling conducted, operation-related activities would not result in total project-generated emissions of ROG or NO_X that exceed SJVAPCD's significance threshold of 10 tpy (refer to Table 4.3-7). Thus, project-generated, operation-related emissions of criteria air pollutants and precursors would not violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, or conflict with air quality planning efforts. As a result, this impact would be **less than significant**.

IMPACT 4.3-3 Air Quality—Exposure of Sensitive Receptors to Toxic Air Contaminant Emissions. *The project would not expose sensitive receptors to substantial emissions of TACs because construction emissions would be temporary and would rapidly dissipate with distance from the source and proposed operations would not result in the exceedance of the SJVAPCD's screening criteria for project's resulting in significant TAC emissions. As a result, this impact would be* ***less than significant.***

The exposure of sensitive receptors from on-site project-generated construction-related and operation-related sources is discussed separately below.

On-Site Construction-Related Equipment Emissions

Construction-related activities would result in short-term project-generated emissions of diesel PM from the exhaust of off-road heavy-duty diesel equipment for site preparation (e.g., excavation, grading, and clearing); paving; application of architectural coatings; and other miscellaneous activities. Diesel PM was identified as a TAC by ARB in 1998. The potential cancer risk from the inhalation of diesel PM, as discussed below, outweighs the potential noncancer health impacts (ARB 2003). At this time, SJVAPCD has not adopted a methodology for analyzing such impacts and does not recommended the completion of health risk assessments (HRAs) for construction-related emissions of TACs, with a few exceptions (e.g., where construction phase is the only phase of project) (Reed, pers. comm., 2007).

It is important to note that construction equipment emissions would be reduced over the period of project development. In January 2001, EPA promulgated a Final Rule to reduce emission standards for 2007 and subsequent model year heavy-duty diesel engines. These emission standards represent a 90% reduction in NO_X, 72% reduction of nonmethane hydrocarbon (NMHC) emissions, and 90% reduction of PM emissions in comparison to the 2004 model year emission standards. In December 2004, ARB adopted a fourth phase of emission standards (Tier 4) in the Clean Air Non-road Diesel Rule that are nearly identical to those finalized by EPA on May 11, 2004. As such, engine manufacturers are now required to meet after treatment-based exhaust standards NO_X and PM starting in 2011 that are more than 90% lower than current levels, putting emissions from off-road engines virtually on par with those from on-road heavy-duty diesel engines.

More specifically, the dose to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the maximally exposed individual. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of sensitive receptors to TAC emissions,

should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the proposed project (Salinas, pers. comm., 2004). Thus, because the use of off-road heavy-duty diesel equipment would be temporary in combination with the highly dispersive properties of diesel PM (Zhu and Hinds 2002) and further reductions in exhaust emissions, project-generated, construction-related emissions of TACs would not expose sensitive receptors to substantial emissions of TACs. It is also important to note that compliance with the ISR rule, as required by law, would also reduce PM exhaust emissions. As a result, this impact would be **less than significant**.

On-Site Operation-Related Stationary Source Emissions

SJVAPCD has developed a publicly owned treatment works (POTW) worksheet, which serves as a screening tool to determine if emissions from wastewater treatment facilities could potentially represent a significant source of TACs and associated health risk (SJVAPCD 2006e). The worksheet contains emission factors for 25 TACs that are commonly associated with POTW and determines excess cancer and noncancer health risks based on such inputs as influent flow rate, methods of treatment, and digester gas and LPG combustion rates. According to SJVAPCD, if the worksheet determines that the screening value is above 10, then a more detailed analysis is required (e.g., health risk assessment). The worksheet was populated with project specific data for the proposed Manteca WQCF at buildout conditions. Based on the analysis conducted, the screening value for the proposed project would be 6.0, which would not exceed SJVAPCD's recommended value of 10. Refer to Appendix B for detailed modeling input parameters and results. Project-generated stationary source emissions would not be a significant source of TACs. This impact would be **less than significant**.

IMPACT 4.3-4 Air Quality—Generation of Long-Term Operation-Related (Local) Mobile-Source Emissions of Carbon Monoxide. *The proposed project would generate a trip increase that is less than 1.0% of existing traffic volumes on local area roadways and would not decrease the LOS of these roadways. The proposed project would be defined as a small project (e.g., generates less than 1,000 trips per day) for which no quantitative analysis would be required. Project-generated, long-term operation-related (local) mobile-source emissions of CO would not violate or contribute substantially to a violation of the CAAQS or NAAQS, or expose sensitive receptors to substantial pollutant concentrations. This impact would be* ***less than significant.***

CO concentration is a direct function of motor vehicle activity (e.g., idling time and traffic flow conditions), particularly during peak commute hours, and meteorological conditions. Under specific meteorological conditions (e.g., stable conditions that result in poor dispersion), CO concentrations may reach unhealthy levels with respect to local sensitive land-uses such as residential areas, schools, and hospitals. As a result, SJVAPCD recommends analysis of CO emissions at a local rather than a regional level.

SJVAPCD has established preliminary screening criteria to determine with fair certainty that if not violated project-generated long-term operational local mobile-source emissions of CO would not violate or contribute substantially contribute to a violation of the CAAQS or NAAQS. SJVAPCD's preliminary screening criteria include the following:

- a traffic study for the project indicates that the level of service (LOS) on one or more streets or at one or more intersections in the project vicinity would be reduced to LOS E or F; or
- a traffic study for the project indicates that implementation would substantially worsen an already existing LOS F on one or more streets or at more or more intersections in the project vicinity (SJVAPCD 2002).

Furthermore, the *Transportation Project-Level Carbon Monoxide Protocol* (Garza et al. 1997) states that signalized intersections that operate at an LOS represent a potential for a CO violation.

As described in Section 4.11 "Transportation and Circulation", the proposed project would generate 20 one-way employee passenger vehicle trips per day and less than one truck haul trip per day. These trips are less than 1.0%

of existing traffic volumes on local area roadways and would not decrease the LOS of these roadways. In addition, as described above, the proposed project would be defined as a small project (e.g., generates less than 1,000 trips per day) for which no quantitative analysis would be required. Project-generated, long-term operation-related (local) mobile-source emissions of CO would not violate or contribute substantially to a violation of the CAAQS or NAAQS, or expose sensitive receptors to substantial pollutant concentrations. This impact would be **less than significant**.

IMPACT 4.3-5 Air Quality—Exposure of Sensitive Receptors to Odors. *The WQCF is known to produce odors and there has been at least one confirmed compliant per year over a three year period. While the design of the project incorporates all feasible odor control technologies to reduce project-generated odors, it is unknown whether these technologies would limit odor complaints to less than one per year, which is the significance standard used by the SJVAPCD for significant odor problems. No other feasible odor control technologies are available to reduce the intensity of odors at the WQCF site and that would guarantee that odor complaints would be limited to one per year. Therefore, this impact would be* ***significant and unavoidable.***

SJVAPCD has determined some common types of facilities and screening trigger level distances that have been known to produce odors, including wastewater treatment facilities, for which the screening distance is 2 miles. Odors from domestic wastewater are typically a result of anaerobic biological activity in the sewer collection and wastewater treatment systems. Any actions related to odors are based on citizen complaints to local governments and SJVAPCD. According to SJVAPCD, significant odor problems occur when there is more than one confirmed complaint per year averaged over a 3-year period or when there are three unconfirmed complaints per year averaged over a 3-year period (SJVAPCD 2002). With respect to the WQCF, there has been at least one confirmed complaint in each of the years 2003 through 2005; therefore the WQCF is considered a significant odor source.

As described in Section 3, "Project Description," there currently is an odor control biofilter installed at the WQCF and implementation of the proposed project would result in the installation of two additional biofilter systems. Biofilter systems utilize bacteria to remove the majority of odor compounds without the need to use large quantities of chemicals. Foul air is blown through the bottom of the soil filter through a distribution system or perforated pipe, and as the air comes in contact with the bacteria, hydrogen sulfide and other odor compounds are consumed. The sludge drying beds, a present source of some odor complaints, would be eliminated with buildout of the WQCF. These improvements would reduce the potential for the exposure of sensitive receptors to odors. However, it is unknown whether these improvements would limit odor complaints to one per year averaged over a 3-year period. No other feasible odor control technologies are available to reduce the intensity of the odors generated at the WQCF site and that would guarantee that odor complaints would be reduced to one per year. This impact would be **significant and unavoidable.**

4.3.3 MITIGATION MEASURES

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

4.3-2: Generation of Long-Term Operation-Related (Regional) Emissions of Criteria Air Pollutants and Precursors.

4.3-3: Exposure of Sensitive Receptors to Toxic Air Contaminant Emissions.

4.3-4: Generation of Long-Term Operation-Related (Local) Mobile-Source Emissions of Carbon Monoxide.

The following mitigation measures are provided for the significant impacts of Impact 4.3-1:

Mitigation Measure 4.3-1: Generation of Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors.

A. SJVAPCD has indicated that the project may be subject to Rule 9510, Indirect Source Review (SJVAPCD 2006d). It would appear that the WQCF expansion portion of the project would be exempt in accordance with Section 4.4.3 of the Rule, which exempts facilities that are subject to the New and Modified Source Rule. Construction of the collection system and outfall would result in emissions of NO_X in excess of 2.0 tons per year, which is a baseline for applicability of the Rule. Therefore, the City of Manteca will ensure that the proposed project complies with the following, as required by law:

- Submit an Air Impact Assessment (AIA) application to SJVAPCD. The AIA application will be submitted on a form provided by the SJVAPCD and contain, but not limited to, the applicant's name and address, detailed project description, on-site emission reduction checklist, monitoring and reporting schedule, and an AIA. The AIA shall quantify construction NOx and PM_{10} emissions associated with the project. (PM_{10} emissions would be less than 2 tpy; therefore, it may be acceptable to limit the AIA analysis to NO_X emissions.) This will include the estimated construction baseline emissions, and the mitigated emissions for each applicable pollutant for the development project, or each phase thereof, and shall quantify the off-site fee, if applicable.

  General mitigation requirements, as contained in the ISR rule, include the following:

  - Exhaust emissions for construction equipment greater than 50 horsepower used or associated with the project will be reduced by 20% of the total NO_X and by 45% of the total PM_{10} exhaust emissions from the statewide average as estimated by ARB.

  - Consider using less polluting construction equipment, which can be achieved by utilizing add-on controls, cleaner fuels, or newer lower emitting equipment.

  - Additional strategies for reducing construction emissions may include, but are not limited to:

    - Providing commercial electric power to the project site in adequate capacity to avoid or minimize the use of portable electric generators and the equipment;

    - Substitution of electric-powered equipment for diesel engine driven equipment; and

    - Limiting the hours of operation of heavy duty equipment and/or the amount of equipment in use at any one time.

- The requirements listed above can be met through any combination of on-site, emission-reduction measures or off-site fees. The ISR rule provides a method of calculating fees to be paid to offset any NO_X and PM_{10} emission reductions that would not be achieved by selection of construction equipment and fuels.

B. The City of Manteca will ensure that the proposed project complies with SJVAPCD's Regulation VIII, "Fugitive Dust Prohibitions," and that all applicable control measures, as required by law, are implemented during construction to reduce the generation of fugitive PM_{10} and $PM_{2.5}$ emissions. Regulation VIII contains, but not limited to, the following required control measures.

1. Prewater site sufficient to limit visible dust emissions (VDE) to 20% opacity.

2. Phase work to reduce the amount of disturbed surface area at any one time.

3. During active operations, apply water or chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity.

4. During active operations, construct and maintain wind barriers sufficient to limit VDE to 20% opacity.

5. During active operations, apply water or chemical/organic stabilizers/suppressants to unpaved haul/access roads and unpaved vehicle/equipment traffic areas sufficient to limit VDE to 20% opacity and meet the conditions of a stabilized unpaved road surface.

6. An owner/operator shall limit the speed of vehicles traveling on uncontrolled unpaved access/haul roads within construction sites to a maximum of 15 miles per hour.

7. An owner/operator shall post speed limit signs that meet State and Federal Department of Transportation standards at each construction site's uncontrolled unpaved access/haul road entrance. At a minimum, speed limit signs shall also be posted at least every 500 feet and shall be readable in both directions of travel along uncontrolled unpaved access/haul roads.

8. When handling bulk materials, apply water or chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity.

9. When handling bulk material, construct and maintain wind barriers sufficient to limit VDE to 20% opacity and with less than 50% porosity.

10. When storing bulk materials, comply with the conditions for a stabilized surface as listed above.

11. When storing bulk materials, cover bulk materials stored outdoors with tarps, plastic, or other suitable material and anchor in such a manner that prevents the cover from being removed by wind action.

12. When storing bulk materials construct and maintain wind barriers sufficient to limit VDE to 20% opacity and with less than 50% porosity. If utilizing fences or wind barriers, apply water or chemical/organic stabilizers/suppressants to limit VDE to 20% opacity or utilize a three-sided structure with a height at least equal to the height of the storage pile and with less than 50% porosity.

13. Limit vehicular speed while traveling on the work site sufficient to limit VDE to 20% opacity.

14. Load all haul trucks such that the freeboard is not less than 6 inches when material is transported across any paved public access road sufficient to limit VDE to 20% opacity.

15. Apply water to the top of the load sufficient to limit VDE to 20% opacity.

16. Cover haul trucks with a tarp or other suitable cover.

17. Clean the interior of the cargo compartment or cover the cargo compartment before the empty truck leaves the site; and prevent spillage or loss of bulk material from holes or other openings in the cargo compartment's floor, sides, and/or tailgate; and load all haul trucks such that the freeboard is not less than 6 inches when material is transported on any paved public access road, and apply water to the top of the load sufficient to limit VDE to 20% opacity; or cover haul trucks with a tarp or other suitable cover.

18. Owners/operators shall remove all visible carryout and trackout at the end of each workday.

19. An owner/operator of any site with 150 or more vehicle trips per day, or 20 or more vehicle trips per day by vehicles with three or more axles shall take the actions for the prevention and mitigation of carryout and trackout.

20. Within urban areas, an owner/operator shall prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved surface exit point of a site.

21. Within rural areas, construction projects 10 acres or more in size, an owner/operator shall prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved surface exit point of a site.

22. For sites with paved interior roads, an owner/operator shall prevent and mitigate carryout and trackout.

23. Cleanup of carryout and trackout shall be accomplished by manually sweeping and picking-up; or operating a rotary brush or broom accompanied or preceded by sufficient wetting to limit VDE to 20% opacity; or operating a PM_{10}-efficient street sweeper that has a pick-up efficiency of at least 80%; or flushing with water, if curbs or gutters are not present and where the use of water would not result as a source of trackout material or result in adverse impacts on storm water drainage systems or violate any National Pollutant Discharge Elimination System permit program.

24. An owner/operator shall submit a Dust Control Plan to the Air Pollution Control Officer (APCO) prior to the start of any construction activity on any site that will include 10 acres or more of disturbed surface area for residential developments, or 5 acres or more of disturbed surface area for nonresidential development, or will include moving, depositing, or relocating more than 2,500 cubic yards per day of bulk materials on at least three days. Construction activities shall not commence until the APCO has approved or conditionally approved the Dust Control Plan. An owner/operator shall provide written notification to the APCO within 10 days prior to the commencement of earthmoving activities via fax or mail. The requirement to submit a dust control plan shall apply to all such activities conducted for residential and nonresidential (e.g., commercial, industrial, or institutional) purposes or conducted by any governmental entity.

C. The City of Manteca will ensure that the following SJVAPCD-recommended additional control measures will be implemented by the proposed project during construction to further reduce fugitive PM_{10} and PM2.5 dust emissions.

1. Install sandbags or other erosion control measures to prevent silt runoff to public roadways from adjacent project areas with a slope greater than 1%.

2. Suspend excavation and grading activity when winds exceed 20 mph.

3. Limit area subject to excavation, grading, and other construction activity at any one time.

D. The City of Manteca will ensure that the following SJVAPCD-recommended additional control measures will be implemented by the proposed project during construction to further reduce construction equipment exhaust emissions.

1. Minimize idling time (e.g., 10-minute maximum).

2. Replace fossil-fueled equipment with electrically driven equivalents (provided they are not run via a portable generator set). This measure would be particularly applicable to the utilization of signal boards.

3. Staging areas for heavy-duty construction equipment shall be located as far as possible from sensitive receptors.

4. Use alternative fueled or catalyst equipped diesel construction equipment, where reasonable available, such as equipment capable of using biodiesel or emulsified fuel. Alternative fuels and NOx reduction equipment should be ARB-certified.

5. Limit the hours of operation of heavy duty equipment and/or the amount of equipment in use at any one time.

6. Curtail construction during periods of high ambient pollutant concentrations; this may include ceasing of construction activity during the peak-hour of vehicular traffic on adjacent roadways or on Spare the Air Days.

4.3.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of Mitigation Measures 4.3-1A and D would result in the required minimum 20% reduction in NO_X emissions and a 45% reduction in PM_{10} emissions from heavy-duty diesel equipment, as compared with statewide average emissions. In addition, implementation of these measures would also result in a 5% reduction in ROG emissions from heavy-duty diesel equipment. All or part of the reductions may result from on-site equipment and fuel selection; the remainder would result from off-site reductions achieved through the payment of fees. Implementation of these measures would reduce temporary, short-term, construction-related emissions of ROG and NO_X generated by the proposed project, but not to a less-than-significant level, as emissions would still exceed SJVAPCD's significance thresholds. As a result, this impact (generation of construction-related NO_X emissions) would remain **significant and unavoidable**.

With respect to fugitive PM_{10} dust emissions, implementation of Mitigation Measures 4.3-1B and C would ensure compliance with Regulation VIII, which is required by law, and include additional SJVAPCD-recommended control measures. As a result, this impact (generation of construction-related fugitive PM_{10} dust emissions) would be reduced to a **less-than-significant** level.

With respect to Impact 4.3-5, "Exposure of Sensitive Receptors to Odors," design of the WQCF would incorporate all feasible odor control technologies to reduce the potential for the exposure of sensitive receptors to odors. However, at this time it is not possible to determine if these measures would reduce the number of complaints to less than one per year averaged over three years. No further odor reduction measures are feasible. The impact would remain **significant and unavoidable**.

4.4 NOISE

This section includes a description of acoustic fundamentals, existing noise conditions (e.g., existing noise-sensitive land uses and noise sources in the project vicinity), a summary of applicable regulations, and analyses of potential short-term and long-term noise impacts of the proposed project. Noise effects are evaluated according to the standards of the jurisdictions in which they are generated. Mitigation measures are recommended, as necessary, to reduce significant noise impacts.

4.4.1 ENVIRONMENTAL SETTING

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, unexpected, or unwanted. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave because of a disturbance or vibration, and as any pressure variation in air that the human ear can detect.

Sound Properties

A sound wave is introduced into a medium (air) by a vibrating object. The vibrating object (e.g., vocal cords, the string and sound board of a guitar, or the diaphragm of a radio speaker) is the source of the disturbance that moves through the medium. Regardless of the type of source creating the sound wave, the particles of the medium through which the sound moves are vibrating in a back-and-forth motion at a given frequency. The frequency of a wave refers to how often the particles vibrate when a wave passes through the medium. The frequency of a wave is measured as the number of complete back-and-forth vibrations of a particle per unit of time. If a particle of air undergoes 1,000 longitudinal vibrations in 2 seconds, then the frequency of the wave would be 500 vibrations per second. A commonly used unit for frequency is cycles per second, called hertz (Hz).

Each particle vibrates as a result of the motion of its nearest neighbor. For example, the first particle of the medium begins vibrating at 500 Hz and sets the second particle of the medium into motion at the same frequency (500 Hz). The second particle begins vibrating at 500 Hz and thus sets the third particle into motion at 500 Hz. The process continues throughout the medium; hence each particle vibrates at the same frequency, which is the frequency of the original source. Subsequently, a guitar string vibrating at 500 Hz will set the air particles in the room vibrating at the same frequency (500 Hz), which carries a sound signal to the ear of a listener that is detected as a 500-Hz sound wave.

The back-and-forth vibration motion of the particles of the medium would not be the only observable phenomenon occurring at a given frequency. Because a sound wave is a pressure wave, a detector could be used to detect oscillations in pressure from high to low and back to high pressure. As the compression (high-pressure) and rarefaction (low-pressure) disturbances move through the medium, they would reach the detector at a given frequency. For example, a compression would reach the detector 500 times per second if the frequency of the wave were 500 Hz. Similarly, a rarefaction would reach the detector 500 times per second if the frequency of the wave were 500 Hz. Thus, the frequency of a sound wave refers not only to the number of back-and-forth vibrations of the particles per unit of time but also to the number of compression or rarefaction disturbances that pass a given point per unit of time. A detector could be used to monitor the frequency of these pressure oscillations over a given period of time. The period of the sound wave can be found by measuring the time between successive high-pressure points (corresponding to the compressions) or the time between successive low-pressure points (corresponding to the rarefactions). The frequency is simply the reciprocal of the period; thus an inverse relationship exists so that as frequency increases, the period decreases, and vice versa.

A wave is an energy transport phenomenon that transports energy along a medium. The amount of energy carried by a wave is related to the amplitude (loudness) of the wave. A high-energy wave is characterized by high amplitude; a low-energy wave is characterized by low amplitude. The amplitude of a wave refers to the maximum

amount of displacement of a particle from its rest position. The energy transported by a wave is directly proportional to the square of the amplitude of the wave. This means that a doubling of the amplitude of a wave is indicative of a quadrupling of the energy transported by the wave.

Sound and the Human Ear

Because of the ability of the human ear to detect a wide range of sound-pressure fluctuations, sound-pressure levels are expressed in logarithmic units called decibels (dB) to avoid a very large and awkward range in numbers. The sound-pressure level in decibels is calculated by taking the log of the ratio between the actual sound pressure and the reference sound pressure squared. The reference sound pressure is considered the absolute hearing threshold (Caltrans 1998). Use of this logarithmic scale reveals that the total sound from two individual 65 A-weighted decibel (dBA) sources is 68 dBA, not 130 dBA (i.e., doubling the source strength increases the sound pressure by 3 dBA).

Because the human ear is not equally sensitive to all sound frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. This A-weighted scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale has been chosen by most authorities for the purpose of regulating environmental noise. Typical indoor and outdoor noise levels are presented in Exhibit 4.4-1.

With respect to how humans perceive and react to changes in noise levels, a 1-dBA increase is imperceptible, a 3-dBA increase is barely perceptible, a 6-dBA increase is clearly noticeable, and a 10-dBA increase is subjectively perceived as approximately twice as loud (Egan 1988), as presented in Table 4.4-1. Table 4.4-1 was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broadband noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50–70 dBA, as this is the usual range of voice and interior noise levels.

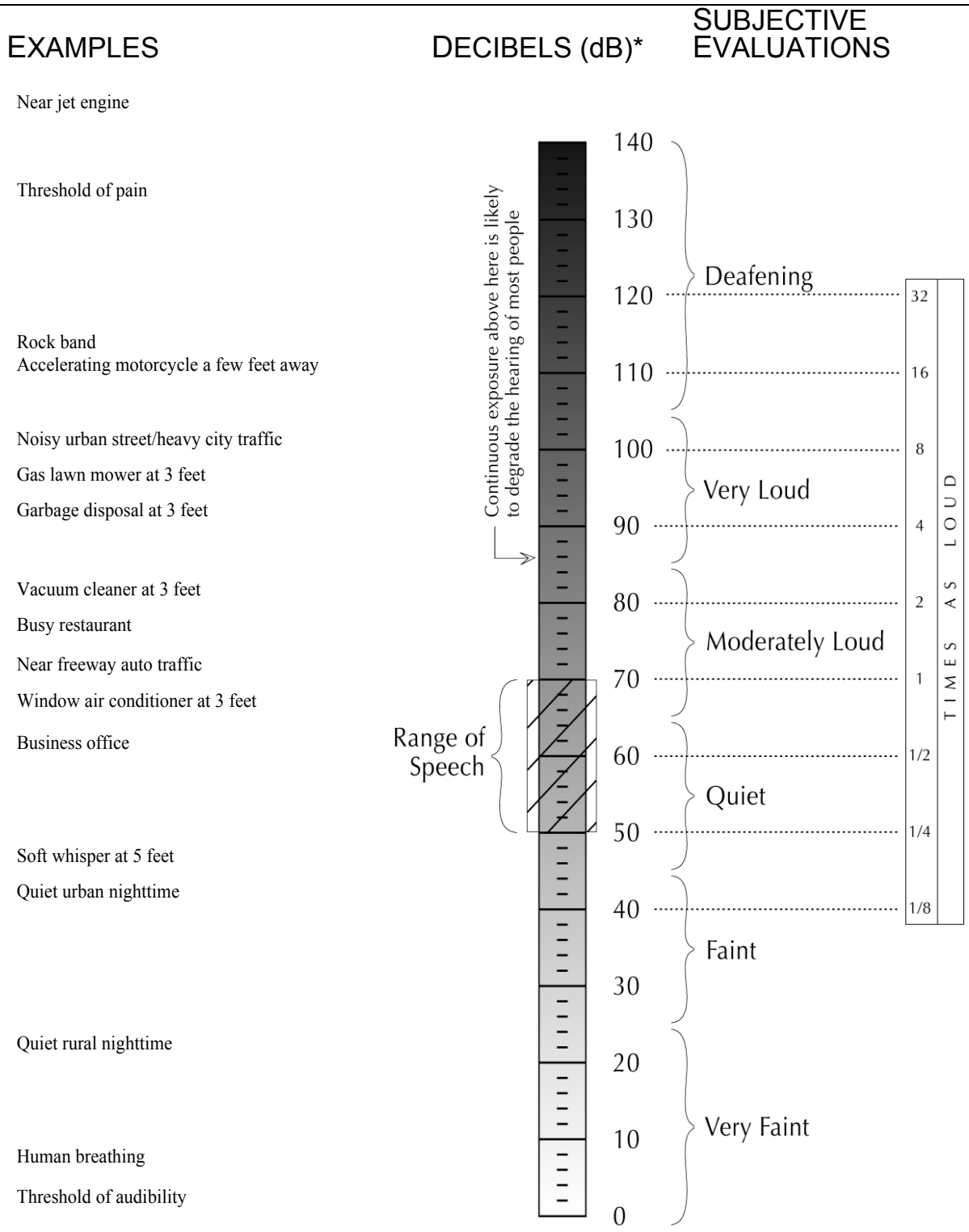
Table 4.4-1
Subjective Reaction to Changes in Noise Levels of Similar Sources

Change in Level, dBA	Subjective Reaction	Factor Change in Acoustical Energy
1	Imperceptible (Except for Tones)	1.3
3	Just Barely Perceptible	2.0
6	Clearly Noticeable	4.0
10	About Twice (or Half) as Loud	10.0

Note: dBA = A-weighted decibels
Source: Egan 1988

Sound Propagation and Attenuation

As sound (noise) propagates from the source to the receptor, the attenuation, or manner of noise reduction in relation to distance, is dependent on surface characteristics, atmospheric conditions, and the presence of physical barriers. The inverse-square law describes the attenuation caused by the pattern in which sound travels from the source to receptor. Sound travels uniformly outward from a point source in a spherical pattern with an attenuation rate of 6 dBA per doubling of distance (dBA/DD). However, from a line source (e.g., a road), sound travels uniformly outward in a cylindrical pattern with an attenuation rate of 3 dBA/DD. The surface characteristics



* dB are "average" values as measured on the A-scale of a sound-level meter.
From *Concepts in Architectural Acoustics* (M. David Egan, McGraw Hill, 1972) and U.S. Department of Housing and Urban Development, Office of Community Planning and Development, *The Noise Guidebook*.

Source: Data compiled by EDAW in 2005

Noise Levels Generated by Common Sources **Exhibit 4.4-1**

between the source and the receptor may result in additional sound absorption and/or reflection. Atmospheric conditions such as wind speed, temperature, and humidity may affect noise levels. Furthermore, the presence of a barrier between the source and the receptor may also attenuate noise levels. The actual amount of attenuation is dependent upon the size of the barrier and the frequency of the noise. A noise barrier may be any natural or human-made feature such as a hill, tree, building, wall, or berm (Caltrans 1998).

All buildings provide some exterior-to-interior noise reduction. A building constructed with a wood frame and a stucco or wood sheathing exterior typically provides a minimum exterior-to-interior noise reduction of 25 dBA with its windows closed, whereas a building constructed of a steel or concrete frame, a curtain wall or masonry exterior wall, and fixed plate glass windows of one-quarter-inch thickness typically provides an exterior-to-interior noise reduction of 30–40 dBA with its windows closed (Paul S. Veneklasen & Associates 1973, cited in Caltrans 2002).

Noise Descriptors

The selection of a proper noise descriptor for a specific source is dependent upon the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise are defined below (Caltrans 1998, Lipscomb and Taylor 1978).

- **L_{max} (Maximum Noise Level):** The maximum instantaneous noise level during a specific period of time. The L_{max} may also be referred to as the "peak (noise) level."

- **L_{min} (Minimum Noise Level):** The minimum instantaneous noise level during a specific period of time.

- **L_X (Statistical Descriptor):** The noise level exceeded X% of a specific period of time.

- **L_{eq} (Equivalent Noise Level):** The energy mean (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq}. In noise environments determined by major noise events, such as aircraft overflights, the L_{eq} value is heavily influenced by the magnitude and number of single events that produce the high noise levels.

- **L_{dn} (Day-Night Noise Level):** The 24-hour L_{eq} with a 10-dBA "penalty" for noise events that occur during the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours, and this generates a higher reported noise level when determining compliance with noise standards. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.

- **CNEL (Community Noise Equivalent Level):** The CNEL is similar to the L_{dn} described above, but with an additional 5-dBA "penalty" added to noise events that occur during the noise-sensitive hours between 7 p.m. and 10 p.m., which are typically reserved for relaxation, conversation, reading, and television. When the same 24-hour noise data are used, the reported CNEL is typically approximately 0.5 dBA higher than the L_{dn}.

- **SENL (Single-Event [Impulsive] Noise Level):** The SENL describes a receiver's cumulative noise exposure from a single impulsive noise event, which is defined as an acoustical event of short duration and involves a change in sound pressure above some reference value. SENLs typically represent the noise events used to calculate the L_{eq}, L_{dn}, and CNEL.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level L_{eq}, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually 1 hour).

The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and correlates well with community response to noise.

Negative Effects of Noise on Humans

Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time; traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period. Gradual and traumatic hearing loss both may result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases depends on the frequency, bandwidth, and level of the noise, and the exposure time (Caltrans 1998).

Vibration

Vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structureborne noise. Sources of groundborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, groundborne vibrations may be described by amplitude and frequency.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean square (RMS), as in RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (Federal Transit Administration [FTA] 2006, Caltrans 2004).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2006). This is based on a reference value of 1 microinch per second (μin/sec).

The background vibration-velocity level in residential areas is usually approximately 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2006).

Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Construction activities can generate groundborne vibrations, which can pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2006).

Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers,

large pumps, horizontal directional drilling, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment. Table 4.4-2 describes the general human response to different levels of groundborne vibration-velocity levels.

Table 4.4-2
Human Response to Groundborne Vibration Levels

Vibration Velocity (VdB)	Human Response
65	Approximate threshold of perception for many humans.
75	Approximate dividing line between barely perceptible and distinctly perceptible.
85	Vibration acceptable only if there are an infrequent number of events per day.

VdB = vibration decibels
Source: FTA 2006

EXISTING NOISE CONDITIONS

Existing Sensitive Land Uses

Noise-sensitive land uses generally are those uses where exposure to noise would result in adverse effects, as well as uses where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Adverse effects include speech interference, sleep interference, annoyance, and, in the extreme, hearing damage. Other noise-sensitive land uses are schools, hospitals, convalescent facilities, parks, hotels, places of worship, libraries, and other uses where low interior noise levels are essential.

Existing noise-sensitive land uses in the project area consist primarily of residential dwellings adjacent to the roadways where pipelines for the collection system would be installed. The nearest residences to the Manteca Wastewater Quality Control Facility (WQCF) are residences along Yosemite Avenue, approximately 650 feet from the facility. There are residential communities or groups of residences adjacent to the following proposed collection system roadway segments: West Center St, west of Union Road; Lathrop Road, east and west of State Route (SR) 99; Lathrop Road, west of Airport Way; the Union Pacific Railroad (UPRR) right-of-way intersection with Airport Way; and Manteca Road, south of Woodward Avenue. There are also scattered residences adjacent to many other segments of the proposed collection system.

Vibration-sensitive land uses include those described above as noise sensitive; schools are considered less vibration sensitive than residences and similar land uses where people sleep. Vibration-sensitive land uses also include educational, commercial, and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance. Equipment such as electron microscopes and high-resolution lithographic equipment can be very sensitive to vibration, and even normal optical microscopes will sometimes be difficult to use when vibration is well below the human annoyance level. Manufacturing of computer chips is an example of a vibration-sensitive process. This category does not include most computer installations or telephone switching equipment because most such equipment is designed to operate in typical building environments where the equipment may experience occasional shock from bumping and continuous background vibration caused by other equipment (FTA 2006). The vibration-sensitive receptors in the project area are the same residences that are considered noise sensitive.

Existing Sources

Existing noise conditions in the project are influenced primarily by surface transportation noise emanating from vehicular traffic on the nearby area roadways (e.g., SR 120 and West Yosemite Avenue). At receptors adjacent to

the existing roadways where the trunk sewers would be installed, the principal noise source is vehicle traffic on adjacent roadways. Some of the roadways where sewers would be installed are currently rarely used or may not exist. In these areas, noise from agricultural equipment and aircraft overflight may be as noticeable as vehicle noise. The UPRR mainline track runs diagonally through Manteca in a southeast-to-northwest direction. There are about 18–23 freight trains on the track per day (City of Manteca 2003a). Noise from railroad operations (e.g, train pass-bys and warning horns) is also a dominant noise source for receptors near the tracks. The UPRR is also considered to be a source of groundborne vibration in the immediate vicinity of the tracks.

REGULATORY SETTING

Federal Plans, Policies, Regulations, and Laws

The Federal Highway Administration (FHWA), the Federal Aviation Administration (FAA), and the U.S. Department of Housing and Urban Development (HUD) provide standards for noise levels in relation to highway projects, aircraft standards, and federally funded housing, respectively. None of these standards are relevant to this project.

U.S. Department of Transportation

To address the human response to groundborne vibration, the U.S. Department of Transportation (DOT), FTA has set forth guidelines for maximum-acceptable vibration criteria for different types of land uses. These include 65 VdB referenced to 1 μin/sec and based on the RMS velocity amplitude for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-tech manufacturing, laboratory facilities); 80 VdB for residential uses and buildings where people normally sleep; and 83 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, offices) (FTA 2006).

Standards have also been established to address the potential for groundborne vibration to cause structural damage to buildings. These standards were developed by the Committee of Hearing, Bio Acoustics, and Bio Mechanics (CHABA) at the request of the U.S. Environmental Protection Agency (FTA 2006). For fragile structures, CHABA recommends a maximum limit of 0.25 inch per second (in/sec) PPV (FTA 2006).

State Plans, Policies, Regulations, and Laws

Governor's Office of Planning and Research

The State of California Governor's Office of Planning and Research (OPR) published the *State of California General Plan Guidelines* (OPR 2003), which provide guidance for the acceptability of projects within specific day-night average noise level (L_{dn}) contours. Table 4.4-3 summarizes acceptable and unacceptable community noise exposure limits for various land use categories. Generally, residential uses (e.g., mobile homes) are considered to be acceptable in areas where exterior noise levels do not exceed 60 dBA L_{dn}. Residential uses are normally unacceptable in areas exceeding 70 dBA L_{dn} and conditionally acceptable within 55–70 dBA L_{dn}. Schools are normally acceptable in areas up to 70 dBA L_{dn} and normally unacceptable in areas exceeding 70 dBA L_{dn}. Commercial uses are normally acceptable in areas up to 70 dBA CNEL. Between 67.5 and 77.5 dBA L_{dn}, commercial uses are conditionally acceptable, depending on the noise insulation features and the noise reduction requirements. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

Table 4.4-3
Summary of Land Use Noise Compatibility Guidelines

Land Use Category	Community Noise Exposure (dBA L_{dn})

	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential—Low-Density Single-Family, Duplex, Mobile Home	<60	55–70	70–75	75+
Residential—Multifamily	<65	60–70	70–75	75+
Transient Lodging—Motel, Hotel	<65	60–70	70–80	80+
Schools, Libraries, Churches, Hospitals, Nursing Homes	<70	60–70	70–80	80+
Auditoriums, Concert Halls, Amphitheaters		<70	65+	
Sports Arena, Outdoor Spectator Sports		<75	70+	
Playgrounds, Neighborhood Parks	<70		67.5–75	72.5+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	<75		70–80	80+
Office Building, Business Commercial, and Professional	<70	67.5–77.5	75+	
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	

Notes: dBA = A-weighted decibels; L_{dn} = day-night average noise level

[1] Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

[2] New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

[3] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.

[4] New construction or development should generally not be undertaken.

Source: OPR 2003

Title 24, Part 2, of the State of California Building Code establishes noise standards for all new multifamily residential units. Where exterior noise levels exceed 60 dBA CNEL/L_{dn}, the code stipulates that an acoustical analysis shall be performed and submitted before construction. The acoustical analysis is required to establish mitigation measures that will limit maximum CNEL/L_{dn} levels to 45 dBA in any inhabitable room. Although there are no generally applicable interior noise standards pertinent to all uses, California communities typically adopt a CNEL/L_{dn} standard of 45 dBA as a maximum limit on interior noise in all residential units.

California Department of Transportation

For the protection of fragile, historic, and residential structures, the California Department of Transportation (Caltrans) recommends a more conservative threshold of 0.2 in/sec PPV for normal residential buildings and 0.08 in/sec PPV for old or historically significant structures (Caltrans 2004). These standards are more stringent than the federal standard established by CHABA, presented above.

Regional and Local Plans, Policies, Regulations, and Ordinances

San Joaquin County

San Joaquin County General Plan 2010

Some wastewater collection system pipeline segments would be constructed within San Joaquin County. The Noise Element of the adopted *San Joaquin County General Plan 2010* includes the following objectives and policies that are relevant to this analysis.

- **Objective 1:** To ensure acceptable noise environments for each land use.
  - **Policy 1:** The following noise levels shall be considered acceptable:

    (a) The maximum allowable noise exposure from transportation noise sources for outdoor activity areas shall be 65 dB for residential development; transient lodging, hospitals, nursing homes, and similar health-related facilities; churches, meeting halls, and similar community assembly facilities.

    (b) The maximum allowable noise exposure from transportation noise sources for indoor spaces shall be 45 dB L_{dn} for residential development; transient lodging, hospitals, nursing homes, and similar health-related facilities; churches, meeting halls, and similar community assembly facilities; office buildings; schools; libraries; museums; and day-care centers.

    (c) The hourly equivalent sound level from stationary noise sources shall be 50 dB during the daytime and 45 dB during the nighttime for outdoor activity areas for residential development; transient lodging, hospitals, nursing homes, and similar health-related facilities; churches, meeting halls, and similar community assembly facilities; office buildings; schools; libraries; museums; and day-care centers.

    (d) The maximum sound level from stationary noise sources shall be 70 dB during the daytime and 65 dB during the nighttime for outdoor activity areas for residential development; transient lodging, hospitals, nursing homes, and similar health-related facilities; churches, meeting halls, and similar community assembly facilities; office buildings; schools; libraries; museums; and day-care centers.

  - **Policy 2:** The County shall not permit new areas of residential development within the 65 dB L_{dn} contours around public access airports.

  - **Policy 3:** Development shall be planned and designed to minimize noise impacts on neighboring noise sensitive areas and to minimize noise interference from outside noise sources.

  - **Policy 4:** The County noise regulations shall be based on projections, using the noise contours in Volume III of the General Plan or the best available information.

  - **Policy 5:** The County shall seek to alleviate existing community noise problems.

San Joaquin County Municipal Code

The San Joaquin County Municipal Code includes the following objectives and policies relating to noise that may be relevant to this analysis.

Section 9-1022.5 Noise Attenuation Walls

Walls, fences, berms, and/or landscaping for the purpose of noise attenuation may be required in any zone when adjacent to a high noise generator such as a major roadway or railroad. Noise attenuation requirements shall be developed in response to the noise level and source affecting a specific property. Where noise attenuation walls are required, height and yard restrictions for walls shall be waived by the Director as required for effective noise reduction.

Section 9-1025.5 Vibration

(a) Perceptible Displacement. No use shall cause perceptible displacement at any lot line abutting any zone except an I-G Zone.

(b) Displacement within the General Industrial Zone. Vibration displacement along any lot line within an I-G Zone shall not exceed the levels set forth in Table 9-1025.5 (see Table 4.4-4). Vibration displacement shall be measured by a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity, or acceleration. Readings shall be made at points of maximum vibration along any lot line with an I-G Zone.

Table 4.4-4
San Joaquin County Development Code Table 9-1025.5: Maximum Displacement Levels at Any Lot Line

Frequency (Cycles per Second)	Steady State (inches)	Impact (inches)
10 and below	0.0010	0.0020
10–20	0.0008	0.0016
20–30	0.0007	0.0014
30–40	0.0003	0.0006
40–50	0.0002	0.0004
50–60	0.0001	0.0002
60 and over	0.0001	0.0002

Source: San Joaquin County Development Code, Title 9, issued in 1999 and updated in 2002

Section 9-1025.9 Noise

All uses and property shall be subject to the following provisions concerning noise levels:

(b) Stationary Noise Sources.

(1) Excluding proposed noise sensitive land uses on infill lots, proposed noise sensitive land uses that will be impacted by stationary noise sources shall be required to mitigate the noise levels from these stationary noise sources so that the resulting noise levels on said proposed noise sensitive land uses do not exceed the standards specified in Table 9-1025.9, Part II (Table 4.4-5).

(2) Proposed projects that will create new stationary noise sources or expand existing stationary noise sources shall be required to mitigate the noise levels from these stationary noise sources so as not to exceed the noise level standards specified in Table 9-1025.9, Part II (Table 4.4-5).

(c) Exemptions. The following shall be exempt from the provisions of this Chapter:

(1) Activities conducted in public parks, public playgrounds, and public or private school grounds, including but not limited to school athletic and school entertainment events;

(2) Any mechanical device, apparatus, or equipment used, related to, or connected with, emergency activities or emergency work;

(3) Noise sources associated with construction, provided such activities do not take place before 6:00 a.m. or after 9:00 p.m. on any day;

(4) Noise sources associated with the maintenance of residential property located in a residential zone, provided such activities shall take place between the hours of 8:00 a.m. and 9:00 p.m. on any day;

(5) Noise sources emanating from any agricultural operation, including activities associated with the processing or transportation of crops when such activities are conducted on agriculturally zoned lands;

(6) Noise sources associated with residential air conditioning equipment, provided such equipment is in good repair;

(7) Noise sources associated with work performed by private or public utilities in the maintenance or modification of its facilities;

(8) Noise sources associated with the collection of waste or garbage;

(9) Any activity whose regulation has been preempted by state or federal law.

(d) Acoustical Study. The Review Authority shall require the preparation of an acoustical study in instances where it has [been] determined that a project may expose existing or proposed noise sensitive land uses to noise levels exceeding the noise standards specified in Table 9-1025.9 (Table 4.4-5). This determination shall be based on the existing or future sixty-five (65) dB L_{dn} noise contour in the General Plan, the proximity of new noise sensitive land uses to known noise sources, or the knowledge that a potential for adverse noise impacts exists. The study shall be paid for by the applicant and shall be prepared by a person or persons selected by the Director. The Director shall select the consultant from the County's consultant list. The acoustical study shall include the following information:

(1) A general description of the project, with appropriate maps, and the noise sources of concern;

(2) description of the methodology that will be used to assess noise impacts, including a listing of all assumptions and data used in any computer models.

(A) Computer models that will be used for noise predictions shall be standard versions approved by the FHWA, FAA (Federal Aviation Administration), Caltrans, or other government agencies.

(B) For traffic noise studies, the computer models, SOUND32 or other proprietary models based on the 1978 "FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108)" shall be used. The FHWA's new "Traffic Noise Model" (TNM) shall be used after its phase-in date. For aircraft noise studies, the latest version of the FAA's "Integrated Noise Model (INM)" shall be used.

Table 4.4-5
San Joaquin County Development Code Table 9-1025.9

Part I—Transportation Noise Sources		
Noise Sensitive Land Use (Use types)	Outdoor Activity Areas1 (dB L_{dn})	Interior Spaces (dB L_{dn})

Table 4.4-5 San Joaquin County Development Code Table 9-1025.9		
Part I—Transportation Noise Sources		
Noise Sensitive Land Use (Use types)	Outdoor Activity Areas1 (dB L_{dn})	Interior Spaces (dB L_{dn})
Residential	65	45
Administrative Office	—	45
Child Care Services—Child Care Centers	—	45
Community Assembly	65	45
Cultural & Library Services	—	45
Educational Services: General	—	45
Funeral & Interment Services—Undertaking	65	45
Lodging Services	65	45
Medical Services	65	45
Professional Services (excluding Hospitals)	—	45
Public Services (hospitals only)	65	45
Recreation—Indoor Spectator	—	45
Religious Assembly	65	45
Part II—Stationary Noise Sources		
	Outdoor Activity Areas[1]—Daytime[2] (7 a.m.–10 p.m.)	Outdoor Activity Areas[1]—Nighttime[2] (10 p.m.–7 a.m.)
Hourly Equivalent Sound Level (L_{eq}),dB	50	45
Maximum Sound Level (L_{max}), dB	70	65

Notes: dB = decibels; L_{dn} = day-night average noise level

[1] Where the location of outdoor activity areas is unknown or is not applicable, the noise standard shall be applied at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards shall be applied on the receiving side of noise barriers or other property line noise mitigation measures.

[2] Each of the noise level standards specified shall be reduced by 5 dB for impulsive noise, single-tone noise, or noise consisting primarily of speech or music.

Source: San Joaquin County 2006

(C) If standard government approved models do not exist (e.g., railroad and industrial noise sources), a description of the model shall be provided.

(3) A description of existing and future noise levels together with a comparison of these noise levels to the noise level standards specified in Table 9-1025.9 (Table 4.4-5).

(4) Recommend(ed) mitigation measures to achieve compliance with the standards specified by Table 9-1025.9 (Table 4.4-5) (i.e., noise barriers, site design, setbacks, equipment modification, structure soundproofing), or a detailed explanation stating why mitigation is infeasible.

(e) Measurement. When noise level measurements are conducted, sound level meters meeting Type 1 (precision) or Type 2 (general purpose) sound level meter/microphone combinations shall be used.

(1) Sound level meters shall be properly calibrated before use and used according to the manufacturer's instructions.

(2) All measurements shall be in terms of A-weighted decibels using slow meter response, except for impulsive noise, which shall be measured using fast meter response.

(3) Measurements shall include sufficient sampling periods and locations to adequately describe local conditions and significant noise sources.

(f) Prohibited Activities. The outdoor operation of any industrial, commercial, or residential property maintenance tool or equipment powered by an internal combustion engine or electric motor including, but not limited to, leaf blower, chainsaw, lawn mower, hedger, and vacuum cleaner is prohibited with(in) 500 feet of a residence located in a residential zone between the hours of 9:00 p.m. and 8:00 a.m.

Section 9-1025M Noise

- The regulations concerning noise shall be as specified in the development title with the following modifications:

(a) Standards for Commercial and Industrial Uses. For new commercial uses, industrial uses or utilities, the exterior, non-transportation noise level performance standards specified in Table 9-10259M (Table 4.4-6) shall be applicable.

Table 4.4-6
San Joaquin County Development Code Table 9-10259M:
Exterior Nontransportation Noise Level Standards

Noise Level Descriptor	Daytime (7 a.m.–10 p.m.)	Nighttime (10 p.m.–7 a.m.)
Hourly L_{eq}	55 dB	50 dB

Note: dB = decibels; L_{eq} = hourly equivalent sound level. Each of the above noise levels may be lowered by five (5) dB for simple tone noises or for noises consisting primarily of speech or music.
Source: San Joaquin County Development Code, Title 9, issued in 1999 and updated in 2002

(2) Noise levels from mobile noise sources in primary outdoor use areas of new residential development shall not exceed an L_{dn} of sixty (60) dB unless the project design includes mitigation measures to reduce noise in outdoor activity areas to sixty (60) dB, or as reasonably close to sixty (60) dB as is possible. Where it is not possible to reduce noise in outdoor activity areas to an L_{dn} of sixty (60) dB or less, an exterior noise level of up to, but not exceeding, an L_{dn} of sixty-five (65) dB may be allowed by the Review Authority.

(c) Standards for Other Specified Uses.

(1) Noise-sensitive land uses other than residential uses shall not be allowed where noise levels due to stationary noise sources would exceed the exterior level standards set forth in Table 1025.9M (Table 4.4-6).

(2) On school sites and other noise-sensitive land uses, any outdoor instructional areas or areas which require speech audibility shall be located outside the sixty (60) dB L_{dn} noise contour from mobile sources or shielded from mobile noise in excess of sixty (60) dB L_{dn}.

(3) Noise levels within buildings meant for human occupancy shall not exceed an L_{dn} of forty-five (45) dB.

(4) Noise studies prepared for noise-sensitive land uses shall address how noise levels in outdoor areas mobile sources shall be maintained at or below an L_{dn} of sixty (60) dB.

City of Manteca

City of Manteca General Plan

The Noise Element of the *City of Manteca General Plan 2023* (City of Manteca 2003b) identifies goals, standards, and policies designed to ensure that City residents are not subjected to noise beyond acceptable levels. A general objective of the Noise Element is to protect existing noise-sensitive development (e.g., hospitals, schools, churches, and residences) from new uses that would generate noise levels incompatible with those uses and, conversely, discourage noise-sensitive uses from locating near sources of high noise levels. The Noise Element establishes noise criteria for determining land use compatibility for new land uses affected by transportation noise sources; these are not directly applicable to this project. The Noise Element also establishes maximum allowable noise performance standards for stationary noise sources, which are shown in Table 4.4-7.

Several policies and implementation measures contained in the general plan's Noise Element specifically address noise issues associated with stationary sources and construction and may be relevant to this analysis.

Table 4.4-7
City of Manteca General Plan Performance Standards for Stationery Noise Sources or Projects Affected by Stationary Noise Sources

Noise Level Descriptor (dBA)	Daytime (7 a.m.–10 p.m.)	Nighttime (10 p.m.–7 a.m.)
Hourly Equivalent Sound Level (L_{eq})	50	45
Maximum Sound Level (L_{max})	70	65

Notes:
Each of the noise level standards specified above shall be reduced by 5 dBA for simple noise tones, noises consisting primarily of speech or music, or recurring impulsive noises. Such noises are generally considered by residents to be particularly annoying and are a primary source of noise complaints. No standards have been included for interior noise levels. Standard construction practices should, with the exterior noise levels identified, result in acceptable interior noise levels.
Source: City of Manteca 2003b

Policy N-P-4: The City shall require stationary noise sources proposed adjacent to noise sensitive uses to be mitigated so as to not exceed the noise level performance standards in Table 4.4-7.

Policy N-P-5: In accord with Table 4.4-8 standards, the City shall regulate construction-related noise impacts on adjacent uses.

Implementation Measure N-I-3: In making a determination of impact under the California Environmental Quality Act (CEQA), a substantial increase will occur if ambient noise levels are increased by 10 dB or more. An increase from 5–10 dB may be substantial. Factors to be considered in determining the significance of increases from 5–10 dB include:

(a) The resulting noise levels;
(b) The duration and frequency of the noise;
(c) The number of people affected;

(d) The land use designation of the affected receptor sites;
(e) Public reactions or controversy as demonstrated at workshops or hearings, or by correspondence;
(f) Prior CEQA determinations by other agencies specific to the project

Implementation Measure N-I-4: Control noise at the source through use of insulation, berms, building design and orientation, buffer space, staggered operating hours and other techniques. Use noise barriers to attenuate noise to acceptable levels.

City of Manteca Municipal Code

The purpose of Chapter 17.13 of the City of Manteca Municipal Code, Performance Standards, is to provide necessary control measures to protect the community from hazards and nuisances and to establish limits and procedures for measuring the nuisances. The general statement of the section is, "Land or buildings shall not be used or occupied in a manner creating any dangerous injurious, noxious, fire, explosive or other hazard*; noise,* vibration, smoke, dust, order or form of air pollution; heat, cold, dampness, electrical or other disturbance; glare, refuse or wastes; other substances, conditions or elements which would adversely affect the surrounding area" (City of Manteca 1992).

With respect to noise, Section 17.13.040A specifies maximum allowable sound pressure levels for various land uses. Normal household appliances and construction equipment operated between the hours of 7 a.m. to 7 p.m. are exempt from these standards. The maximum sound pressure levels radiated by any use or facility shall not exceed the computed noise level values specified in Table 4.4-8, after applying corrections. This regulation is commonly referred to as the noise ordinance.

Table 4.4-8
City of Manteca Municipal Code Noise Performance Standards

Receiving Land Use Category	Time Period	Maximum Exterior Noise Level (dBA)
Single and Limited Multiple Family	10 p.m.–7 a.m.	50
	7 a.m.–10 p.m.	60
Multifamily residential, Public Institutional and Neighborhood Commercial	10 p.m.–7 a.m.	55
	7 a.m.–10 p.m.	60
Medium and Heavy Commercial	10 p.m.–7 a.m.	60
	7 a.m.–10 p.m.	65
Light industrial	Anytime	70
Heavy industrial	Anytime	75

Notes: dBA = A-weighted decibels. The following corrections are applicable (apply only one correction):
Daytime Operation Only (7 a.m. – 7 p.m.): +5 decibels
Noise Source Operates Less Than:
20% of any 1-hour period: +5 decibels
5% of any 1-hour period: +10 decibels
1% of any 1-hour period: +15 decibels
Noise of Impulsive Character (hammering, etc.): -5 decibels
Noise Rising or Falling in Pitch or Volume (hum, screech, etc.): -5 decibels
Source: City of Manteca 1992

Section 17.13.040B specifies vibration requirements. No vibration shall be produced that is transmitted through the ground and is discernible without the aid of instruments, nor shall any vibration produced exceed 0.002*g* (in acceleration attributable to gravity) peak at up to 50 cycles per second (cps) frequency, using either seismic or electronic vibration-measuring equipment. Vibrations occurring at higher than 50 cps frequency of a periodic vibration shall not induce accelerations exceeding 0.001*g*. Single impulse periodic vibrations occurring at an average interval greater than 5 minutes shall not induce accelerations exceeding 0.01*g*.

Section 17.13.030 specifies the point of measurement for both the noise and vibration standards. Measurements necessary for enforcement of performance standards shall be taken at the lot line of the establishment or use in any district, except in the M-1 and M-2 districts measurements shall be taken at the district boundary of 500 feet to the exterior wall of the establishment or use, whichever is less.

4.4.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Noise-sensitive land uses and noise sources in the vicinity of the proposed project sites were identified based on existing documentation, aerial photos, and site reconnaissance data. To assess potential construction-noise and stationary-source noise impacts, sensitive receptors and their potential exposure, as a function of distance and ground cover, were identified. Typical noise levels associated with the specific types of construction equipment anticipated to be used for project construction were determined, and resultant potential noise levels at those receptors were calculated based on accepted relationships for noise attenuation. Potential vibration impacts were assessed according to methods recommended by FTA (FTA 2006).

THRESHOLDS OF SIGNIFICANCE

For the purpose of this analysis, the following applicable thresholds of significance, as identified by the State CEQA Guidelines (Appendix G), San Joaquin County, and the City of Manteca, have been used to determine whether implementing the proposed project would result in significant noise impacts. The proposed project would result in significant noise impacts if project implementation would do any of the following:

- **Short-Term Construction Source Noise Levels**. Short-term noise impacts would be significant if construction of the proposed project would expose persons to or generate noise levels in excess of applicable standards (e.g., City of Manteca and San Joaquin County general plan and municipal codes) or result in a substantial temporary or periodic increase in ambient noise above levels existing without the project (e.g., 5 dBA L_{dn} or greater) at nearby existing noise-sensitive receptors during the more noise-sensitive early morning, evening, and nighttime periods of the day (i.e., 7 p.m. to 7 a.m. in the City of Manteca and 9 p.m. to 6 a.m. in San Joaquin County).

- **Long-Term Increases in Traffic Source Noise Levels**. Long-term noise impacts would be significant if project-generated increases in traffic would expose persons to or generate noise levels in excess of applicable standards (e.g., City of Manteca and San Joaquin County general plans and municipal codes) or result in a permanent increase in ambient noise levels above levels existing without the project (e.g., 5 dBA L_{dn} or greater) at nearby existing noise-sensitive receptors.

- **Long-Term Stationary- and Area-Source Noise Levels**. Long-term noise impacts would be significant if project-generated stationary or area sources would expose persons to or generate noise levels in excess of applicable standards (e.g., City of Manteca and San Joaquin County general plans and municipal codes) or result in a permanent increase in ambient noise levels above levels existing without the project (e.g., 5 dBA L_{dn} or greater) at nearby existing noise-sensitive receptors.

- **Compatibility of Proposed Land Uses with On-site Noise Levels**. Long-term noise impacts would be significant if on-site noise levels would expose persons to or generate noise levels in excess of applicable standards (e.g., City of Manteca and San Joaquin County general plans and municipal codes) at proposed noise-sensitive receptors.

- **Exposure of Sensitive Receptors to or Generation of Excessive Ground-Borne Vibration or Noise Levels**. Vibration impacts would be significant if construction or operation of the proposed project would expose persons to or generate excessive groundborne vibration or groundborne noise levels (e.g., exceed

Caltrans's recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings or FTA's maximum acceptable vibration standard of 80 VdB with respect to human response for residential uses [i.e., annoyance] at nearby existing vibration-sensitive land uses).

- **Exposure of Sensitive Receptors to Airport-Related Noise Levels**. Airport-related impacts would be significant if construction or operation of the proposed project would expose people residing or working in the area to excessive noise levels, for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport or expose people residing or working in the project area to excessive noise levels, for a project within the vicinity of a private airstrip.

IMPACT ANALYSIS

IMPACT 4.4-1 Noise—Short-Term Increases in Construction Source Noise Levels. *If construction activities were to occur during the more noise-sensitive hours or if construction equipment were not properly equipped with noise control devices, construction-generated source noise could result in the exposure of persons to or generation of noise levels in excess of applicable standards, could result in annoyance and/or sleep disruption to occupants of any existing noise-sensitive land uses in the project vicinity, and/or could create a substantial temporary increase in ambient noise levels. As a result, this impact would be* ***potentially significant.***

Construction noise typically occurs intermittently and varies depending on the nature of the construction activities being performed. Noise generated by construction equipment, including excavation equipment, material handlers, portable generators, and trucks, can reach high levels for brief periods. When noise levels generated by construction operations are being evaluated, activities occurring during the more noise-sensitive evening and nighttime hours are of increased concern. Because exterior ambient noise levels typically decrease during the late evening and nighttime hours as traffic volumes and commercial activities decrease, construction activities performed during these more noise-sensitive periods of the day can result in increased annoyance and potential sleep disruption for occupants of nearby residential dwellings.

Construction noise associated with the WQCF expansion would be temporary in nature and would include noise from activities such as site preparation, foundation construction, building construction, application of architectural coatings, paving, finishing, and cleanup. Construction equipment would be the principal source of noise. For most equipment, such as bulldozers, trucks, loaders, and scrapers, the diesel engines of the equipment would be the loudest noise source. When jackhammers or other sorts of pavement breakers are used, the noise of the impact tool would be dominant. Table 4.4-9 shows some typical maximum noises at a distance of 50 feet from the equipment.

Table 4.4-9 Typical Construction Equipment Noise	
Equipment	Maximum Noise Level (dBA L_{max}) 50 Feet from Source
Backhoe	80
Grader	85
Loader	85
Pile Driver	96–101
Jackhammer	88
Bulldozer	85
Truck	88
Scraper	89

Notes: dBA = A-weighted decibels; L_{max} = maximum noise level
Source: FTA 2006

Noise from two or more pieces of equipment would be greater than noise from one piece of equipment. Average noise levels would be less than maximum noise levels because equipment would not operate at full power all of the time, nor would the equipment remain in one location. With these considerations, an average noise level of 75 dBA L_{eq} at a distance of 50 feet would be a reasonable value, assuming pile drivers would not be required during construction. Construction equipment may be considered a point source, with noise attenuation (reduction) of 6 dBA/DD from the source over hard surfaces such as concrete or water. Thus, a noise level of 80 dBA at 50 feet would be 74 dBA at 100 feet, 68 dBA at 200 feet, etc. Where the terrain between the source and receptor is vegetated and the line of sight from source to receptor is within 10 feet of the ground, called acoustically "soft" conditions, the noise attenuation may increase up to 7.5 dBA/DD. Based on these noise levels and a typical noise-attenuation rate of 7.5 dBA/DD, construction activities would result in a modeled exterior noise level at the closest noise-sensitive receptors, located approximately 650 feet from the project site, of approximately 50 dBA, with intermittent maximum noise levels of approximately 60 dBA L_{max}.

Similar to the WQCF expansion, construction equipment would be the principal source of noise during installation of the wastewater collection system (e.g., pipelines and pump stations). Typical equipment for the collection system installation would include backhoes, trucks, loaders, pavement breaking tools, and generators to support compressors and welders. The diesel engines of the equipment would be the loudest noise source except when jackhammers or other sorts of pavement breakers would be used, for which times the noise from impact tools would be dominant.

Pipeline installation would be linear in nature, moving at a rate of 100–200 feet per day. There would be a series of activities at each location: trenching and excavation, with pavement breaking if needed; pipeline installation; backfill; and paving. Paving would occur after installation of the pipeline and the backfill activities. The noise at adjacent residences or sensitive land uses would occur intermittently for one to three days at any individual residence. It is not anticipated that any element of the project would be located less than 50 feet from sensitive receptors, and noise levels would not exceed 75 dBA L_{eq} averaged over any hour, with intermittent maximum noise levels at 85 dBA.

Noise from construction activities that occur between 7 a.m. and 7 p.m., and 6 a.m. and 9 p.m. is exempt from the provisions of the City of Manteca and San Joaquin County noise ordinances, respectively. Although construction of the proposed project would be anticipated to occur primarily during the daytime hours, the exact hours of construction are not specified in the project description. Thus, if construction activities were to occur during the more noise-sensitive hours (e.g., evening, nighttime, and early morning) or construction equipment not properly

equipped with noise control devices, construction-generated source noise could result in the exposure of persons to or generation of noise levels in excess of applicable standards, annoyance and/or sleep disruption to occupants of any existing noise-sensitive land uses in the project vicinity, and/or create a substantial temporary increase in ambient noise levels. As a result, this impact would be **potentially significant**.

IMPACT 4.4-2 Noise—Long-Term Increases in Traffic Source Noise Levels. *Because operation would generate few traffic trips in comparison to existing traffic volumes on local roadways, the proposed project would not result in a noticeable change in the traffic noise contours of area roadways. Thus, long-term increases in traffic source noise levels would not result in the exposure of persons to or generation of noise levels in excess of applicable standards or create a substantial permanent increase in ambient noise levels at existing noise-sensitive receptors. As a result, this impact would be* ***less than significant.***

As described in Section 4.11, "Transportation and Circulation," the proposed project would generate 20 one-way employee passenger vehicle trips per day and less than one truck haul trip per day. These trips are less than 1.0% of existing traffic volumes on local area roadways. Typically, traffic volumes have to double before the associated increase in noise levels is noticeable (3 dBA [CNEL/L_{dn}]) along roadways. Therefore, the addition of these daily trips on the local roadway system to existing volumes would be negligible. The operation of the project would not result in a noticeable change in the traffic noise contours of area roadways and long-term increases in traffic source noise levels would not result in the exposure of persons to or generation of noise levels in excess of applicable standards or create a substantial permanent increase in ambient noise levels at existing noise-sensitive receptors. As a result, this impact is considered **less than significant.**

IMPACT 4.4-3 Noise—Long-Term Increases in Stationary- and Area-Source Noise Levels. *Long-term on-site stationary-source noise would not result in the exposure of persons to or generation of noise levels in excess of applicable standards or create a substantial permanent increase in ambient noise levels in the project vicinity. Area sources of noise (e.g., landscape maintenance equipment) would not be anticipated to differ substantially from existing noise equipment levels. As a result, this impact would be* ***less than significant.***

For the WQCF, long-term operation would increase the use of on-site noise-generating stationary equipment such as electrical pump motors, air compressors, fans, aerators, chlorination systems, transformers, and emergency generators. Without proper noise control or enclosure, such equipment could result in noise levels of more than 100 dBA at 3 feet from the source depending on the exact type and size (EPA 1971). Specifically, pumps could result in noise levels of more than 90 dBA at 3 feet, transformers 80 dBA at 3 feet, and electrical motors 100 dBA at 3 feet (EPA 1971). Based on this equipment noise level and a typical noise-attenuation rate of 7.5 dBA/DD for soft sites, the operation of on-site stationary equipment would result in a modeled exterior noise level at the closest noise-sensitive receptors, located approximately 650 feet from the project site, of approximately 42 dBA. In addition, the operation of on-site stationary equipment would result in a modeled noise level of approximately 69 dBA at 50 feet. This noise level would be in compliance with the City of Manteca's noise ordinance, which limits noise in industrial area to 70 dBA at 50 feet. Such equipment would also likely be housed in buildings, enclosed, and/or equipped with interior sound insulation resulting in substantially lower noise levels. Area sources of noise (e.g., landscape maintenance equipment) would not be anticipated to differ substantially from existing noise equipment levels.

For the wastewater collection system, long-term operation would increase the use of noise-generating stationary equipment such as electrical pump motors and generators associated with the proposed permanent and interim wastewater pumping stations. The location of these is not known at this time; however, the pump motors would be installed below grade and generators would only operate during emergencies and testing on a frequency of once per week to once per month (e.g., temporary in nature). The City of Manteca's noise ordinance would govern the design of pump stations within the city, including emergency generators, and the San Joaquin County noise ordinance exempts activities associated with the maintenance of public utilities. Thus, long-term on-site

stationary-source noise would not result in the exposure of persons to or generation of noise levels in excess of applicable standards or create a substantial permanent increase in ambient noise levels in the project vicinity. As a result, this impact would be **less than significant**.

IMPACT 4.4-4 Noise—Compatibility of Proposed Land Uses with On-site Noise Levels. *Project implementation would not result in the exposure of any sensitive receptors, proposed as part of the project, or any people working in the area to noise levels that exceed applicable City or County standards, including aircraft-generated noise levels. As a result, this impact would be* ***less than significant.***

Implementation of the proposed project would not result in the development of any noise-sensitive land uses (e.g., residential) or result in a different land use type than what currently exists at the project site. In addition, the proposed project site would not be located within 2 miles of an airport land use plan or in the vicinity of a public or private airport, as the nearest airport to the WQCF is the Stockton Metropolitan Airport located approximately 6.5 miles to the north. Thus, project implementation would not result in the exposure of any sensitive receptors, proposed as part of the project, or any people working in the area to noise levels that exceed applicable City or County standards, including aircraft-generated noise levels. As a result, this impact would be **less than significant**.

IMPACT 4.4-5 Noise—Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration or Noise Levels. *Short-term project-generated vibration levels from construction sources could exceed FTA's maximum-acceptable vibration standard of 80 VdB with respect to human response for residential use at vibration-sensitive land uses. As a result, this impact would be* ***significant.***

The long-term operation of the proposed project would not include any vibration sources. However, construction activities have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Table 4.4-10 displays vibration levels for typical construction equipment that may be used on the proposed project.

Table 4.4-10
Vibration Source for Typical Construction Equipment

Equipment	PPV at 25 feet (in/sec)[1]	Approximate L_v at 25 feet (Vdb)[2]
Large Bulldozer	0.089	87
Hoe Ram	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

[1] Where PPV is the peak particle velocity.
[2] Where Lv is the velocity level in decibels (VdB) and based on the root mean square (RMS) velocity amplitude.
Source: FTA 2006

For the WQCF, the required construction equipment would likely include trucks and bulldozers, as discussed above. According to FTA, vibration levels associated with the use of such equipment would be approximately 0.089 in/sec PPV and 87 VdB (referenced to 1 µin/sec and based on the RMS velocity amplitude) at 25 feet, as shown in Table 4.4-10. Using FTA's recommended procedure for applying a propagation adjustment to these reference levels, predicted worst-case vibration levels would exceed 0.2 in/sec PPV (Caltrans's recommended standard with respect to the prevention of structural damage for normal buildings) within 15 feet and 80 VdB

(FTA's maximum-acceptable vibration standard with respect to human annoyance for residential uses) within 60 feet of vibration-sensitive receptors. The closest vibration-sensitive receptor is located approximately 650 feet from the WQCF site; thus, worst-case vibration levels would not exceed the recommended standards.

For the wastewater collection system, the maximum potential vibration levels would likely be attributable to the use of hoe rams for pavement breaking, trucks, and jackhammers. As shown in Table 4.4-10, the hoe ram would result in vibration levels of 0.089 in/sec PPV and 87 VdB at 25 feet. Worst-case vibration levels would exceed 0.2 in/sec PPV (Caltrans's recommended standard with respect to the prevention of structural damage for normal buildings) within 15 feet and 80 VdB (FTA's maximum-acceptable vibration standard with respect to human annoyance for residential uses) within 60 feet of vibration-sensitive receptors. No pavement breaking would be anticipated within 15 feet of any existing structures; however, hoe rams and other pieces of equipment could be operated within 60 feet of vibration-sensitive receptors. Thus, short-term project-generated vibration levels from construction sources could exceed FTA's maximum-acceptable vibration standard of 80 VdB with respect to human response for residential uses (i.e., annoyance) at vibration-sensitive land uses. As a result, this impact would be **significant**.

4.4.3 MITIGATION MEASURES

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

4.4-2: Long-Term Increases in Traffic Source Noise Levels.

4.4-3: Long-Term Increases in Stationary- and Area-Source Noise Levels.

4.4-4: Compatibility of Proposed Land Uses with On-site Noise Levels.

The following mitigation measures are provided for the potentially significant and significant impacts of Impacts 4.4-1 and 4.4-5.

Mitigation Measure 4.4-1: Short-Term Increases in Construction Source Noise Levels. To reduce the exposure of noise-sensitive receptors to project-generated construction source noise levels, the City will implement the following measures:

- Limit all construction activities within the city to the hours from 7 a.m. to 7 p.m. to ensure compliance with Section 17.13.04(A) of the City of Manteca Municipal Code.
- Limit all construction activities within the county, or affected by the County, to the hours from 6 a.m. to 9 p.m. to ensure compliance with the San Joaquin County Development Code (Section 9-1029.9[C][3]).
- Properly maintain and equip all construction equipment with noise control, such as mufflers, in accordance with manufacturers' specifications.
- Place noisy stationary equipment (e.g., compressors, generators) away from existing off-site noise-sensitive receptors and/or provide acoustical shielding.

Implementation of Mitigation Measure 4.4-1 would reduce significant impacts related to noise from construction sources to a **less-than-significant** level because noise levels would be reduced (e.g., by approximately 5 dBA) and construction activities would be limited to the hours during which noise levels are exempt from the provisions of the applicable standards and would not result in a noticeable increase in ambient noise levels at noise-sensitive receptors during the more noise-sensitive hours of the day.

Mitigation Measure 4.4-5: Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration or Noise Levels. To reduce the exposure of vibration-sensitive receptors to project-generated construction source vibration levels, the City will implement the following measure:

- Construction activities within 60 feet of occupied residences will be performed without equipment that produces relatively high levels of vibration (e.g., use jackhammers in place of hoe rams).

Implementation of Mitigation Measure 4.4-5 would reduce significant impacts related to the exposure of sensitive receptors to excessive groundborne vibration to a **less-than-significant** level because vibration levels would not exceed FTA's maximum-acceptable standard with respect to human response for residential uses (i.e., annoyance).

4.4.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of Mitigation Measures 4.4-1 and 4.4-5, the project's potential noise and vibration impacts would be reduced to a **less-than-significant** level because noise and vibration levels would be reduced and construction activities would be limited to the hours during which noise levels are exempt from the provisions of the applicable construction noise standards.

4.5 TERRESTRIAL BIOLOGICAL RESOURCES

This section discusses biological resources present in the project area and evaluates potential impacts on these resources that could result from project implementation. EDAW biologists reviewed existing documents that address biological resources in the vicinity of the project area and conducted searches of the California Natural Diversity Database (CNDDB 2006) and California Native Plant Society (CNPS) database (CNPS 2006) for specific information on documented sightings of special-status species and sensitive natural communities in the project vicinity. On June 26, 2006, EDAW biologists conducted a reconnaissance-level field survey along the proposed pipeline alignments for the treated effluent outfall, wastewater collection system, and recycled-water distribution system, and at the wastewater quality control facility (WQCF) site (Exhibits 4.5-1 and 3-6). In addition, an EDAW biologist conducted a limited confirmatory field survey along portions of the recycled-water distribution system alignment on March 16, 2007. The purpose of these surveys was to characterize general biological resources present in these areas, determine the potential for sensitive biological resources to be present, and assess potential for such resources to be affected by the proposed project.

4.5.1 ENVIRONMENTAL SETTING

The project area, located on the east side of the San Joaquin River in the northern San Joaquin Valley, includes the WQCF site and several proposed pipeline alignments in and around the city of Manteca. As illustrated in Exhibit 4.5-1, proposed pipelines for the wastewater collection system would generally be located along the perimeter of the city, and proposed recycled-water pipelines would generally be located within the city. The proposed effluent outfall pipeline would extend from the WQCF to the San Joaquin River. The topography of the project area is flat with elevations ranging from 15 to 45 feet above mean sea level. The lands surrounding the city historically supported agricultural land uses, including almond orchards, vineyards, dairies, hay crops, and row crops. In recent years, agricultural lands surrounding the city have been incorporated and have been or are in the process of being converted to urban land uses. Implementation of the proposed project would locate most proposed pipelines for the wastewater collection system and recycled-water distribution system on lands that are either currently developed or proposed for development. Habitat types present in the project area are briefly described below using the terminology of Holland (1986), Hickman (1993), and the Natural Resource Conservation Service's PLANTS Database (NRCS 2006). The location and extent of each habitat type are shown in Exhibits 4.5-2a through 4.5-2c. Only portions of the proposed alignment for the wastewater collection system are shown in these exhibits. Existing portions of the wastewater collection system sewers germane to this EIR are shown in Exhibits 4.5-1 and 4.5-2.

VEGETATION AND HABITAT TYPES

Developed/Roadway

Pipelines and WQCF facilities would be constructed primarily within developed or landscaped lands (111 acres). These areas are dominated by roadways and land cleared for the construction of new housing. The landscaped areas are immediately adjacent to the proposed pipeline routes for the wastewater collection system and recycled-water distribution system along roadways. Trees in landscaped areas include gum tree (*Eucalyptus* spp.), tree of heaven (*Ailanthus altissima*), black locust (*Robinia pseudoacacia*), London plane tree (*Platanus hybrida*), and lombardy poplar (*Populus nigra*).

Agricultural Lands

Agricultural lands made up approximately 16.5 acres of the proposed WQCF site and proposed pipeline routes at the time of the field surveys. Portions of these agricultural lands are currently proposed for urban development. At the time of the reconnaissance surveys, these lands were occupied by hay crops, tomatoes, and corn, or the land was disked and fallow. Additional agricultural lands were immediately adjacent to the proposed pipeline routes

for the wastewater collection system and recycled-water distribution system. In addition to the crops mentioned above, almond orchards, vineyards, and strawberry fields existed on these adjacent lands.

Annual Grassland

Annual grasslands used for pasture occur in four locations within the project area. Permission to access and walk areas supporting annual grassland habitat was not obtained. Therefore, annual grassland habitat was observed and evaluated from a distance during the reconnaissance surveys, and soil survey data pertaining to the annual grassland areas was reviewed (SCS 1992). The annual grassland present along the proposed pipeline routes for the wastewater collection system, effluent outfall, and recycled-water distribution system was dominated by nonnative grasses such as Bermuda grass (*Cynodon dactylon*), Italian ryegrass (*Lolium multiflorum*), slender oats (*Avena barbata*), and foxtail barley (*Hordeum murinum*). Most of the soils underlying these annual grassland areas are very sandy, well drained, and nonsaline, with the impermeable hardpan soil layer, when present, usually found at a depth of 50–60 inches from the soil surface. Saline soils are present under one area of annual grassland that is located on the outfall route south of State Route (SR) 120 immediately west of McKinley Avenue. In addition, an area of ponded water was observed in annual grassland habitat within 30 feet of the proposed wastewater collection system route approximately 900 feet north of Yosemite Avenue and east of Airport Way.

Drainage Canal, Irrigation Ditch, and Freshwater Marsh Habitat

The proposed pipeline routes for the wastewater collection system, effluent outfall, and recycled-water distribution system cross or are located immediately adjacent to several canals and irrigation ditches (Exhibits 4.5-1, 4.5-2a, 4.5-2b, and 4.5-2c). Freshwater marsh habitat is present in two of the canals and an irrigation ditch. Habitat conditions at each of these locations are described below.

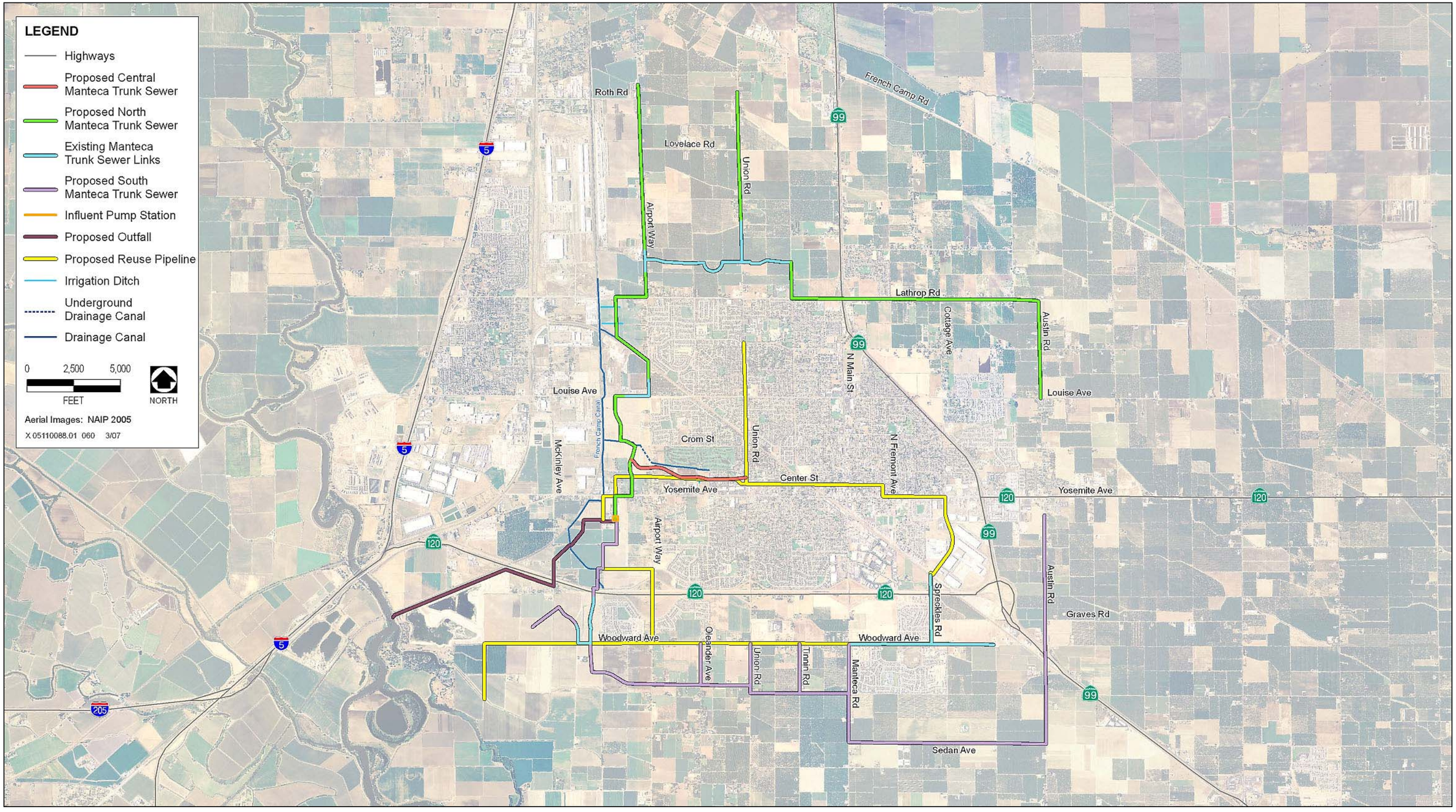
South Manteca Trunk Sewer

The proposed wastewater collection system crosses the French Camp Outfall Canal south of the WQCF property and north of SR 120 (Exhibit 4.5-2c). The French Camp Outfall Canal is a human-made drainage canal and is also a tributary of the San Joaquin River. Where the proposed wastewater collection system crosses the French Camp Outfall, the canal averages 30 feet wide at its ordinary high-water mark (OHWM). Water and freshwater marsh vegetation was present in the channel of the canal at the time of the June 2006 reconnaissance survey. The marsh was dominated by common tule (*Scirpus acutus*) and tall flatsedge (*Cyperus eragrostis*). One large red willow (*Salix laevigata*) grew on the bank, and six-petal water primrose (*Ludwigia hexapetala*) was floating in the open water of the channel.

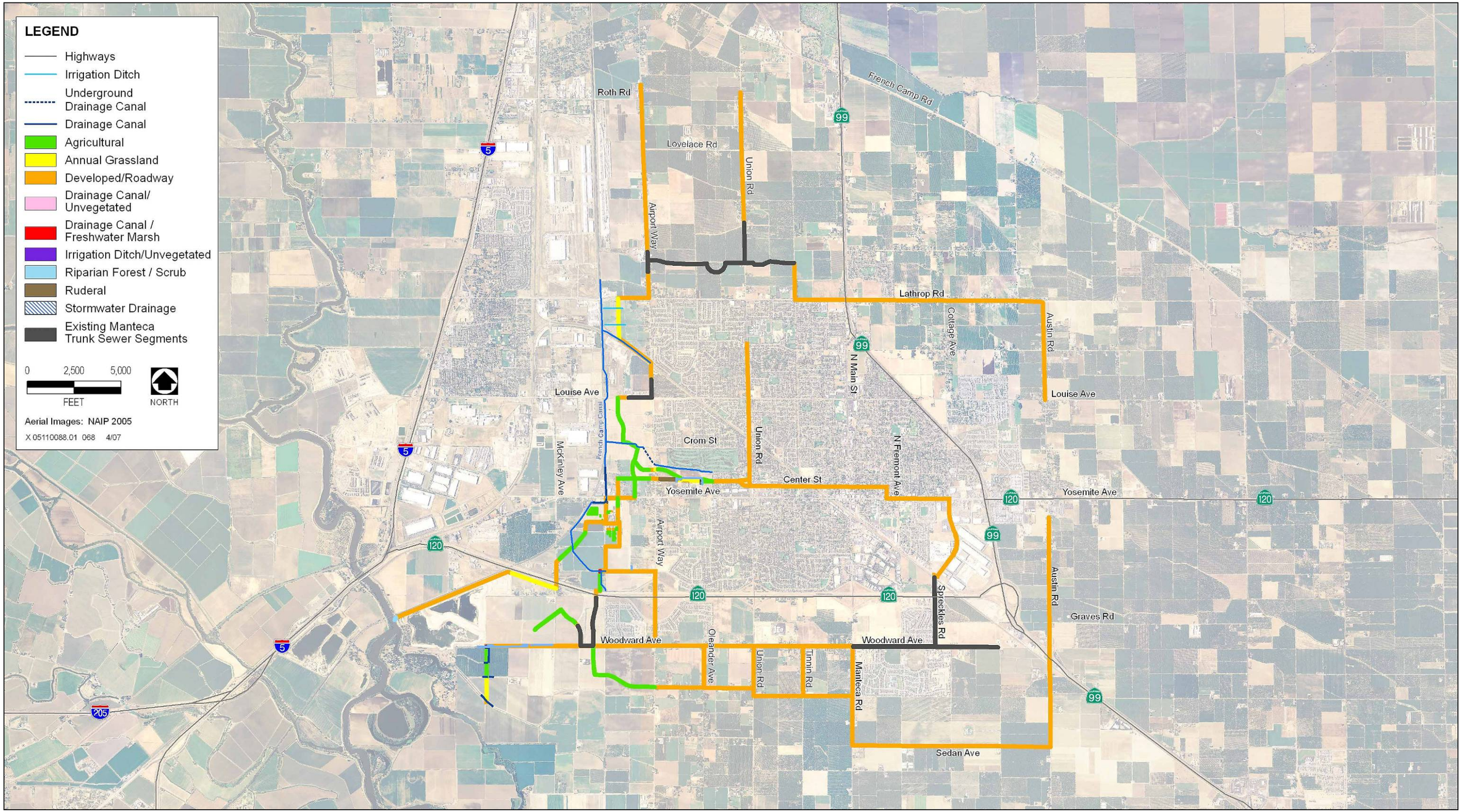
North Manteca Trunk Sewer

The proposed wastewater collection system would cross a drainage canal north of Yosemite Avenue and west of Airport Way (Exhibit 4.5-2a). The crossing is located 1,000 feet east of the confluence of the drainage canal with the French Camp Outfall Canal. This drainage canal averages 25 feet wide at its OHWM, and water was present in the channel at the time of the reconnaissance survey. A few wetland species, including common rush (*Juncus effusus*), willow smartweed (*Polygonum lapathifolium*), and tall flatsedge, grew on the banks of the canal at the proposed crossing point.

Beginning at a point just west of Airport Way and north of the Southern Pacific Railroad tracks, the proposed wastewater collection system route would be located within 5 feet of a drainage canal for approximately 2,000 feet (Exhibit 4.5-2b). This canal is also a tributary of the French Camp Outfall Canal and averages 20 feet wide at its OHWM. Water and dense freshwater marsh vegetation types are present within and along the banks of the channel including common sedge, tall flatsedge, slender willowherb (*Epilobium ciliatum*), purpletop vervain (*Verbena bonariensis*), and willow smartweed.

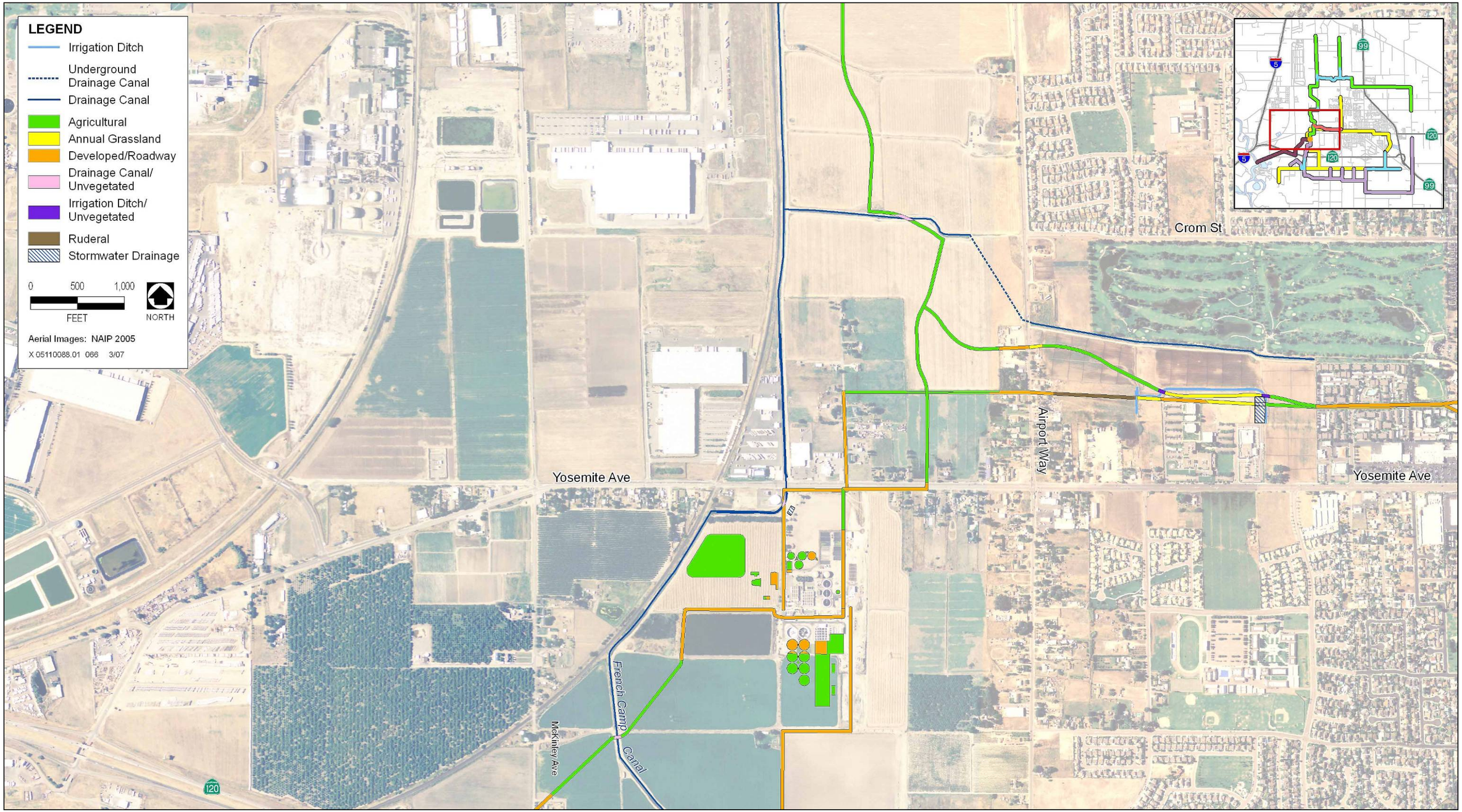


Proposed Project Facilities **Exhibit 4.5-1**



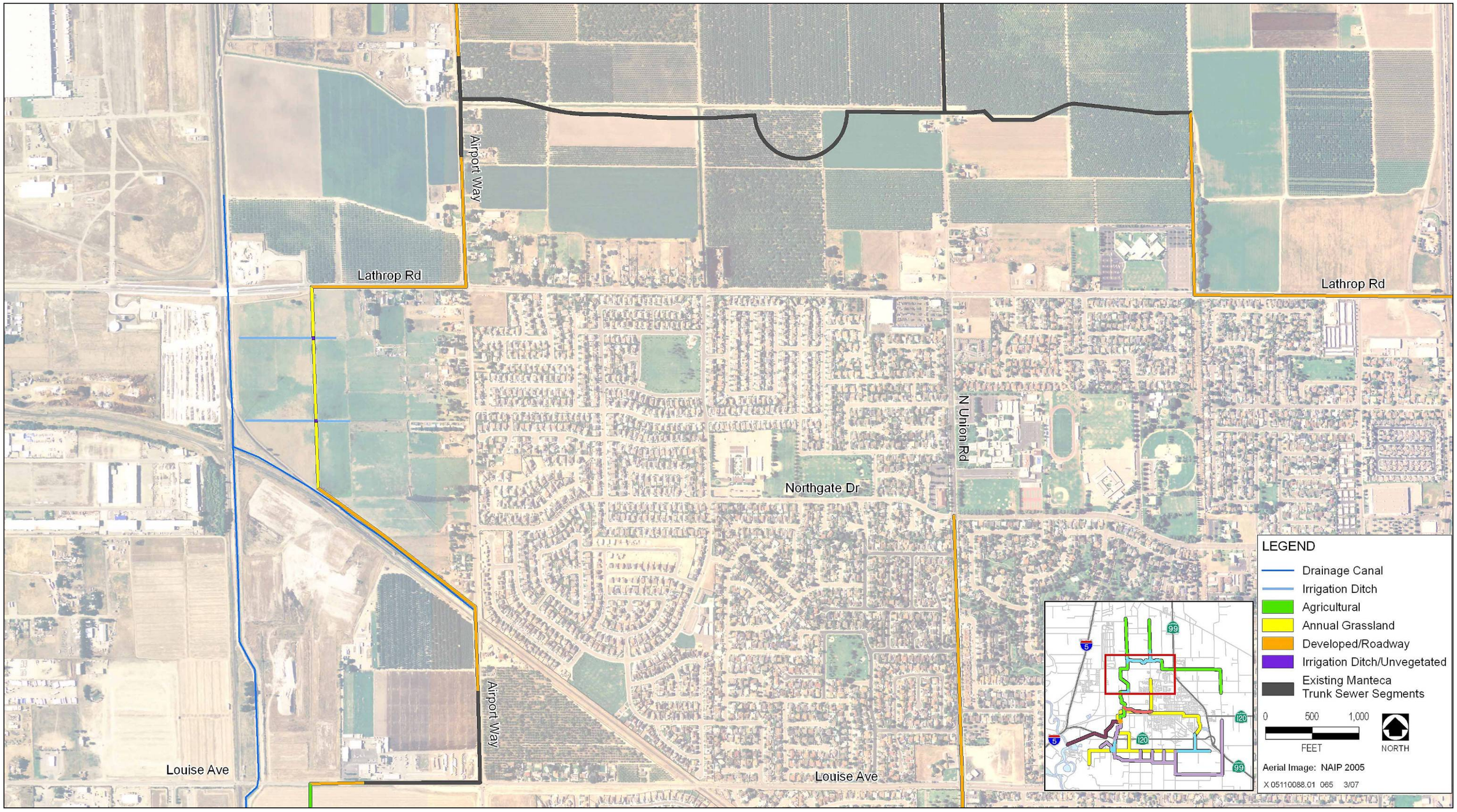
Overview of Habitat Types in the Project Area

Exhibit 4.5-2



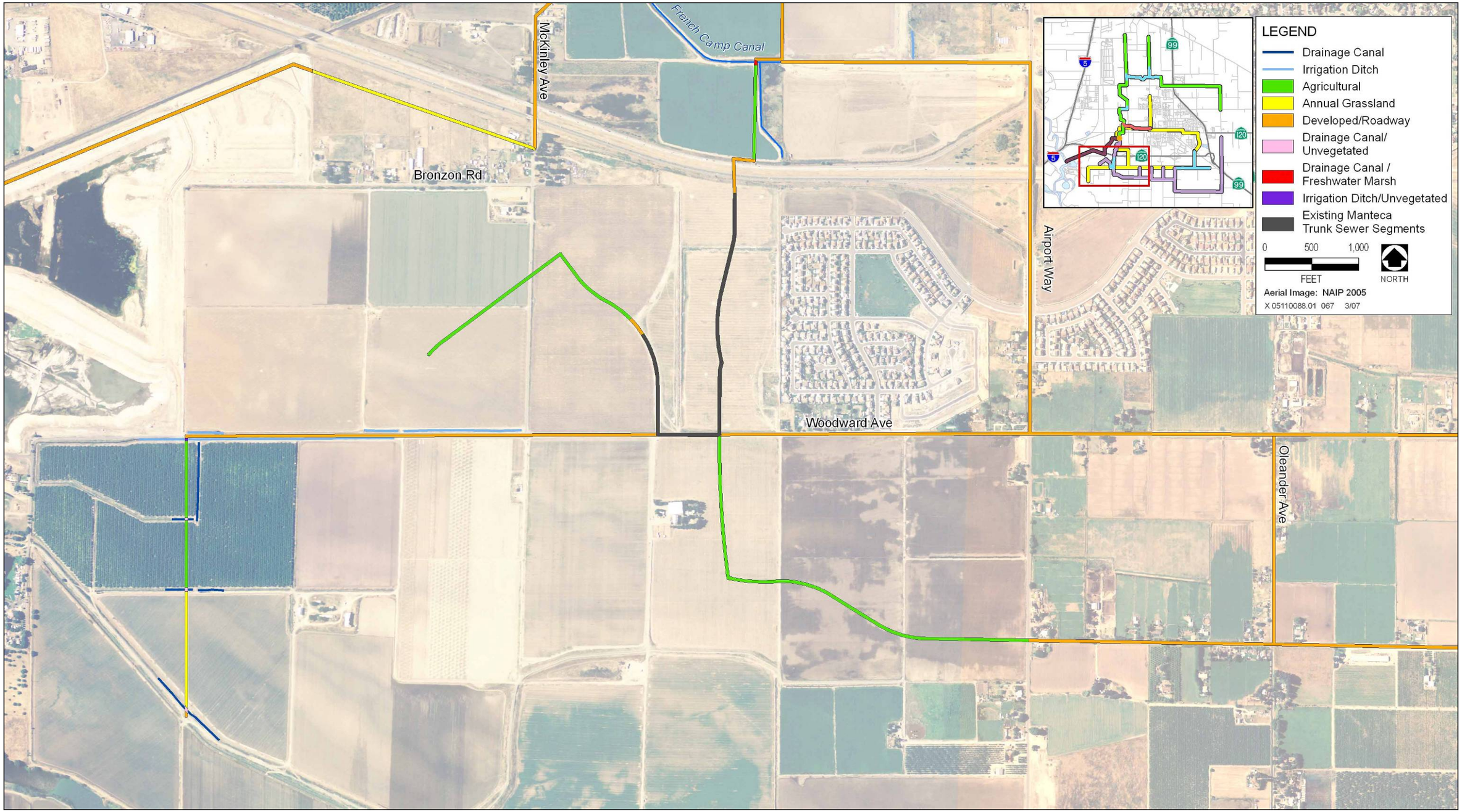
Habitat Types in the Project Area—WQCF and Vicinity

Exhibit 4.5-2a



Habitat Types in the Project Area—Northern Area

Exhibit 4.5-2b



Habitat Types in the Project Area—Southwestern Area

Exhibit 4.5-2c

The proposed wastewater collection system would cross two irrigation ditches south of Lathrop Road and west of Airport Way (Exhibit 4.5-2b). These irrigation ditches are approximately 1,000 feet long and average 2–3 feet wide at their OHWM. The ditches receive water via irrigation supply valves at their western ends. The ditches are used to supply water to pasturelands located on their north and south sides and are not connected via a culvert to a drainage canal or other tributary of the San Joaquin River. However, they are located within 50 feet of a drainage canal. No water was present in these irrigation ditches at the time of the reconnaissance survey and no wetland vegetation was observed.

Central Manteca Trunk Sewer

The proposed wastewater collection system would cross an irrigation ditch at two points approximately 900 feet north of Yosemite Avenue and east of Airport Way (Exhibit 4.5-2a). The irrigation ditch is approximately 1,500 feet long and receives water via an irrigation supply control valve at its eastern end. The ditch is used to supply water to agricultural fields to the north and east via concrete aprons and is not connected to a drainage canal or other tributary of the San Joaquin River. The ditch is approximately 15 feet wide at its OHWM. No water was present in the irrigation ditch at the time of the reconnaissance survey and the adjacent agricultural fields were disked and fallow. A small amount of wetland vegetation, including common rush, tall flatsedge, and purpletop vervain, was observed in the western end of the ditch at the crossing point.

Outfall Pipeline

The proposed effluent outfall pipeline runs within 30 feet of a freshwater marsh located west of the main treatment pond on the Manteca WQCF property (Exhibit 4.5-2a). This marsh is dominated by common tule. At the location where the proposed outfall pipeline would cross the French Camp Outfall Canal, the channel was unvegetated, and where the proposed wastewater collection system would cross, freshwater marsh was present in the channel (Exhibit 4.5-2c).

Recycled-Water Distribution System

The proposed recycled-water distribution system would cross an irrigation ditch and three drainage canals south of Woodward Avenue and west of McKinley Way (Exhibit 4.5-2c). No water was present in the irrigation ditch and drainage canals at the time of the reconnaissance survey and no wetland vegetation or freshwater marsh habitat was observed.

The proposed recycled-water distribution system would also cross an irrigation ditch at two points approximately 900 feet north of Yosemite Avenue and east of Airport Way (Exhibit 4.5-2a). As described above, the irrigation ditch is approximately 1,500 feet long and is used to supply water to agricultural fields to the north and east, and is not connected to a drainage canal or other tributary of the San Joaquin River. No water was present in the irrigation ditch at the time of the reconnaissance survey and the adjacent agricultural fields were disked and fallow.

Riparian Habitat

The proposed side-bank outlet structure for the outfall pipeline would be positioned on the east bank of the San Joaquin River, just south of the Union Pacific Railroad bridge (Exhibit 4.5-2). The outlet (or outfall) structure would consist of a concrete junction manhole for maintenance access, a headwall structure, and a concrete spillway to the river edge. Riprap would be provided at the bottom of the spillway for erosion protection and to dissipate energy during peak flows.

A relatively few number of riparian species typical of Great Valley riparian forest and Great Valley willow scrub are present on the east bank of the river. Higher numbers of these riparian species are present on the river's west bank. Dominant species included valley oak (*Quercus lobata*), Fremont's cottonwood (*Populus fremontii*),

buttonbush (*Cephalanthus occidentalis*), and sandbar willow (*Salix exigua*). Ruderal species such as moth mullein (*Verbascum thapsus*) and cocklebur (*Xanthium strumarium*) are growing within and on the riprap banks.

COMMON WILDLIFE

The quality of wildlife habitat in the project vicinity is the highest in areas where the proposed pipeline routes for the wastewater collection system, effluent outfall, and recycled-water distribution system are not within existing roadways and developed areas. The areas of high-quality habitat include the freshwater marsh habitat, adjacent to the wastewater treatment pond on the WQCF property and French Camp Outfall Canal and other drainage canals, agricultural lands, annual grassland habitat, and riparian woodland and scrub associated with the San Joaquin River.

Freshwater marsh habitat within the project area supports a high diversity of bird species, including waterfowl, egrets, herons, grebes, cormorants, and shorebirds. Freshwater marsh provides nesting habitat for songbirds such as red-winged blackbird (*Agelaius phoeniceus*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), and marsh wren (Cistothorus *palustris*). In addition, permanent and seasonal pools in the project area are expected to provide habitat for amphibians such as Pacific treefrog (*Pseudacris regilla*), western toad (*Bufo boreas*), and aquatic garter snake (*Thamnophis couchii*).

Numerous common wildlife species are also expected to use the annual grasslands and field crops, fallow fields, and ruderal areas of the project area. Mammals generally found in these habitat include California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), and coyote (*Canis latrans*). A black-tailed jackrabbit (*Lepus californicus*) was observed along the side banks of a canal that connected to the French Camp Outfall Canal and raccoon (*Procyon lotor*) tracks were evident on an aboveground existing pipeline traversing the drainage canal located next to the proposed outfall pipeline route.

Birds that are known to breed in annual grassland habitats include the burrowing owl (*Athene cunicularia*), horned lark (*Eremophila alpestris*), and western meadowlark (*Sturnella neglecta*). A number of common birds were observed in the agricultural fields during the surveys including brewer’s blackbird (*uphagus cyanocephalus*), yellow-billed magpie (*Pica nuttalli*), and western kingbird (*Tyrannus verticalis*). These habitats also provide important foraging habitat for raptors such as American kestrel (*Falco sparverius*), red-shouldered hawk (*Buteo lineatus*), and red-tailed hawk (*Buteo jamaicensis*).

SENSITIVE BIOLOGICAL RESOURCES

Sensitive biological resources include special-status species and sensitive natural habitats identified by the California Department of Fish and Game (DFG), CNPS, and U.S. Fish and Wildlife Service (USFWS). Sensitive biological resources for this project also include those afforded protection under the City of Manteca’s General Plan or by the *San Joaquin County Multi-Species Habitat Conservation and Open Space Plan* (SJMSCP).

Special-Status Species

Special-status species include plants and animals in the following categories:

- species listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA),
- species considered candidates for listing as threatened or endangered under ESA or CESA,
- wildlife species identified by DFG as California Species of Special Concern,

- animals fully protected in California under the California Fish and Game Code,
- plants listed as Endangered or Rare under the California Native Plant Protection Act, and
- plants on CNPS Lists 1A (plants presumed extinct in California), 1B (plants rare, threatened, or endangered in California and elsewhere), or List 2 (plants rare, threatened, or endangered in California but more common elsewhere).

Recent and historical reports of special-status species in the vicinity of the project area were identified through a search of the CNDDB (2006) and the CNPS Inventory (CNPS 2006). The CNDDB is a statewide inventory managed by DFG, which is continually updated with the locations and condition of the state's rare and declining species and habitats. Although the CNDDB is a reliable tool for site-specific information on sensitive biological resources, it should be noted that it contains only those records that have been submitted to DFG and is not always up to date or comprehensive.

A CNDDB and CNPS database search was conducted for the Manteca, Avena, Lathrop, Peters, Stockton East, Stockton West, Salida, Ripon, and Vernalis USGS 7.5-minute quadrangles. Tables 4.5-1 and 4.5-2 list the special-status species potentially existing in the project area, based on a review of the CNDDB search, the CNPS inventory, and the reconnaissance-level surveys.

Special-Status Plants

A total of 13 special-status plants have been known to exist or have potential to exist in the project area. The regulatory status, habitat requirements, and potential for existence of each species are provided in Table 4.5-1. Each species is also discussed further in the text that follows the table. Two additional species, round-leaved filaree (*Erodium macrophyllum*) and palmate-bracted bird's beak (*Cordylanthus palmatus*), historically grew in the vicinity of the project area. However, these species require clay soils not found in the area. Therefore, these plants do not have potential to exist in the project area and are not included in Table 4.5-1.

Table 4.5-1
Special-Status Plants Known or with Potential to Occur in the Proposed Project Area

Species	Status[1]			Habitat and Blooming Period	Potential for Occurrence
	USFWS	DFG	CNPS		
Suisun Marsh aster *Aster lentus*	—	—	1B	Endemic to the Sacramento–San Joaquin Delta; generally occurs in marshes and swamps; often occurs along sloughs, at 0–3 meters in elevation. Blooms May–November	Possible. California Natural Diversity Database (CNDDB) lists occurrences near Stockton and in the Lathrop quadrangle. Freshwater marsh and the San Joaquin River bank in the project area provide suitable habitat.
Alkali milk vetch *Astragalus tener* var. *tener*	—	—	1B	Playas and vernal pools in valley and foothill grassland, alkali flats, and flooded lands, occurs at 0–60 meters in elevation. Blooms March–June	Unlikely. CNDDB lists a historic occurrence near the port of Stockton along Smith Canal. No vernal pool habitat is known to be present in the project area.
San Joaquin spearscale *Atriplex joaquiniana*	—	—	1B	Alkali meadow, chenopod scrub, seeps in valley and annual grassland, disturbed areas near fields, often in seasonal alkali wetlands or alkali sink scrub, occurs at 1–835 meters in elevation Blooms April–October	Possible. CNDDB lists an historic occurrence in alkali plains near Stockton. The project area has suitable alkaline soils and habitat to support this species.

Table 4.5-1 Special-Status Plants Known or with Potential to Occur in the Proposed Project Area					
Species	Status[1]			Habitat and Blooming Period	Potential for Occurrence
	USFWS	DFG	CNPS		
Lesser saltscale *Atriplex minuscula*	—	—	1B	Chenopod scrub, playas, alkali sink in valley and annual grassland, often in sandy, alkaline soils, occurs at 15–200 meters in elevation. Blooms May–October	Possible. CNDDB lists a historic occurrence near the San Joaquin River along State Route 132 between Vernalis and Modesto in low alkaline areas. The project area has suitable alkaline soils and habitat to support this species.
Slough thistle *Cirsium crassicaule*	—	—	1B	Chenopod scrub, marshes and swamps, riparian scrub, sloughs, and riverbanks, occurs at 3–100 meters. Blooms May–August	Possible. CNNDB lists historic occurrences from along the San Joaquin River, both north (Lathrop) and south (Vernalis) of the project area. Freshwater marsh and the San Joaquin River bank in the project area provide marginal habitat.
Recurved larkspur *Delphinium recurvatum*	—	—	1B	Chenopod scrub, cismontane woodland, annual grassland, in alkaline soils. Blooms March–June	Possible. CNDDB lists historic occurrences from Stockton area. The project area has suitable alkaline soils and habitat to support this species.
Delta button celery *Eryngium racemosum*	—	E	1B	Riparian scrub, seasonally inundated floodplain on clay, vernally mesic clay depressions, occurs at 3–30 meters in elevation. Blooms June–September	Unlikely. CNNDB lists a historic occurrence along the San Joaquin River where the species existed on seasonally flooded clay soils. Because it has riprap, the bank of the San Joaquin River provides marginal habitat for this species. No other suitable clay soils are present in the project area.
Rose-mallow *Hibiscus lasiocarpus*	—	—	2	Freshwater marshes and swamps, generally found on wetted river banks and low peat islands in sloughs, known from the Sacramento–San Joaquin Delta watershed, occurs at 0–120 meters in elevation. Blooms June–September	Possible. CNDDB lists one recent occurrence near Stockton along the Calaveras River growing on riprap. Suitable habitat is present in freshwater marsh and along the San Joaquin River in the project area.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	—	—	1B	Freshwater and brackish marshes, generally restricted to the Sacramento–San Joaquin Delta, occurs from 0–4 meters in elevation. Blooms May–September	Possible. CNDDB lists one record from Rough and Ready Island near Stockton. Suitable freshwater marsh habitat is present in the project area.
Delta mudwort *Limosella subulata*	—	—	2	Riparian scrub, freshwater marsh, brackish marsh, generally on mud banks of the delta in marshy or scrubby riparian associations, occurs at 0–3 meters in elevation Blooms May–August	Unlikely. This species is reported by the CNPS database as occurring in one of the nine quads searched. Freshwater marsh and the San Joaquin River bank in the project area provide marginal habitat.

Table 4.5-1
Special-Status Plants Known or with Potential to Occur in the Proposed Project Area

Species	Status[1]			Habitat and Blooming Period	Potential for Occurrence
	USFWS	DFG	CNPS		
Sanford's arrowhead *Sagittaria sanfordii*	—	—	1B	Marshes and swamps, assorted shallow freshwater, at 0–619 meters in elevation. Blooms May–October	Possible. CNDDB lists a historic occurrence near Stockton. From herbarium specimens, species is known to occur more widely in the area along irrigation ditches. Freshwater marsh habitat in the project area provides suitable habitat.
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	—	—	2	Marshes and swamps, meadows and seeps, riparian forest, vernal pools, often in alkaline areas, occurs at 3–500 meters in elevation. Blooms May–September	Unlikely. CNDDB lists one historic occurrence from the San Joaquin River near Lathrop. Freshwater marsh and the San Joaquin River bank provide marginal habitat for this species in the project area.
Greene's tuctoria *Tuctoria greenei*	E	R	1B	Vernal pools in annual grassland, dry bottoms of vernal pools, occurs at 30–1,065 meters in elevation. Blooms May–September	Unlikely. CNDDB lists one historic occurrence from Farmington. No vernal pool habitat is known to occur in the project area.

Notes:
CNPS = California Natural Diversity Database; DFG = California Department of Fish and Game; USFWS = U.S. Fish and Wildlife Service

Legal Status Definitions

Federal Listing Categories (USFWS)
E Endangered

State Listing Categories (DFG)
E Endangered
R Rare

CNPS Categories
1A Plants presumed to be extinct in California
1B Plants that are rare, threatened, or endangered in California and elsewhere
2 Plants that are rare, threatened, or endangered in California but more common elsewhere

Sources: CNDDB 2006, CNPS 2006, Hickman 1993

Two of the species included in Table 4.5-1, alkali milk vetch (*Astragalus tener* var. *tener*) and Greene's tuctoria (*Tuctoria greenei*), are restricted to vernal pools, which require soils with a relatively shallow impermeable layer. Based on soil survey data, vernal pool habitat is not known to underlie annual grassland areas in the project area. However, because annual grassland areas that would be traversed by proposed pipeline routes for the wastewater collection system, effluent outfall, and recycled-water distribution system were not accessible during the reconnaissance survey, and a ponded area was observed in annual grassland adjacent to the proposed wastewater collection system approximately 900 feet north of Yosemite Avenue, the presence of vernal pools in the project area cannot be ruled out.

Special-Status Plants

Suisun Marsh aster is a rhizomatous, perennial herb in the daisy family with violet flowers that are arranged in heads. Suisun Marsh aster grows in many different habitats along sloughs and rivers of the Sacramento–San Joaquin Delta (Delta). It has been found on wooden posts and in riprap, although it is most common in freshwater and brackish marshes. It could occur in marshes or along the San Joaquin River in the project area.

Alkali milk vetch is in the pea family. It is an annual herb with pink to purple flowers that grows at the edges of vernal pools, often on alkaline soils. Although vernal pools are not known to be present in the project area, ponded water in annual grassland habitat that could support this species was observed adjacent to the project area during the reconnaissance survey.

San Joaquin spearscale and lesser saltscale are annuals in the goosefoot family. Both grow in vernally mesic saline or alkaline habitats, sometimes in annual grassland. Alkaline grassland is present on the proposed outfall pipeline route near the intersection of SR 120 and McKinley Road.

Slough thistle is a robust, annual, or perennial herb in the daisy family that typically grows in freshwater marshes and swamps (usually sloughs) or riparian scrub habitats. Slough thistle occurred historically along the banks of the San Joaquin River in the vicinity of the project area and could occur on the south bank of the San Joaquin River at the location of the proposed outfall structure. Freshwater marsh in the project area provides marginal habitat (or habitat of questionable or minimal quality) for slough thistle in comparison to the large slough marshes where populations of this species are known to grow.

Recurved larkspur is in the buttercup family. It is a perennial herb that grows to 2.5 feet tall and has pink flowers. Recurved larkspur grows on poorly drained, alkaline soils in grassland and could grow on alkaline grassland present on the proposed outfall route near the intersection of SR 120 and McKinley Road.

Delta button celery is state listed as an endangered species. It is a perennial herb in the carrot family with tiny flowers arranged in spherical clusters with spiny bracts. Historically, it grew on the floodplain of the San Joaquin River in clay soils, and a sighting was recorded just north of the project area along the river. The south bank of the San Joaquin River at the location of the proposed outfall structure provides marginal habitat for this species.

Rose-mallow is a robust, aquatic, emergent perennial herb in the cotton family. This species grows in freshwater marshes and swamps and along sloughs within the Delta watershed and is known to grow on riprap. Freshwater marsh in the project area and the riprap at the proposed outfall structure on the bank of the San Joaquin River provide suitable habitat for this species.

Delta tule pea is in the pea family. It is a perennial, climbing herb with pink to purple flowers. Alkali milk vetch grows in freshwater or brackish marshes of the Delta and could grow in marshes in the project area.

Delta mudwort is a diminutive perennial in the figwort family found in the Delta and on the east coast of the United States. It has small, narrow leaves and white to lavender-blue flowers. It is frequently found in micro habitats where bank sloughing and other similar disturbances have created localized areas of saturated fine sediment (clay and silty clay) deposition below the average high-tide level. The French Camp Outlet Canal and the bank of the San Joaquin River in the project area provide marginal habitat for this species.

Sanford’s arrowhead is a perennial, emergent herb in the water-plantain family. This species grows in assorted shallow freshwater marshes and swamps, including irrigation canals. Freshwater marsh in the project area provides suitable habitat for this species.

Wright’s trichocoronis is an annual herb in the daisy family that typically grows in moist places such as floodplains, rice fields, marshes and swamps, riparian scrub and vernal pools, and often in alkaline areas. Wright’s trichocoronis occurred historically in mud and on floodplains along the banks of the San Joaquin River in the vicinity of the project area and could occur on the south bank of the San Joaquin River at the location of the proposed outfall structure. The French Camp Outlet Canal and its tributaries, as well as the bank of the San Joaquin River, provide marginal habitat for this species in the project area.

Greene’s tuctoria is federally listed as endangered and state listed as rare. It is an annual herb in the grass family with glandular flowers. It grows in vernal pools in annual grassland. Although vernal pools are not known to be

present in the project area, ponded water in annual grassland habitat that could support this species was observed adjacent to the project area during the reconnaissance survey.

Special-Status Terrestrial Wildlife Species

A total of 21 special-status wildlife species are known to occur or could potentially occur in the vicinity of the project area. The regulatory status, habitats, and potential for occurrence of each species are provided in Table 4.5-2.

Table 4.5-2
Special-Status Wildlife Species Known or with Potential to Occur in the Proposed Project Area

Species	USFWS	DFG	CNPS	Habitat	Potential for Occurrence
Invertebrates					
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T	—	—	Elderberry shrubs	Unlikely. Elderberry shrubs not present.
Conservancy fairy shrimp *Branchinecta conservation*	T	—	—	Vernal pools in valley and foothill grasslands	Possible. No known sightings, but suitable habitat could be present.
Vernal pool fairy shrimp *Branchinecta lynchi*	T	—	—	Vernal pools in valley and foothill grasslands	Possible. No known sightings, but suitable habitat could be present.
Vernal pool tadpole shrimp *Lepidurus packardi*	E	—	—	Vernal pools in valley and foothill grasslands	Possible. No known sightings, but suitable habitat could be present.
Longhorn fairy shrimp *Branchinecta longiantenna*	E	—	—	Vernal pools in valley and foothill grasslands	Possible. No known sightings, but suitable habitat could be present.
Amphibians					
California tiger salamander *Ambystoma californiense*	T	CSC	—	Vernal pools and small ponds for breeding; seeks cover in burrows, rock crevices, and under logs	Possible. Recent California Natural Diversity Database (CNDDB) sighting near the eastern section of the outfall route adjacent to State Route 120. Suitable habitat may be present.
Western spadefoot *Scaphiopus hammondi*	—	CSC	—	Shallow seasonal wetlands in grassland and oak woodland	Possible. No known sightings, but suitable habitat could be present.
Reptiles					
Western pond turtle *Clemmys marmorata*	—	CSC	—	Still waters, ponds, slow streams with instream or bank resting sites	Possible. Suitable foraging habitat present in French Camp Canal, but no suitable nesting habitat present.
Giant garter snake *Thamnophis gigas*	T	T	—	Freshwater marsh, low gradient streams, drainage canals and irrigation ditches	Possible. Suitable aquatic and upland habitat present in and along French Camp Canal.
Birds					
White-tailed kite *Elanus leucurus*	—	FP	—	Forages in grasslands and agricultural fields; nest in isolated trees or small woodland patches	Likely. Suitable foraging and nesting habitat present.

Table 4.5-2 Special-Status Wildlife Species Known or with Potential to Occur in the Proposed Project Area					
Species	USFWS	DFG	CNPS	Habitat	Potential for Occurrence
Western burrowing owl *Athene cunicularia hypugea*	—	CSC	—	Forages and nests in grasslands, agricultural land, and open woodlands	Likely. Nearest CNDDB sighting (1997) is 0.2 miles north of WQCF treatment pond near Yosemite Avenue. Suitable foraging and nesting habitat present.
Northern harrier *Circus cyaneus*	—	CSC	—	Grasslands, freshwater marsh, and agricultural fields	Likely. Suitable foraging and nesting habitat present.
Cooper's hawk *Accipter cooperii*	—	CSC	—	Open woodlands and woodland margins	Unlikely. No suitable nesting habitat present and foraging habitat is marginal.
Swainson's hawk *Buteo swainsoni*	—	T	—	Forages in grasslands, and agricultural fields; nests in open woodland or scattered trees	Likely. Sighting by EDAW ecologist near WQCF during reconnaissance survey on July 26, 2006. Suitable nesting and foraging habitat present.
Ferruginous hawk *Buteo regalis*	—	CSC	—	Forages in grasslands, agricultural fields, and other open habitats	Possible. Suitable foraging habitat present, but not within breeding range.
Merlin *Falco columbarius*	—	CSC	—	Forages in grasslands, agricultural fields, marshes, and other open habitats	Possible. Suitable foraging habitat present, but not within breeding range.
American peregrine falcon *Falco peregrinus*	—	E	—	Forages in marshes and grasslands	Possible. Suitable foraging habitat present, but not within breeding range.
Loggerhead shrike *Lanius ludovicianus*	—	CSC	—	Forages in grasslands, and agricultural fields; nests in scattered shrubs and trees	Possible. Suitable foraging and nesting habitat present.
Tricolored blackbird *Agelaius tricolor*	—	CSC	—	Forages in grasslands and agricultural fields; nests in freshwater marsh with dense cattails and tules, riparian scrub, and other dense shrubs and herbs for nesting	Unlikely. Historic CNDDB sightings (1986) recorded in vicinity of the WQCF and along proposed wastewater collection system route north of State Route 120, but no nesting colonies currently known from the county.
Mammals					
Riparian brush rabbit *Sylvilagus bachmani riparius*	E	E	—	Riparian forests along the San Joaquin River; along edges of shrub cover	Unlikely. Nearest CNDDB sighting (2003) is 1.4 miles on west bank of San Joaquin River and habitat at the outfall is unsuitable.
San Joaquin Valley riparian woodrat *Neotoma fuscipes riparia*	E	CSC	—	Dense chaparral, oak and riparian woodland, and in mixed coniferous forest that has a well-developed understory	Unlikely. No suitable habitat present.

Notes: CNPS = California Natural Diversity Database; DFG = California Department of Fish and Game; USFWS = U.S. Fish and Wildlife Service Legal Status Definitions

Table 4.5-2
Special-Status Wildlife Species Known or with Potential to Occur in the Proposed Project Area

Species	USFWS	DFG	CNPS	Habitat	Potential for Occurrence

Federal Listing Categories (U.S. Fish and Wildlife Service)

E	Endangered
T	Threatened

State Listing Categories (Department of Fish and Game)

E	Endangered
T	Threatened
CSC	California Species of Concern
FP	Fully Protected

Sources: CNDDB 2006, USFWS 2006

Based on the reconnaissance field surveys and assessment of database records, 16 of the species listed in Table 4.5-2 are not expected to occur in the project area. These species are not discussed further in this section. Species that were determined to have potential to occur in the project area are discussed further below.

Vernal Pool Invertebrates

A variety of wildlife species are specially adapted to life in vernal pools and other seasonal wetland habitats for at least part of their life cycle. Conservancy fairy shrimp, vernal pool fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp, are small crustaceans (one-half to 2 inches long) that are restricted to vernal pools, swales, and other seasonal pools. Eggs of these species lie dormant during most of the year in the form of cysts, which are capable of withstanding extreme environmental conditions, such as heat, cold, and prolonged periods of dryness. The cysts hatch when the pools fill with rainwater, and the young rapidly develop into sexually mature adults. Not all of the cysts hatch with the first rainfall; some remain dormant to hatch during subsequent events or in later years.

Vernal pool crustaceans occupy a variety of seasonal aquatic habitats, from small, clear, sandstone-rock pools to large, turbid, alkaline, grassland valley-floor pools. They can exist in wetlands ranging in size from small pools of several square feet to large vernal lakes of more than 50 acres (USFWS 2005). Habitat for vernal pool crustaceans has become highly fragmented and continues to be threatened by conversion to urban and agricultural uses. Almost three-quarters of vernal pool habitat in the Central Valley was estimated to have been lost by 1997 (USFWS 2005). Potential habitat for vernal pool crustaceans within the project area is likely to be limited to annual grassland habitat that was not accessible during the reconnaissance survey, including a ponded area observed in annual grassland adjacent to the proposed wastewater collection system approximately 900 feet north of Yosemite Avenue and the effluent outfall pipeline alignment.

Reptiles and Amphibians

California tiger salamander is known to live in the Central Valley from Colusa County to Kern County. California tiger salamanders use vernal pools and other seasonal ponds for reproduction. The proposed wastewater collection system alignment approximately 900 feet north of Yosemite Avenue is situated near ponded water and agricultural land that could provide suitable habitat for tiger salamander. A 1996 CNDDB sighting was documented southwest of the intersection of SR 120 and McKinley Avenue, approximately 2,000 feet south of the French Camp Outfall Canal (CNDDB 2006). This documented sighting is also close to the annual grassland habitat that was not accessible during the reconnaissance survey, including a ponded area observed in annual grassland adjacent to the proposed wastewater collection system approximately 900 feet north of Yosemite Avenue and the effluent outfall pipeline alignment.

Western spadefoot toad breeds in suitable aquatic habitats (e.g., vernal pools) during wet winter conditions, and aestivate in adjacent grassland habitat after the pools have dried. Although vernal pools are the preferred habitat for these species, other aquatic habitats may be used, provided that they are free of predatory fish and hold water long enough to sustain reproduction. Western spadefoot larvae can complete development in as little as 3 weeks,

but may require up to 12 weeks depending on pool conditions (Jennings and Hayes 1994, Feaver 1971, Morey 1998). Inaccessible annual grassland habitat and a ponded area observed in annual grassland adjacent to the proposed collection system alignment approximately 900 feet north of Yosemite Avenue and along the effluent outfall pipeline route could contain suitable habitat for western spadefoot toad.

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 burrows for wintering that provide sufficient cover and are at high enough elevations to function as refuges from floodwaters during the snakes' inactive season (October–May). There are 13 known population clusters in various locations in San Joaquin Valley that are isolated from each other with no protected dispersal corridors. The nearest known population is the Rio Blanco, which is approximately 20 miles northwest of Manteca. The freshwater marsh habitat and open waterways with vegetation associated with French Camp Outfall Canal and its connecting agricultural canals provide potentially suitable aquatic habitat for giant garter snake.

Western pond turtles generally inhabit 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. Turtle nests are typically located on sunny upland slopes with sparse, low vegetation (annual grasses and herbs), low slope angle, and dry hard soil. Potential habitat for pond turtles is present in the freshwater marshes associated with the French Camp Outfall Canal and closely adjoining canals within the project area.

Birds

Swainson's hawks prefer to nest in scattered riparian or woodland trees adjacent to grasslands and/or agricultural fields that provide suitable foraging habitat. Agricultural patches and isolated trees throughout the project area provide suitable Swainson's hawk foraging habitat. In addition, trees associated with residential properties provide suitable nesting habitat. There are approximately 40 CNDDB sightings reported within a 5-mile radius of the project area (CNDDB 2006). A Swainson's hawk was observed foraging within the project area during the June 2006 reconnaissance survey.

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. Burrowing owls are known to nest in areas in the vicinity of the project area. CNDDB sightings of burrowing owls were reported in the northwestern portion of the proposed wastewater collection system alignment near Lathrop Road and within the agricultural fields slightly northwest of the WQCF and Yosemite Avenue (CNDDB 2006). In addition, potential habitat and burrows were observed in the project area during the reconnaissance survey.

Tricolored blackbirds nest in colonies and prefer dense cattail patches, but they also utilize blackberry and other patches of dense vegetation. They forage in grasslands and agricultural fields. The nearest CNDDB sighting of tricolored blackbird is adjacent to the northeastern section of the proposed outfall route near the French Camp Outfall Canal (CNDDB 2006). However, this sighting was documented in 1986, and no nest colonies were found in San Joaquin County during a statewide survey conducted in 2005 (USFWS unpublished data). Therefore, the small amount of freshwater marsh, riparian scrub habitats, and their associated irrigation/drainage channels in the project area are unlikely to support a nesting colony.

Other special-status raptors that are known to or could exist in the project area include white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), ferruginous hawk (*Buteo ragalis*), American peregrine falcon (*Falco peregrinus*), and merlin (*F. columbarius*). White-tailed kite could nest in isolated trees and riparian patches and northern harrier could nest in grassland, agricultural, and marsh habitats present in the project area. The remaining species are not expected to nest on the project area and are only likely to inhabit the area during winter.

Loggerhead shrikes (*Lanius ludovicianus*) inhabit lowland and foothill areas with scattered shrubs and trees. They also nest in shrubs and small trees and typically forage in grasslands and agricultural fields. Loggerhead shrike foraging and nesting habitat is present throughout the project area.

Sensitive Habitats

Sensitive habitats include those that are of special concern to resource agencies; are addressed in regional and local plans, policies, and ordinances; or are afforded specific consideration through CEQA, Section 1602 of the California Fish and Game Code, the Porter Cologne Act, and/or Section 404 of the Clean Water Act (CWA). The sparse riparian forest and scrub vegetation present at the location of the proposed outfall structure and the freshwater marsh habitat within the French Camp Outlet Canal and its tributaries and west of the WQCF treatment pond could be considered sensitive habitat by regulatory agencies. Any seasonal wetlands or vernal pools that might exist in annual grassland habitat in the project area would also be considered sensitive habitat by regulatory agencies.

The San Joaquin River is a navigable water of the United States under the jurisdiction of the U.S. Army Corps of Engineers (USACE), and the French Camp Outlet Canal and its tributaries may qualify as jurisdictional waters of the United States. The proposed pipeline routes for the wastewater collection system and recycled-water distribution system would cross irrigation ditches that are likely not jurisdictional waters of the United States. These irrigation ditches do not have connectivity to a navigable water of the United States. In addition, the irrigation ditches do not support wetland vegetation that is well developed enough to qualify as freshwater marsh habitat.

Oak trees are protected under Sections 17.61.030 and 17.19.060 of the City Municipal Code. Other trees in the project area that would be affected by project implementation could be eligible for protection under Sections 17.19.060 and 12.08.07 of the City Municipal Code if they have a diameter of 6 inches or more when measured 4.5 feet about the ground.

REGULATORY SETTING

Biological resources in California are protected and/or regulated by a variety of federal and state laws and policies. In addition, in many parts of California, there are local or regional habitat and species conservation planning efforts in which a project applicant may participate. Key regulatory and conservation planning issues applicable to the project are discussed below.

Federal Plans, Policies, Regulations, and Laws

Clean Water Act

Section 404 of the CWA requires that an applicant obtain a permit before conducting 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, USACE regulates and issues permits for activities that involve the discharge of dredged or fill materials into waters of the United States.

Pursuant to Section 401 of CWA, projects that apply for a USACE permit for discharge of dredged or fill material must obtain a certificate from the appropriate state agency stating that the intended dredge or fill activity is consistent with the state's water quality standards and criteria. In California, the authority to grant water quality certification is delegated to the relevant regional water quality control board (RWQCB).

Federal Endangered Species Act

USFWS has authority over projects that may affect the continued existence of a federally listed (threatened or endangered) species. Section 9 of ESA prohibits "take" of federally listed species; take is defined under ESA, in part, as killing, harming, or harassing. Under federal regulations, take is further defined to include habitat modification or degradation where it actually results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Section 7 of ESA outlines procedures for federal interagency cooperation to conserve federally listed species and designated critical habitat. Critical habitat identifies specific areas that have the physical and biological features that are essential to the conservation of a listed species, and that may require special management considerations or protection. Section 7(a)(2) requires federal agencies to consult with USFWS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat.

For projects where federal action is not involved and take of a listed species may occur, the project proponent may seek to obtain an incidental take permit under Section 10(a) of ESA. That section allows USFWS to permit the incidental take of listed species if such take is accompanied by a habitat conservation plan that includes components to minimize and mitigate impacts associated with the take.

State Plans, Policies, Regulations, and Laws

California Endangered Species Act

In accordance with CESA and Section 2081 of the California Fish and Game Code, a permit from DFG is required for projects that could result in take of a species state listed as threatened or endangered. 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 ESA does. As a result, the threshold for take under CESA is higher than that under ESA.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act, waters of the state fall under jurisdiction of the appropriate RWQCB. Under the act, the RWQCB must prepare and periodically update water quality control basin plans. Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Projects that affect wetlands or waters of the state must meet waste discharge requirements of the RWQCB, which may be issued in addition to a water quality certification under Section 401 of the CWA.

Section 1602 of the California Fish and Game Code—Streambed Alterations

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports fish or wildlife resources is subject to regulation by DFG, pursuant to Section 1602 of the California Fish and Game Code. Section 1602 states that it is unlawful for any governmental agency, including state and local agencies or any public utility, to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake; use any material from the bed, bank, or channel of any river, stream, or lake; or deposit or dispose of debris, wastes, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake without first notifying DFG of such activity.

The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports wildlife, fish, or other aquatic life. This includes watercourses having a surface or subsurface flow that support or have supported riparian vegetation. DFG's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife.

California Fish and Game Code Sections 3503–3503.5—Protection of Bird Nests and Raptors

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., hawks, owls, eagles, and falcons), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction.

Regional and Local Plans, Policies, Regulations, and Ordinances

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, maintain the agricultural economy, and allow development in San Joaquin County. It was developed to avoid, minimize, and mitigate impacts on plant and wildlife habitat projected to exist in the county between 2001 and 2051, resulting from the anticipated conversion of as much as 109,300 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, in accordance with federal, state, and local regulations, for impacts on these species from SJMSCP-permitted activities. USFWS and DFG 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 confers authorization for activities that result in (or may result in) incidental take of covered federally listed or state-listed species, as well as other covered but nonlisted sensitive species that may otherwise require a federal or state incidental take authorization.

The approach of the SJMSCP is to minimize the potential for take through implementation of take avoidance and minimization measures and compensation for incidental take and habitat conversion through payment of fees (or in-lieu land dedication) for conversion of open space lands. These fees shall be used to preserve and create 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 Manteca adopted the SJMSCP on February 5, 2001, and has signed the implementation agreement. Therefore, a Section 10(a)(1)(B) permit was issued by USFWS to the City. This Section 10 permit also makes up a special-purpose permit for species covered by the federal Migratory Bird Treaty Act (MBTA). A Section 2081 permit was also issued by DFG to the City of Manteca. Because of the City's participation in the SJMSCP and issuance of these permits, project proponents within the City's jurisdiction (including the City) have the opportunity to seek coverage under the SJMSCP.

The City is committed to obtaining coverage under the SJMSCP to mitigate 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. Impacts on sensitive habitats (e.g., waters of the United States) and protected trees are not covered by the SJMCSP.

Compensation for significant 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. Development fees would be paid to the San Joaquin Council of Governments (SJCOG) in the amount specified by SJCOG, which administers the SJMCSP. Development fees for the SJMSCP are continually being revised; therefore, a specified amount cannot be provided at this time. In addition, incidental take avoidance and minimization measures for species that could be significantly affected as a result of the project would be implemented, as determined by the SJCOG, and in accordance with requirements of the SJMSCP.

City of Manteca General Plan

The following biological resources policies, identified in the Resource Conservation Element of the *City of Manteca General Plan* (City general plan), are relevant to this analysis:

- **Policy RC-P-31:** Minimize impact of new development on native vegetation and wildlife.
- **Policy RC-P-33:** Discourage the premature removal of orchard trees in advance of development, and discourage the removal of other existing healthy mature trees, both native and introduced.
- **Policy RC-P-34:** Protect special-status species and other species that are sensitive to human activities.
- **Policy RC-P-35:** Allow contiguous habitat areas.
- **Policy RC-P-36:** Consider the development of new drainage channels planted with native vegetation, which would provide habitat as well as drainage.

City of Manteca Tree Ordinance

The Manteca Municipal Code calls for the avoidance of heritage trees. Heritage trees are defined under Section 17.61.030 of the code as any natural woody plant rooted in the ground and having a diameter of 30 inches or more when measured 2 feet above the ground. Section 17.19.060 calls for protection of all existing trees having a diameter of 6 inches or more when measured 4.5 feet above the ground. The City Planning Department must be notified of planned construction or grade changes. Existing trees must be protected from construction equipment, grade changes, excavation for utilities, paving, and footers for the proposed structure of walls. Replacement of existing trees is subject to approval from the planning director and must be with a minimum 24-inch box tree of compatible species for the development site. Agricultural and farming orchard areas of 1 acre or more are exempt from Section 17.19.060.

Section 12.08.07 of the municipal code prohibits cutting, pruning, removing, injuring, or interfering with any tree, shrub, or plant upon or in any street tree area or other public place in the city without prior permission and approval from the superintendent. The superintendent is authorized to grant such permission at his discretion and where necessary. Excepting and with reference to utility companies, as provided in Section 12.08.080, no such permission granted shall be valid for a longer period than 30 days after its issuance.

4.5.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Information obtained from biological studies previously conducted in the vicinity of the project area, field and reconnaissance-level surveys conducted for the project area, reviews of aerial photographs, CNDDB records, and CNPS database records were used to assess potential impacts on biological resources that could result from implementation of the proposed project.

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines. The proposed project would result in significant biological resources impacts if it would result in:

- a substantial adverse effect (either directly or through habitat modifications) on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG or USFWS;
- a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by DFG or USFWS;
- a substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA (including but not limited to marsh, vernal pool, or coastal) through direct removal, filling, hydrological interruption, or other means);
- substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impediment to the use of native wildlife nursery sites;
- conflict with any federal, state, or local plans, policies, or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- conflict with the provisions of an adopted habitat conservation plan, natural communities conservation plan, or other approved state, regional, or local habitat conservation plan.

IMPACT ANALYSIS

The City general plan requires that the City minimize the impact of new development on native vegetation and wildlife, discourage the premature removal of trees, protect special-status species and other species that are sensitive to human activities, allow contiguous habitat areas, and consider the development of new drainage channels planted with native vegetation (Policies RC-P-31, RC-P-33, RC-P-34, RC-P-35, and RC-P-36). As described above, lists of special-status plants and animals with the potential to occur on the project site were developed based on database searches, a review of previously conducted biological studies, and field surveys. Mitigation measures are proposed below for potentially significant impacts. Therefore, the project would be consistent with the City's biological resources goals and policies.

IMPACT 4.5-1 Terrestrial Biological Resources—Impacts on Common Plants and Wildlife. *Implementation of the project would not substantially reduce available habitat or the population of any common plant or animal species because most of the species present in the project area are common and widely distributed throughout the county, and implementation of the proposed project would not have a substantial effect on regional populations of common species throughout the region. This impact would be* ***less than significant****.*

Proposed WQCF improvements and pipeline routes are designed to avoid natural areas as much as possible. Most proposed pipeline routes and improvements to the WQCF would be located within existing roadway alignments, land proposed for development, and land cleared for development. Approximately 16.5 acres of agricultural land and 5 acres of annual grassland that provides habitat for common plant and animal species would be disturbed or removed with project implementation. Habitat disturbance or alteration would occur primarily during site preparation and project construction or to provide vehicle access to specific locations. Activities involved in habitat disturbance include ground surface trenching or scraping that disturbs surface and subsurface soils. After

project completion, the habitat may not be restored to the same quality that existed before project implementation. Disturbance of habitat in the project area could adversely affect plants and wildlife that inhabit agricultural and annual grassland habitats. However, most of the species present in the project area are common and widely distributed throughout the county, and implementation of the proposed project would not substantially effect regional populations of common species throughout the region. Therefore, the potential disturbance or alteration of habitat for common plants and wildlife species present in the project area would be a **less-than-significant** impact.

IMPACT 4.5-2 Terrestrial Biological Resources—Impacts on Special-Status Plants. *Implementation of the proposed project would result in loss and disturbance of riparian, freshwater marsh, and annual grassland habitat that could potentially support 13 special-status plant species. This impact would be* ***potentially significant****.*

Thirteen special-status plants have been known to exist or have potential to exist in the vicinity of the project area: Suisun Marsh aster, alkali milk vetch, San Joaquin spearscale, lesser spearscale, slough thistle, recurved larkspur, Delta button celery, rose-mallow, Delta tule pea, Delta mudwort, Sanford's arrowhead, Wright's trichcoronis, and Greene's tuctoria. Approximately 5.5 acres of riparian, freshwater marsh, and annual grassland habitat that potentially provides habitat for these special-status plants would be disturbed as a result of implementation of the proposed project. No special-status plant sightings have been reported in the project area, and no special-status plant species were observed during the reconnaissance-level surveys. However, the potential for their existence in the project area cannot be dismissed because some areas of annual grassland habitat were not accessible during the reconnaissance-level surveys, one of the surveys was not carried out during a time of year when most of the special-status plants would be recognizable, and protocol-level special-status plant surveys have not been conducted. Because the project could result in the potential loss of special-status plants, this would be a **potentially significant** impact.

IMPACT 4.5-3 Terrestrial Biological Resources—Impacts on Vernal Pool Crustaceans, California Tiger Salamander, and Western Spadefoot Toad. *Implementation of the proposed project would result in loss and disturbance of annual grassland habitat that could support vernal pools and other wetlands suitable for vernal pool crustacean species, California tiger salamander, and western spadefoot. This impact would be* ***potentially significant****.*

Construction of the proposed wastewater collection system alignment approximately 900 feet north of Yosemite Avenue and the effluent outfall pipeline alignment could result in disturbance and/or loss of suitable habitat for vernal pool crustaceans, California tiger salamander, and western spadefoot toad. No vernal pool invertebrate or spadefoot sightings have been reported within 5 miles of the project area. However, some annual grassland habitat in the project area was not surveyed during the July 2006 reconnaissance survey because of limited access, and observations made during the survey indicated that wetland habitats suitable for these species could be present in the grasslands along the proposed wastewater collection system alignment approximately 900 feet north of Yosemite Avenue and the effluent outfall pipeline alignment. A CNDDB sighting of California tiger salamander larvae was recorded in 1996 on the south side of SR 120, near the junction of McKinley Road, south of Lathrop. CNDDB records indicate that tiger salamander larvae were observed within a seasonal pond created by the berm of SR 120. This observation site is surrounded by residential development and cattle fields. During the reconnaissance survey, no ponds were visible in this area. However, the adjacent agricultural fields that were not assessable for surveying were observed from a distance to have ponded water that could be potential habitat for the tiger salamander. No suitable habitat for vernal pool crustaceans, California tiger salamander, and western spadefoot toad was observed at the WQCF site or along other proposed project pipeline alignments. Construction of the proposed wastewater collection system alignment approximately 900 feet north of Yosemite Avenue and the effluent outfall pipeline alignment could result in loss of habitat and direct loss of individuals of vernal pool crustaceans, western spadefoot, and California tiger salamander, which would be a **potentially significant** impact.

IMPACT 4.5-4 Terrestrial Biological Resources—Impacts on Giant Garter Snake. *Implementation of the proposed project would disturb irrigation/drainage canals and ditches that provide suitable aquatic and upland habitat for giant garter snake and could result in direct take of individuals. This impact would be* ***potentially significant****.*

Construction of the pipelines for the wastewater collection system and treated effluent distribution system would result in disturbance of suitable aquatic and upland habitat for giant garter snake. Construction activities also have the potential to result in direct take of individuals. The French Camp Outfall Canal and associated irrigation/drainage canals and ditches in the western portion of the project area provide suitable aquatic habitat for giant garter snake, although suitability may vary depending on maintenance and hydrology at any given time. The banks of these canals and adjacent upland may provide suitable habitat during the inactive season (October–April), depending on vegetation characteristics and maintenance regimes. Construction activities in these areas could result in direct take of giant garter snake, particularly during the snake's inactive season, when individuals are in upland burrow sites. No suitable habitat for giant garter snake was observed at the WQCF site. Because proposed project construction would disturb suitable habitat for giant garter snake, implementation of the proposed project could result in direct take of individuals and this would be a **potentially significant** impact.

IMPACT 4.5-5 Terrestrial Biological Resources—Impacts on Northwestern Pond Turtle. *Implementation of the proposed project is unlikely to result in loss or disturbance of nesting northwestern pond turtle because suitable nesting habitat for this species is not present within the project area. This impact would be* ***less than significant****.*

The proposed project is not likely to result in disturbance of nesting northwestern pond turtle because no suitable nesting habitat is present within the project area. However, the French Camp Outlet Canal has the potential to support surface water (i.e., freshwater marsh habitat) of sufficient depths to provide suitable habitat for this species. The proposed project would avoid fill and impacts on freshwater marsh habitat within the French Camp Outlet Canal by implementing trenchless construction methods such as horizontal directional drilling (HDD) or bore-and-jack to bore under the French Camp Outlet Canal. Because suitable nesting habitat for northwestern pond turtle is not present within the project area, and project construction would avoid the loss or disturbance of potential nesting northwestern pond turtle habitat through proposed construction practices, this impact would be **less than significant**.

IMPACT 4.5-6 Terrestrial Biological Resources—Impacts on Raptors. *Implementation of the proposed project would result in the disturbance and/or loss of active nests and foraging habitat for special-status and common raptors. This impact would be* ***potentially significant****.*

Construction of proposed WQCF site improvements and pipelines for the wastewater collection system, effluent outfall, and recycled-water distribution system would result in disturbance of suitable nesting and/or foraging habitat for Swainson's hawk, burrowing owl, and other special-status and common raptors. It also would result in loss of suitable foraging habitat and could result in loss of active nests. The project area provides suitable nesting and foraging habitat for Swainson's hawks and other special-status species raptors, including northern harrier, white-tailed kite, and burrowing owl. It also provides foraging habitat for raptors that do not nest in the vicinity of the project area. Swainson's hawk and other tree-nesting species could nest in trees situated along the French Camp Outlet Canal and other patches of nonorchard trees in the project area. Northern harriers and burrowing owls could nest in agricultural field, ruderal, and fallow areas in the project area. Construction activities could result in disturbance of raptors nesting nearby, potentially resulting in nest abandonment and loss of active nests. If burrowing owls are present along proposed pipeline routes, occupied burrows could be directly destroyed by project construction. The proposed project also involves construction of WQCF site improvements that would permanently remove approximately 14 acres of suitable raptor foraging habitat. In addition, pipeline construction would temporarily disturb approximately 7.5 acres of suitable raptor foraging habitat. Although they are not considered special-status species, common raptors such as red-shouldered hawk, red-tailed hawk, and great horned owl are protected under California Fish and Game Code Section 3503.5 and could also be affected by project construction. The permanent loss of approximately 14 acres of suitable raptor foraging habitat and the

potential loss of an active raptor nest and/or occupied burrowing owl burrow would be a **potentially significant** impact.

IMPACT 4.5-7 Terrestrial Biological Resources—Impacts on Other Special-Status Birds. *Implementation of the proposed project would result in disturbance and removal of a relatively small amount of potential foraging habitat for tricolored blackbird and loggerhead shrike. Loss of active nests of these species is unlikely to result, because construction of the proposed pipelines would only temporarily disturb less than 1 acre of marginally suitable nesting habitat, pipelines would be constructed below ground, and the project would avoid impacts on freshwater marsh habitat within the French Camp Outlet Canal by implementing trenchless construction methods. This impact would be* ***less than significant****.*

The project area contains nesting and foraging habitat for two special-status bird species not previously addressed: tricolored blackbird and loggerhead shrike. Wetland and riparian habitats adjacent to proposed pipeline alignments for the wastewater collection system, effluent outfall, and recycled-water distribution system provide marginally suitable nesting habitat for tricolored blackbird. Scattered shrubs and trees associated with riparian habitat are suitable for nesting loggerhead shrike. Although CNDDB sightings of tricolored blackbird nesting colonies have been documented in the project area, these sightings are from 20 years ago when suitable nesting habitat for the species was much more extensive. No nest colonies were documented in San Joaquin County during a 2005 statewide survey (USFWS unpublished data). Therefore, tricolored blackbirds are very unlikely to nest in the project vicinity. Impacts on potential nesting habitat for tricolored blackbird and loggerhead shrike would be limited because proposed pipeline construction would only temporarily disturb the project area, pipelines would be constructed below ground, and the project would avoid impacts on habitat within the French Camp Outlet Canal by implementing trenchless construction methods such as HDD or bore-and-jack to bore under the French Camp Outlet Canal. In addition, no suitable tricolored blackbird or loggerhead shrike nesting habitat is present at the WQCF site. Although approximately 14 acres of potentially suitable foraging habitat for these species would be removed as a result of WQCF site improvements and approximately 7.5 acres would be temporarily disturbed during pipeline construction, these impacts on a relatively small amount of potential foraging habitat would not have a substantial adverse effect on tricolored blackbird or loggerhead shrike. This impact would be **less than significant**.

IMPACT 4.5-8 Terrestrial Biological Resources—Impacts on Wildlife Movement and Nursery Sites. *Implementation of the proposed project would not substantially interfere with wildlife movement or impede the use of wildlife nursery sites because the project area does not connect open space that serves as important wildlife habitat or nursery sites. This would be a* ***less-than-significant*** *impact.*

The project area is surrounded by agricultural and urban development. It does not link any areas of open space that serve as important wildlife habitat and does not serve as a wildlife nursery site. Therefore, implementation of the project would not substantially interfere with wildlife movement or established migratory corridors, or impede the use of important nursery sites. This would be a **less-than-significant** impact.

IMPACT 4.5-9 Terrestrial Biological Resources—Impacts on Protected and Heritage Trees. *Implementation of the proposed project would result in the potential loss and disturbance of native oaks and other existing trees that are protected by local ordinances. This impact would be* ***potentially significant****.*

Several trees would be affected by implementation of the proposed project. Most pipeline alignments and WQCF site improvements would be located within existing roadway alignments, land proposed for development, and land cleared for development. Valley oaks located at the site of the proposed effluent outfall structure on the east bank of the San Joaquin River and along the proposed outfall pipeline route just east of the river could be affected by construction of the proposed effluent outfall pipeline and outfall structure. It is likely that additional horticultural trees along the proposed wastewater collection system and recycled water distribution system pipeline alignments approximately 900 feet north of Yosemite Avenue and south of Crom Street would also be

affected by project implementation. These trees are protected under the Manteca Municipal Code. Disturbance or removal of protected trees would be a **potentially significant** impact.

IMPACT 4.5-10 Terrestrial Biological Resources—Impacts on Sensitive Habitats, Including Jurisdictional Waters of the United States. *Implementation of the project could result in fill or reconfiguration of less than 1 acre of potentially jurisdictional waters of the United States, including drainage canals and the San Joaquin River, and associated freshwater marsh and riparian habitat. This impact would be* ***potentially significant****.*

The proposed wastewater collection system and effluent outfall pipeline alignments cross the French Camp Outlet Canal in two locations. The proposed pipeline alignment for the wastewater collection system west of Airport Way and south of Louise Avenue crosses a tributary of the French Camp Outlet Canal in one location. Freshwater marsh, which is considered a sensitive habitat by regulatory agencies, is present at the wastewater collection system pipeline crossing of the French Camp Outlet Canal just north of SR 120 and east of McKinley Avenue (Exhibit 4.5-2c). In addition, the pipeline alignment for the wastewater collection system closely parallels a tributary of the French Camp Outlet Canal for 2,000 feet west of Airport Way and south of Lathrop Road (Exhibit 4.5-2b). The proposed effluent outfall pipeline is also located very close to a natural depression that supports freshwater marsh, and the outfall structure would be located on the bank of the San Joaquin River. The San Joaquin River is a navigable water of the United States, and the French Camp Outlet Canal and its tributaries, which are tributaries of the San Joaquin River, would likely qualify as jurisdictional waters of the United States. USACE, DFG, and the Central Valley RWQCB are anticipated to assert jurisdiction over these features. Because the project could result in the fill of waters of the United States and impacts on habitat considered sensitive by regulatory agencies, this would be a **potentially significant** impact.

IMPACT 4.5-11 Terrestrial Biological Resources—Consistency with an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Other Approved Conservation Plan. *Implementation of the proposed project would not conflict with or be inconsistent with the adopted San Joaquin Multi-Species Conservation Plan. This impact would be* ***less than significant****.*

The project area is located within the SJMSCP area, and the SJMSCP was adopted by the City of Manteca on February 5, 2001. Implementation of the proposed project would not conflict with provisions of the SJMWCP and the City would ensure that the project is implemented in a manner that is consistent with the provisions outlined in the SJMSCP. This would be a **less-than-significant** impact.

4.5.3 MITIGATION MEASURES

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

4.5-1: Impacts on Common Plants and Wildlife

4.5-5: Impacts on Northwestern Pond Turtle

4.5-7: Impacts on Other Special-Status Birds

4.5-8: Impacts on Wildlife Movement and Nursery Sites

4.5-11: Consistency with an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Other Approved Conservation Plan

The following mitigation measures are recommended for the significant and potentially significant impacts of Impacts 4.5-2, 4.5-3, 4.5-4, 4.5-6, 4.5-9, and 4.5-10.

Mitigation Measure 4.5-2: Impacts on Special-Status Plants.

The proposed project is located in the Central Zone of the SJMSCP. Eleven of the special-status plants listed in Table 4.5-1 are addressed in the SJMSCP. The City will request coverage under the SJMSCP and fees will be paid in the amount determined by SJCOG during the application and review process for the project. If SJCOG determines, based on an independent review by a qualified biologist, that suitable habitat for special-status plants would be affected, the following measures may be required to reduce impacts on the 11 special-status species covered by the SJMSCP:

- Before project construction, surveys for the 11 special-status plants covered by the SJMSCP 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. Surveys shall be conducted in accordance with specific methodologies described in Section 5.2.2 of the SJMSCP. If any of the 11 special-status plants are found, the following measures will be implemented:

  - *Greene's tuctoria, Delta button celery, Sanford's arrowhead and slough thistle:* If these species are present in the project area and cannot be avoided, a mitigation plan will be developed, with review and input from the regulatory agencies (e.g., DFG). The mitigation plan will identify mitigation measures for any populations affected by the proposed project, such as creation of off-site 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. These measures will be designed to ensure that the project does not result in a net reduction in the population size or range of Greene's tuctoria, Delta button celery, Sanford's arrowhead, and slough thistle.

  - *Recurved larkspur, Wright's trichocoronis, alkali milk vetch, Suisun Marsh aster, rose-mallow, Delta mudwort, and Delta tule pea:* If these species are found in the project area and cannot be avoided, a mitigation strategy will be developed with review and input from the regulatory agencies (e.g., DFG). The mitigation strategy will first consider the feasibility of establishing a conservation easement. If dedication of a conservation easement is found not to be a feasible mitigation option, payment of SJMSCP development fees will be used to mitigate impacts on these species. Use of conservation easements or development fees for establishment of habitat preserves, or a combination of the two mechanisms, will be structured to ensure that the project does not result in an overall net reduction in the population size or range of recurved larkspur, Wright's trichocoronis, alkali milk vetch, Suisun Marsh aster, rose-mallow, Delta mudwort, and Delta tule pea.

  - The remaining two species, San Joaquin spearscale and lesser spearscale, are not covered in the SJMSCP. Surveys for these species 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. If survey results indicate that neither species is present in project area, no additional mitigation will be required. If populations of these species are encountered during the surveys, they will be avoided to the extent feasible. If avoidance is not possible, plants will be evaluated for their biological importance based on the known distribution of the plants and other pertinent data, in consultation with DFG. If significant impacts would occur, a mitigation plan will be developed in coordination with DFG. The plan will detail specific measures to reduce impacts on the plants to a less-than-significant level, which may include a combination of avoidance, salvage, replanting, or protection of off-site populations as deemed appropriate by DFG. The plan will also include methods for monitoring of mitigation success and reporting requirements.

Mitigation Measure 4.5-3: Impacts on Vernal Pool Crustaceans, California Tiger Salamander, and Western Spadefoot Toad.

For the wastewater collection system alignment approximately 900 feet north of Yosemite Avenue and the effluent outfall pipeline alignment, the City will request coverage under the SJMSCP and fees will be paid in the

amount determined by SJCOG during the application and review process for the project. SJCOG may also determine, based on an independent review by a qualified biologist, that the following measures will be implemented to reduce impacts on the vernal pool crustaceans, California tiger salamander, and western spadefoot toad if potential habitat is present in the project area and would be affected by plan implementation.

Vernal Pool Crustaceans

- Filling of vernal pools will be delayed until pools are dry and samples from the top layer of vernal pool soils are collected. Soil collections will be sufficient to include a representative sample of plant and animal life present in the pools by incorporating seeds, cysts, eggs, spores and similar inoculum.

- Collected soils will be dried and stored in pillowcases labeled with the date and location of soils collected. Soils will be deposited with the Joint Powers Authority (JPA). The JPA shall retain the soils in a cool, dry area and shall be responsible for providing soils to vernal pool construction managers for inoculating newly created vernal pools on Preserve lands.

California Tiger Salamander and Western Spadefoot Toad

If potential California tiger salamander and spadefoot toad habitat is determined to be present and could be affected, surveys will be conducted according to the current protocol approved by the Technical Advisory Committee (TAC) and the permitting agencies (i.e., DFG and USFWS). If salamanders and/or toads are detected, incidental take minimization measures will be developed in coordination with the TAC and permitting agencies. This may be conducted as part of the CWA Section 404 permitting process, if such a permit is required. The measures will be based on the need to avoid and minimize impacts on breeding, feeding, and sheltering behaviors of California tiger salamander and spadefoot toad, and will include consideration of the following:

- effects on aquatic habitat, including retaining pools and maintaining appropriate pool hydrology to enable successful metamorphosis of larvae to occur, but without fostering nonnative aquatic predators;

- retention of small mammal burrows and other suitable estivation habitat (e.g., underground holes, cracks, or niches) in adjacent uplands;

- the fact that maintenance of open habitat between breeding ponds and estivation sites (e.g., roads and other linear barriers) can increase mortality or even prevent migrations and dispersal, significantly increasing harm to and mortality of salamanders and toads);

- siting replacement wetland habitat, whenever possible, within approximately 1.5 miles of other known breeding sites.

Mitigation Measure 4.5-4: Impacts on Giant Garter Snake.

The City will request coverage under the SJMSCP and fees will be paid in the amount determined by SJCOG during the application and review process for the project. SJCOG may also determine, based on an independent review by a qualified biologist, that the following measures will be implemented to reduce impacts on giant garter snake:

- Construction will occur during the active period for the snake, between May 1 and October 1. Between October 2 and April 30, the JPA, with the concurrence of the permitting agencies' representatives on the TAC, shall determine whether additional measures are necessary to minimize and avoid take.

- Vegetation clearing within 200 feet of the banks of potential aquatic habitat for giant garter snake will be limited to the minimum area necessary.

- The movement of heavy equipment within 200 feet of the banks of potential aquatic habitat for giant garter snake will be confined to existing roadways to minimize habitat disturbance.

- Before ground disturbance, all on-site construction personnel will be given instruction regarding the presence of SJMSCP-covered species and the importance of avoiding impacts on these species and their habitats.

- In areas where wetlands, irrigation ditches, marsh areas, or other potential giant garter snake habitats are being retained on the site:

    a. Temporary fencing will be installed at the edge of the construction area and the adjacent wetland, marsh, or ditch.

    b. Working areas, spoils, and equipment storage and other project activities will be restricted to areas outside of marshes, wetlands, and ditches.

    c. Water quality will be maintained and construction runoff into wetland areas will be limited through the use of hay bales, filter fences, vegetative buffer strips, or other accepted equivalents.

- If on-site wetlands, irrigation ditches, marshes, etc., are being relocated in the vicinity, the newly created aquatic habitat will be created and filled with water before dewatering occurs and the existing aquatic habitat is destroyed. In addition, nonpredatory fish species that exist in the aquatic habitat and that are to be relocated will be seined and transported to the new aquatic habitat as the old site is dewatered.

- If wetlands, irrigation ditches, marshes, etc., will not be relocated in the vicinity, then the aquatic habitat will be dewatered at least 2 weeks before construction begins.

- Preconstruction surveys for the giant garter snake (conducted after completion of environmental reviews and before ground disturbance) will occur within 24 hours of ground disturbance.

- Other provisions of the USFWS *Standard Avoidance and Minimization Measures during Construction Activities in Giant Garter Snake Habitat* will be implemented (excluding programmatic mitigation ratios which are superseded by the SJMSCP's mitigation ratios).

Mitigation Measure 4.5-6: Impacts on Raptors.

The City will request coverage under the SJMSCP and fees will be paid in the amount determined by SJCOG during the application and review process for the project. Compensation for loss of agricultural lands will also mitigate the loss of foraging habitat for raptor species. SJCOG may also determine, based on an independent review by a qualified biologist, that the following measures will be implemented to reduce impacts on special-status raptors.

Swainson's Hawk

The City has the option of retaining known or potential Swainson's hawk nest trees (i.e., trees that hawks are known to have nested in within the past 3 years or trees, such as large oaks, that the hawks prefer for nesting) or removing the nest trees. If the City elects to retain a nest tree, and to encourage tree retention, the following incidental take minimization measure will be implemented during construction activities:

- If a nest tree becomes occupied during construction activities, then all construction activities will remain a distance of two times the dripline of the tree, measured from the nest.

- If the City elects to remove a nest tree, then nest trees may be removed between September 1 and February 15, when the nests are unoccupied.

Burrowing Owl

The City will prevent ground squirrels from occupying the project site early in the planning process by employing one of the following practices:

- New vegetation will be planted or existing vegetation will be retained entirely covering the site at a height of approximately 36 inches above the ground. Vegetation will be retained until construction begins.

- If burrowing owls are not known or suspected on a project site, the City will disk or plow the entire project site to destroy any ground squirrel burrows. At the same time burrows are destroyed, ground squirrels will be removed through one of approved methods described in Appendix A of the SJMSCP to prevent reoccupation of the project site (also found at http://www.sjcog.org/). If these measures are not attempted or are attempted but fail, and burrowing owls occupy the project site, then the following measures will be implemented:

    - During the nonbreeding season (September 1–January 31), burrowing owls occupying the project site will be removed from the project site by passive relocation as described in DFG's *Staff Report on Burrowing Owl Mitigation* (DFG 1995).

    - During the breeding season (February 1–August 31), occupied burrows will not be disturbed and will be provided with a 75-meter protective buffer until the Technical Advisory Committee (TAC)—with the concurrence of the permitting agencies' representatives on the TAC—or a qualified biologist approved by the permitting agencies verifies through noninvasive means that either the birds have not begun egg laying, or juveniles from the occupied burrows are foraging independently and are capable of independent survival. Once the fledglings are capable of independent survival, the burrow can be destroyed.

White-Tailed Kite

Before the start of any ground-disturbing activities (e.g., project site grading), preconstruction surveys will investigate all potential nesting trees on the project site (e.g., especially tree tops 15–59 feet above the ground in oak, willow, eucalyptus, cottonwood, or other deciduous trees), during the nesting season (February 15–September 15) whenever white-tailed kites are noted on-site or within the vicinity of the project site during the nesting season. A setback of 100 feet from nesting areas will 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 will be marked by brightly colored temporary fencing.

Northern Harrier

A setback of 500 feet from nesting areas will 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 will be marked by brightly colored temporary fencing.

Common Raptors

- If project activity would occur during the raptor nesting season (February 15–September 15), preconstruction surveys will be conducted during the nesting season in suitable nesting habitat within 100 feet of areas of project activity. The survey will be conducted within 2 weeks before the beginning of construction or tree removal.

- A setback of 100 feet from active nesting areas will 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 will be marked by brightly colored temporary fencing.

Mitigation Measure 4.5-9: Impacts on Protected and Heritage Trees.

The City will implement the following measures to reduce impacts of the proposed project on protected and heritage trees:

- Before project implementation, a tree survey shall be conducted by a qualified botanist to enumerate and evaluate all trees that meet standards in the applicable City codes outlined above that could be affected by implementation of the proposed project.
- Trees that are subject to protection, but must be removed as a result of project implementation, will be replaced in accordance with tree planting specifications established by the City Tree Ordinance. Replacement trees will be planted on-site at a location in the general vicinity that is consistent with City standards.
- Replacement tree plantings will be monitored in accordance with City monitoring protocols.
- If monitoring indicates that replacement plantings are not meeting performance standards, remedial measures will be implemented. Appropriate measures will be determined by the City. and will be implemented until it is demonstrated that replacement plantings meet performance standards.

Mitigation Measure 4.5-10: Impacts on Sensitive Habitats, Including Jurisdictional Waters of the United States.

The City will avoid impacts on the San Joaquin River and its tributaries and impacts on freshwater marsh habitat within the French Camp Outlet Canal and its tributaries by implementing the following construction methods:

- trenchless construction methods such as horizontal directional drilling or bore-and-jack to bore under the French Camp Outlet Canal in two locations and bore under a tributary of the French Camp Outlet Canal in one location;
- limiting open-cut trench installation near sensitive habitat to improved and unimproved roadways; and
- limiting construction equipment and material to roadways and disturbed upland areas (e.g., agricultural fields and vineyards).

Although it is anticipated that the construction techniques discussed above would avoid impacts on the French Camp Outlet Canal, any proposed action involving tunneling or boring under navigable waters requires a USACE Section 10 permit. Therefore, the City will apply to USACE for a Section 10 permit under the Rivers and Harbors Act to obtain permission to pass under the French Camp Outlet Canal and its tributary. Where construction activities would occur within 25 feet of the French Camp Outlet Canal or its tributaries or other areas with freshwater marsh, biological monitoring will be conducted to ensure that there are no adverse effects on these sensitive habitats.

A determination of waters of the United States, including wetlands and riparian habitat that would be affected by construction of the effluent outfall structure, would be made by qualified biologists through the formal Section 404 wetland delineation process. If necessary, the City will consult with the appropriate agencies (e.g., USACE, DFG, and the U.S. Environmental Protection Agency), and authorization for fill of jurisdictional areas will be secured from USACE via the Section 404 permitting process and other applicable resource agencies' permitting processes, if required. As part of these processes, measures will be developed to minimize impacts, such as conducting activities during the low-flow season and erecting protective fencing to minimize the area of impact and potential for runoff and siltation. Any jurisdictional habitat that is removed will be replaced or rehabilitated on a "no-net-loss" basis in accordance with applicable agency regulations and at a location and by methods

agreeable to the applicable agencies. In addition, construction of the effluent outfall structure may require an encroachment permit from the State Reclamation Board. Therefore, the City will consult with the Reclamation Board before initiating any construction activities.

4.5.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Incorporation and implementation of the mitigation measures specified in the SJMSCP (and summarized in this DEIR) for Impacts 4.5-2, 4.5-3, 4.5-4, and 4.5-6, and incorporation and implementation of the mitigation measures outlined for Impacts 4.5-9 and 4.5-10, would result in no loss of individuals of special-status species, sensitive natural communities or other sensitive natural resources. The significance of these impacts would be reduced to a less-than-significant level.

4.6 HAZARDS AND HAZARDOUS MATERIALS

This section evaluates the potential hazardous material and public health impacts from implementation of the proposed Manteca Wastewater Quality Control Facility (WQCF) and Collection System Master Plans Update Project. The analysis presented in this section is based on a review of project plans, available government reports and documents, and applicable elements from the City of Manteca General Plan 2023 (City general plan). The project area is not located within an airport land use plan or within 2 miles of a public or private airport. Therefore, this issue is not evaluated further in this DEIR.

4.6.1 ENVIRONMENTAL SETTING

EXISTING USE OF HAZARDOUS MATERIALS

Several potentially hazardous materials are currently used at the Manteca WQCF. Some of these materials, such as chlorine and sulfur dioxide, are delivered in 1-ton containers. Other materials, such as acetylene and oxygen, are less hazardous or are used in much smaller quantities (200-cubic-foot pressurized cylinders). Potentially hazardous materials currently used at the WQCF are described in Table 4.6-1. The location of the existing chemical handling area, where chlorine and sulfur dioxide are offloaded and stored, is shown in Exhibit 3-4. A description of chlorine and sulfur dioxide is provided below.

Table 4.6-1
Description of Hazardous Materials Used at the Manteca WQCF

Acetylene (CAS No. 74-86-2)	Acetylene is received in movable pressurized cylinders, and is stored in the maintenance area. Acetylene is used in gas welding/cutting operations. No waste product remains.
Chlorine (CAS No. 7782-50-5)	Chlorine is received in 1-ton capacity steel containers that are located in a covered chemical storage room on load cell platforms and trunnion type storage racks. The chlorine is stored in a liquid state. The liquid is evaporated to gas and is transported by piping under vacuum to the application system where it is injected in the treated effluent to accomplish disinfection. No waste product remains.
Diesel Fuel (CAS No. 68476-34-6)	Diesel fuel is received by truck and stored in aboveground steel storage tanks with secondary containment. Diesel is used as a fuel for vehicles and portable equipment and is consumed in use.
Lubricating Oils (CAS No. 64742-54-7)	Lubricating oils are received in steel drums and used throughout the facility in vehicles and mechanical equipment. Used lubricating oils are recycled.
Methane Gas (CAS No. 74-82-8)	Methane gas is produced in the anaerobic digester. Methane gas can be used as a fuel source for steam boilers, or a cogeneration facility. Methane is consumed in use.
Oxygen (CAS No. 7782-44-7)	Oxygen is used from compressed gas cylinders for maintenance cutting and welding.
Sodium Hydroxide ±30% (CAS No. 1310-73-2)	Sodium hydroxide is received by tank truck and is stored as a liquid in aboveground polyethylene tanks. The solution is used to control the pH of treated wastewater. The sodium hydroxide is dissolved into the final effluent flow and discharged. No waste product remains.
Sulfur Dioxide (CAS No. 7446-09-5)	Sulfur dioxide is received in 1-ton capacity steel containers that are located in a covered chemical storage room on load cell platforms and trunnion type storage racks. Sulfur dioxide is stored in a liquid state. The liquid is evaporated to a gas and is transported by piping under vacuum to the application system where it is injected into the treated effluent to accomplish dechlorination (elimination of residual chlorine). No waste product remains.

Source: Shannon, pers. comm., 2006a

Chlorine

Chlorine is a greenish yellow, nonflammable gas with a pungent, suffocating odor. It is highly toxic and corrosive, and is one of the most chemically reactive of all elements. It kills bacteria, parasites, and other pathogens effectively, so it is commonly used to disinfect water and wastewater. Chlorine reacts quickly with body moisture, and so is extremely irritating to skin, eyes, and mucous membranes. At air concentrations as low as 1 part per million (ppm), chlorine causes a burning sensation in the eyes, nose, and throat. Because of its suffocating odor and irritating effects, traces of chlorine are readily detected by persons exposed.

The primary routes of exposure to chlorine are by inhalation of accidentally released chlorine gas or direct skin contact with liquid chlorine. Exposed persons would experience excitement, sneezing and salivation, nausea, and difficulty breathing. Adverse effects of inhalation could include lung damage, acute respiratory distress, and in severe cases, pulmonary edema and asphyxiation. Contact with liquid chlorine could cause immediate irritation and blistering of exposed skin. Because of its toxicity and volatile physical state, chlorine is a dangerous product and is considered an acutely hazardous material by regulatory agencies. In any atmosphere containing greater than 0.5 ppm chlorine, personnel should evacuate the contaminated area immediately.

Liquid chlorine is supplied and stored in 1-ton capacity steel containers that are located in a covered chemical storage room on load cell platforms and trunnion type storage racks. Existing facilities can accommodate up to 10 containers of chlorine. The liquid chlorine is withdrawn from the steel containers through pressure piping to evaporation units where it transforms to its gaseous state. The gas is then transported through vacuum piping to the chlorine contact basins and injected into the treated effluent to achieve disinfection prior to dechlorination and discharge to the San Joaquin River.

Sulfur Dioxide

Sulfur dioxide is a colorless, corrosive, nonflammable gas. It has a characteristic stinging, suffocating odor that is intensely irritating to the nose and respiratory tract. The irritation is caused by rapid uptake of sulfur dioxide upon contact with moist mucous membranes, accompanied by immediate formation of sulfurous acid. Exposure to sulfur dioxide could cause serious eye, throat, or respiratory injury.

The primary routes of exposure to sulfur dioxide are through direct skin contact or inhalation. Severe or prolonged inhalation would cause acute respiratory distress, lung damage, or asphyxiation. Exposure to liquid sulfur dioxide could blister exposed skin. Sulfur dioxide is considered an acutely hazardous material by regulatory agencies. In any area containing sulfur dioxide concentrations greater than 20 ppm, personnel should evacuate the contaminated area immediately. Personal protective equipment and training are necessary when working with sulfur dioxide.

Liquid sulfur dioxide is supplied and stored in 1-ton capacity steel containers that are located in a covered chemical storage room on load cell platforms and trunnion type storage racks. Existing facilities can accommodate up to seven containers of sulfur dioxide. The liquid sulfur dioxide is withdrawn from the steel containers through pressure piping to evaporation units where it transforms to its gaseous state. The gas is then transported through vacuum piping to the distal end of the chlorine contact basins where it is used to dechlorinate the wastewater effluent. The disinfected dechlorinated wastewater effluent is then transported through 14,000 feet of pressure piping to the WQCF outfall where it is discharged to the San Joaquin River. No waste product remains after dechlorination.

HAZARDOUS MATERIAL DEFINITION

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local agency, or if it has characteristics defined as hazardous by such agency. A hazardous material is defined in Title 22 Section 66260.10, of the California Code of Regulations (CCR) as:

> a substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of or otherwise managed.

Chemical and physical properties of a substance that cause it to be considered hazardous include toxicity, ignitability, corrosivity, and reactivity. Toxicity, ignitability, corrosivity, and reactivity are defined in the CCR, Title 22, Sections 66261.20–66261.24 as follows:

- Toxic substances may cause short-term or long-lasting health effects, ranging from temporary effects to permanent disability, or death. Carcinogens (substances known to cause cancer) are a special class of toxic substances. (Examples of toxic substances include hydrogen sulfide, metal ions such as lead and copper, and trihalomethane compounds that are organic byproducts of water disinfection.)

- Ignitable substances are hazardous because of their ability to burn. (Gasoline and methane gas are examples of ignitable substances.)

- Corrosive materials can cause severe burns or damage materials. (Examples include chlorine gas, sulfur dioxide gas, strong acids, and strong bases.)

- Reactive materials may cause explosions or generate toxic gases. (Dynamite and pressurized gases are examples of reactive materials.)

Toxic, ignitable, corrosive, and reactive materials are all subsets of hazardous materials. For example, all toxic materials are hazardous, but not all hazardous materials are toxic. Many hazardous materials have more than one hazardous property. A solvent, for example, might be both toxic and ignitable; an acid might be both corrosive and reactive. Some chemicals pose multiple hazards; chlorine gas, for example, is acutely toxic, corrosive, and reactive.

A chemical that poses a significant hazard upon a single exposure is considered acutely hazardous if it is so designated by a regulatory agency (California Health and Safety Code Section 25531). Sulfur dioxide and chlorine are acutely hazardous materials at the WQCF.

The criteria that render a material hazardous also make its waste hazardous (California Health and Safety Code Section 25117). A hazardous waste is any hazardous material that is to be recycled, discarded, or abandoned.

Exposure to Hazardous Materials

Worker safety and public health are potentially at risk whenever hazardous materials are used. It is necessary to differentiate between the “hazard” of these materials and the “risk” they pose to human health or the environment. A hazardous situation is one that has the potential to cause damage upon upset or exposure. The risk of an event is determined by a combination of (1) the probability of exposure to the hazardous material and (2) the severity of consequences should exposure occur. In other words, the likelihood of exposure to the hazardous material coupled with its inherent hazardous properties determines the degree of risk to health or the environment. To be of high risk, exposure to a hazardous material must be both likely and consequential.

Means of Exposure

Exposure of the public to hazardous materials or wastes could occur in several ways:

- improper handling or use of hazardous materials during the course of business;
- failure of storage containment systems;

- fire, explosion, or other emergencies;
- unsound disposal/treatment methods; or
- upset during transport.

Pathways of Exposure

Pathways of exposure to hazardous substances depend on the chemical and physical properties of the waste and the type of accident. The four common exposure pathways are inhalation, ingestion, direct contact (with skin or eyes), and injection (skin puncture or cut):

- Inhalation (breathing the hazardous substance) is the primary route of exposure for toxic fumes or vapors and is the primary exposure pathway at a distance.

- Ingestion (swallowing the hazardous substance) would not be expected to occur at an industrial facility unless persons practiced poor personal hygiene. Ingestion can also occur by eating contaminated crops or other foods, and by drinking contaminated water.

- Direct bodily contact requires immediate proximity to the hazardous solid or liquid. Skin or eye contact with hazardous fumes or vapors can also occur over a distance.

- Injection (puncturing the skin with a sharp, contaminated object) typically is a threat only to persons handling unpackaged or improperly packaged hazardous wastes.

Factors that influence the health effects of exposure to hazardous material include the dose to which the person is exposed, the frequency of exposure, the exposure pathway, and individual susceptibility. A material may be hazardous by one exposure pathway but not another; for example, a chemical might be toxic if ingested but not if touched.

Sensitive Receptors

Extremely hazardous materials (i.e., chlorine and sulfur dioxide) are stored and used at the WQCF. The WQCF is surrounded by agricultural, industrial, and residential land uses. The nearest school is approximately 0.75 mile west of the site. The nearest residences are approximately 0.3 mile northeast of the facility and constitute the nearest sensitive receptors for hazardous materials stored and used on the site.

REGULATORY SETTING

Hazardous materials handling is subject to numerous laws and regulations at all levels of government. Table 4.6-2 lists the authority of federal, state, and local regulatory agencies that oversee hazardous materials handling and management. A summary of the most pertinent regulations is provided below.

Federal and State Plans, Policies, Regulations, and Laws

Hazardous Materials Management

Federal and state laws require detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed of, and in the event that such materials are accidentally released, to prevent or to mitigate injury to health or the environment. The Federal Emergency Planning and Community Right to Know Act (EPCRA) of 1986 imposes hazardous materials planning requirements to help protect local communities in the event of accidental release.

Table 4.6-2
Summary of Hazardous Materials Regulatory Authority

Regulatory Agency	Jurisdiction	Authority
Federal		
U.S. Environmental Protection Agency (EPA)	Federal	Federal Water Pollution Control Act Clean Air Act Resource Conservation & Recovery Act Federal Emergency Planning and Community Right to Know Act (EPCRA) Comprehensive Environmental Response, Compensation & Liability Act Superfund Amendments & Reauthorization Act Federal Insecticide, Fungicide & Rodenticide Act
U.S. Department of Transportation (DOT)	Federal	Hazardous Materials Transportation Act
Occupational Safety and Health Administration (OSHA)	Federal	Occupational Safety & Health Act
State		
Department of Toxic Substances Control (DTSC)	Statewide	Health and Safety Code, CCR Titles 17, 19, and 22
Department of Industrial Relations (Cal-OSHA)	Statewide	California Occupational Safety & Health Act
Department of Transportation (Caltrans)	Statewide	Hazardous materials transportation
Public Utilities Commission (PUC)	Statewide	Natural gas pipelines; General Order No. 112-D
Office of Emergency Services (OES)	Statewide	Hazardous Materials Release/Response Plans Acutely Hazardous Materials Law
Department of Toxic Substances Control (DTSC)	Statewide	Hazardous Waste Management Program Resource Conservation & Recovery Act
State Fire Marshal	Statewide	Uniform Fire Code, CCR Title 19 Hazardous liquid pipelines
Health & Welfare Agency	Statewide	Safe Drinking Water & Toxic Enforcement Act
Integrated Waste Management Board	Statewide	Assembly Bill (AB) 939
State Water Resources Control Board (SWRCB)	Statewide	Porter-Cologne Water Quality Control Act CCR Title 23
Central Valley Regional Water Quality Control Board (RWQCB)	Regional	Underground Storage Tanks NPDES permit requirements
San Joaquin Valley Air Pollution Control District (SJVAPCD)	County	California Clean Air Act, SJVAPCD Regulations
Local		
San Joaquin County Environmental Health Department (SJCDEH)	County	Hazardous materials disclosure Underground storage tanks Contaminated sites cleanup CCR Title 22 CEQA implementation
San Joaquin County Office of Emergency Services (SJCOES)	County	Emergency planning and preparedness Risk reduction and management
County Agricultural Commissioner	County	Agricultural chemicals regulation
City of Manteca Sewer Utility	Local	Wastewater conveyance
City of Manteca Fire Department	Local	Hazardous materials disclosure Underground storage tanks Emergency response

Sources: Shannon, pers. comm., 2006b

The California Hazardous Materials Release Response Plans and Inventory Law of 1985 (Business Plan Act) requires businesses handling or storing certain amounts of hazardous materials to prepare a Hazardous Materials Management Plan. For hazardous materials above specified quantities, a Hazardous Materials Management Plan includes an inventory of hazardous materials handled, facility plans showing where hazardous materials are stored, an emergency response plan, and provisions for employee training in safety and emergency response procedures (California Health and Safety Code, Division 20, Chapter 6.95, Article 1).

Under certain circumstances, a business must prepare a Risk Management Plan (RMP) to minimize off-site risks associated with acutely hazardous materials. An RMP provides additional planning information that covers equipment and systems safety, operating procedures, preventive maintenance, upset risk assessments, and safety auditing.

Statewide, the California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances Control (DTSC) has primary regulatory responsibility for management of hazardous materials, with delegation of authority to local jurisdictions that enter into agreements with the state. Local agencies, including the San Joaquin County Department of Environmental Health (SJCDEH), San Joaquin County Office of Emergency Services (SJCOES), and the Manteca Fire Department, administer laws and regulations.

Worker Safety

The California Occupational Safety and Health Administration (Cal-OSHA) and the federal Occupational Safety and Health Administration (OSHA) are the agencies responsible for ensuring worker safety in the handling and use of chemicals in the workplace. Pursuant to the Occupational Safety and Health Act of 1970, OSHA has adopted numerous regulations pertaining to worker safety, contained in Title 29 of the Code of Federal Regulations (29 CFR). These regulations set standards for safe workplaces and work practices, including standards relating to hazardous material handling. Cal-OSHA assumes primary responsibility for developing and enforcing state workplace safety regulations. Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in 29 CFR. Cal-OSHA standards are generally more stringent than federal regulations.

Cal-OSHA regulations concerning the use of hazardous materials in the workplace, as detailed in CCR Title 8, include requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal-OSHA enforces hazard communication program regulations that contain training and information requirements, including procedures for identifying and labeling hazardous substances, communicating hazard information related to hazardous substances and their handling, and preparation of health and safety plans to protect workers and employees at hazardous waste sites. The hazard communication program requires that Material Safety Data Sheets (MSDSs) be available to employees and that employee information and training programs be documented.

Emergency Response to Hazardous Materials Incidents

California has developed an Emergency Response Plan to coordinate emergency services provided by federal, state, and local government and private agencies. Response to hazardous materials incidents is one part of this plan. The plan is administered by the state Office of Emergency Services (OES), which coordinates the responses of other agencies including Cal-EPA, California Highway Patrol (CHP), California Department of Fish and Game, Central Valley Regional Water Quality Control Board, SJCOES, and the Manteca Fire Department. The Manteca Fire Department provides fire protection services at the WQCF (Shannon, pers. comm., 2006c).

Hazardous Materials Transport

The U.S. Department of Transportation (DOT) regulates hazardous materials transportation between states. State agencies with primary responsibility for enforcing federal and state regulations and responding to hazardous

materials transportation emergencies are the CHP and the California Department of Transportation (Caltrans). Together, these agencies determine container types used and license hazardous waste haulers for hazardous waste transportation on public roads.

Regional and Local Plans, Policies, Regulations, and Ordinances

San Joaquin County is responsible for enforcing the state regulations, both in the City of Manteca and remaining unincorporated areas. The San Joaquin County Environmental Health Division (EHD) serves as the Certified Unified Program Agency (CUPA) for San Joaquin County and administers the Hazardous Waste Generator, Hazardous Waste Onsite Treatment (Tiered Permitting), and Underground Storage Tank programs. The EHD also administers the Vector Control Program. SJCOES is a participating agency administering the Hazardous Material Release Response Plan and Inventories, and the Accidental Release Prevention (CalARP) programs (San Joaquin County 2006).

Hazardous Waste Management

DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste under the federal Resource Conservation and Recovery Act (RCRA) and the state Hazardous Waste Control Law. Both laws impose comprehensive regulatory systems for handling hazardous waste in a manner that protects human health and the environment.

City of Manteca General Plan

The *City of Manteca General Plan 2023 Safety Element* (City of Manteca 2002) includes the following policies related to hazards and hazardous materials that are relevant to this analysis:

- **Policy S-P-16:** City approvals of all new development shall consider the potential for the production, use, storage, and transport of hazardous materials and provide for reasonable controls on such hazardous materials.
- **Policy S-P-17:** Within its authority, the City shall regulate the production, use, storage, and transport of hazardous materials to protect the health of Manteca residents.

Manteca WQCF Plans, Programs, and Practices

Risk Management Programs

The WQCF has prepared and implemented an up-to-date RMP (Sierra-Pacific Group 1999). The purpose of an RMP is to encourage handlers of acutely hazardous materials to conduct comprehensive evaluations of plant practices regarding hazardous chemicals with the view of protecting the public and the environment from releases of acutely hazardous materials. Section 25532 of the California Health and Safety Code defines an RMP as all of the administrative and operational programs of a business that are designed to prevent acutely hazardous materials accident risks. These programs may include design safety of new and existing equipment, standard operating procedures, preventive maintenance programs, operator training, accident investigation procedures, risk assessment for unit operations or operating alternatives, emergency response planning, and internal or external audit procedures to ensure that these programs are executed as planned. The Manteca WQCF's RMP includes all of these items, as well as the findings of the RMP Hazard and Operability Study (HAZOP) and Hazard Assessment, described below.

The wastewater systems superintendent has the overall responsibility for management of the safety and environmental program at the WQCF, including implementation of the RMP. The RMP is reviewed and updated every 3 years, and within 60 days following a process modification that would materially affect the handling of a regulated substance, as stipulated in Health and Safety Code Chapter 6.95. The Manteca WQCF prepared and

submitted the RMP to EPA in February 1999. The RMP must be reviewed and recertified by EPA every 5 years. The Manteca WQCF RMP was last revised and recertified in June 2004.

RMP Hazard and Operability Study

The WQCF's Hazard and Operability Study (HAZOP) was a systematic investigation that identified risks of potential releases of acutely hazardous materials at the plant. The HAZOP focused on the safety of the WQCF's use of chlorine and sulfur dioxide, as these are the chemicals that represent the greatest public health and safety risk. The study identified potential chemical release points and then addressed possible improvements in plant safety by documenting additional risk reduction methods that could be employed. The HAZOP included the plant's chlorine and sulfur dioxide cylinder offloading and storage, replacement, and water treatment procedures. The HAZOP study resulted in findings and recommendations to improve the operability and safety of the processes analyzed. These were included in prevention/mitigation measures and a schedule of implementation, and were committed to by the WQCF wastewater systems superintendent for completion in accordance with the schedule.

Hazard Assessment

The purpose of the hazard assessment is to evaluate the risk of a theoretical accidental chemical release, specifically a release of chlorine or sulfur dioxide. The report further developed information presented in the HAZOP study by determining the actual risk of plausible release events of chlorine and sulfur dioxide to off-site receptors. The assessment concluded that no further planning appeared to be justified based on the adequacy of existing safety and training measures already in place and the lack of a record of releases having occurred at the facility.

Training

The WQCF has a documented training program in place. The training program is designed to keep all appropriate employees fully capable of preventing and mitigating an incident that could result in safety or environmental problems. It is also designed to give personnel the skills to prevent a small incident at the facility from becoming one that causes adverse off-site consequences. It is fully revised on a biannual basis. Relevant sections are also reviewed as required by an incident investigation. New employees are given training by the superintendent or a designated person. Existing personnel attend twice-monthly safety meetings. The record of training is kept on safety meeting forms.

RMP Audit and Inspection Program

The WQCF currently has an audit and equipment inspection program organized to maintain compliance with federal, state, and local regulations, as well as to maintain a safe work environment. The RMP manager is responsible for performing a semiannual audit of the WQCF to ensure that prevention program elements have been implemented. In addition, WQCF staff perform quarterly safety audits of the entire facility. The audits are intended to ensure that proper safety measures are being taken to provide a safe workplace for all personnel and to minimize the potential for accidents.

Routine equipment inspections are coordinated by the maintenance supervisor. Routine inspections of all of the regulated substance handling equipment are conducted for serviceability, and to identify potential problems that could result in a regulated substance release.

Hazardous Materials Management Plan

The WQCF developed and submitted a Hazardous Materials Management Plan (HMMP) to the SJCOES. The HMMP is updated regularly as hazardous materials inventory changes occur, and is intended to minimize the potential for employee exposure or public exposure to an actual or threatened hazardous material release at the

plant. The plan is intended to satisfy the requirements for emergency response provisions of Section 6.95 of the California Health and Safety Code.

Principal elements of the HMMP are descriptions of all hazardous materials used at the WQCF, their properties and functions, and maps showing locations of their use and storage. The plan also provides instructions for reporting emergency events and notifying key response personnel and authorities in the event of a release, and methods to use to mitigate a release, including spill containment and cleanup. Ramos Environmental and Chemtrec are notified in the event assistance is needed to cleanup hazardous materials spill.

Prevention Program

The Manteca WQCF has developed a prevention program, as required by the RMP rule, which includes the following elements:

- process safety information,
- process hazard analysis/review,
- operating procedures,
- training,
- mechanical,
- management of change,
- pre-start-up review,
- incident investigations,
- compliance audits,
- contractor safety,
- employee participation, and
- hot work permits (e.g., required for welding activities).

The WQCF Prevention Program is an ongoing program that is intended to provide a means for safe operation throughout the life of the facility. Specifically, it is intended to ensure that process designs are reviewed so that new facilities and equipment are in conformance with safe design principles for the storage and handling of regulated substances. The requirements are also designed to ensure that the operation, maintenance, and controls are being implemented by the facility.

Emergency Response Planning

WQCF management has elected to not permit employees to respond to an accidental release of a regulated substance. Instead, the WQCF relies on agency and contract emergency responders to respond to a reportable release of chlorine or sulfur dioxide. The Manteca Fire Department (MFD) provides fire prevention, organized and efficient response to fires, first response to hazardous materials incidents, and basic level medical response. In the event of a major release, facility personnel have established mechanisms for notifying emergency responders, and are required to coordinate with local planning and response agencies. A major release is defined as one that resulted in on- and off-site deaths, injuries, significant on- or off-site property damage, evacuations, sheltering in place, or environmental damage. However, facility personnel are trained to recognize, respond, and manage incidental, non-health threatening releases of these substances.

Accident History

Section 25534 of the California Health and Safety Code requires that plant accidents involving acutely hazardous materials be documented and described, including measures taken to prevent similar future accidents.
The Manteca WQCF had one incident in 2002 that involved a release of chlorine gas. The accident was investigated to determine the cause of the release and measures were developed to prevent future releases (Shannon, pers. comm., 2006b).

Sensitive Receptors

The WQCF is situated on approximately 22 acres in the northeastern section of a 210-acre site that is dominated by agricultural fields where WQCF-treated effluent is land applied for irrigation; no sensitive receptors are located immediately adjacent to the treatment plant. Commercial development is located directly north of the WQCF along Yosemite Avenue, and the "Stadium Center" shopping center is approximately 2,000 feet to the south on State Route (SR) 120. A "Big League Dreams" recreational facility is located approximately 600 feet to the south. Residential housing is located beyond the agricultural lands surrounding the WQCF site along Yosemite Avenue, McKinley Avenue, Airport Way, and SR 120. The nearest residences are approximately 600 feet northeast of the central plant facilities. The next closest point of similar residential development is roughly 1,300 feet to the northwest. There are seven schools located within 2 miles of the WQCF. The nearest school is approximately 0.75 mile west of the WQCF. Two hospitals are situated approximately 3,500 feet to the northeast, and a children's clinic is approximately 1.5 miles northeast of the site. SR 120, which forms the southern site boundary, is located approximately 3,200 feet from central plant facilities, while the Union Pacific Railroad line, which forms the western site boundary, is located approximately 1,200 feet from central plant facilities.

As discussed above, no sensitive receptors would be adversely affected by the proposed wastewater collection system and recycled water distribution system because wastewater collection system and recycled water distribution system pipelines would be buried underground and would not convey hazardous materials.

4.6.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

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

- plans for the project;
- available literature, including documents published by federal, state, county, and city agencies; and
- applicable elements from the City general plan.

In addition to reviewing the above reports, EDAW searched EPA's Envirofacts website to identify any new hazardous materials sites in the project area. Project activities were evaluated against the hazardous materials information gathered from the above sources to determine whether any risks to public health and safety or other conflicts would occur. EDAW also searched DTSC's online EnviroStor Database, and found that the WQCF site is not listed in regulatory agency databases as a known hazardous materials contamination site, and is not included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. Therefore, this issue is not evaluated further in this DEIR.

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines. The proposed project would result in significant hazardous materials impacts if it would:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;

- create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

- create hazardous emissions or require handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school; or

- impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

IMPACT ANALYSIS

IMPACT 4.6-1 Hazards and Hazardous Materials—Creation of a Significant Hazard to the Public or the Environment. *Existing safety practices and health and safety programs currently in effect would continue to be implemented with expansion of the Manteca WQCF and construction of new pipelines for the wastewater collection system and recycled-water distribution. In addition, use of hazardous materials during project construction and operation would be in compliance with federal, state, and local regulations. Because adequate safety procedures and precautions are in place and would continue with implementation of the Manteca WQCF and Collection System Master Plan Updates, and the project would implement and comply with existing hazardous materials regulations, the potential for accidental releases of hazardous materials or other significant hazards to the public or the environment would be* ***less than significant****.*

Hazardous materials are transported, handled, and used daily at the Manteca WQCF. Use of some of these hazardous materials would increase as plant capacity increases. However, use of acutely hazardous materials under the Manteca WQCF and Collection System Master Plan Updates would be significantly reduced with conversion from chlorine disinfection to an ultraviolet light (UV) disinfection process. Chlorine would still be used in the event of a process upset in the secondary treatment facility or for algae control. Chlorine would also be used to maintain a residual in the recycled water distribution system. Sulfur dioxide would be used only in the event that a chlorine residual is measured in the treated effluent.

The chemicals stored and handled in greatest quantity at the WQCF following expansion would be used for fuel, plant maintenance, and wastewater treatment applications (acetylene, diesel fuel, methane gas, oil, oxygen, sodium hydroxide, and polymers [nonhazardous]). Data on current and projected future use of chemicals are presented in Table 4.6-3. Of the chemicals used in bulk, only chlorine and sulfur dioxide are considered acutely hazardous materials.

Table 4.6-3
Current and Projected Future Average Monthly Hazardous Materials Use at the Manteca WQCF

Hazardous Material	Current Conditions [1]	Future Conditions
Chlorine	23,500 lbs	1,200 lb
Sulfur dioxide	20,600 lbs	1,050 lb
Sodium hydroxide	16,500 gallons	45,000 gallons
Acetylene Gas	50 cu. ft.	50 cu. ft.
Oxygen	100 cu. ft.	100 cu. ft.
Methane Gas [2]	170,000 cu. ft.	460,000 cu. ft.
Oil	2,750 gallons	2,750 gallons

[1] Averages based on May–October 2006 Monthly Operations Data Summary.
[2] Daily average usage.
Sources: Shannon, pers. comm., 2006d; Richard, pers. comm., 2006

The location of chemical storage buildings, where polymers and laboratory chemicals would be offloaded and stored, is shown in Exhibit 3-4. Procedures for handling hazardous materials would not change or otherwise be affected with implementation of the project. Fuels and laboratory chemicals would continue to be handled in the same manner. All training, safety, and emergency response provisions would remain in effect and apply to areas of the plant affected by implementation of the WQCF Master Plan. In addition, all training, safety, and emergency response provisions applicable to proposed wastewater collection system and recycled-water distribution system pipelines would remain in effect. Together, the Manteca WQCF's procedures manual and HMMP define employee training, protective equipment use, and other procedures that provide an adequate basis for properhandling of hazardous materials and mitigate this potential impact sufficiently. Implementation of the proposed project would not increase hazardous materials risks to plant workers, the general public, the collection system, or WQCF environment. Rather, the risk of release or exposure to acutely hazardous materials would be reduced with proposed project implementation, because of the reduction in the use of chlorine and sulfur dioxide resulting from conversion to UV disinfection. Furthermore, the WQCF managers would continue to enforce existing safety practices at the new facilities and new facility design and construction would require adherence to applicable building codes and fire codes.

Construction of pipelines for the wastewater collection system and recycled-water distribution system and WQCF facilities would involve the storage, use, and transport of hazardous materials. WQCF operation would also involve the routine transport of hazardous materials on and off the site. Transportation of hazardous materials on area roadways is regulated by the CHP and Caltrans, whereas use of these materials is regulated by DTSC, as outlined in Title 22 of the CCR. The City of Manteca, project consulting engineers, and project contractors would be required to use, store, and transport hazardous materials in compliance with federal, state, and local 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. Therefore, the project would be consistent with relevant City general plan policies that regulate the use of hazardous materials (Policies S-P-16 and S-P-17).

Because the City would ensure compliance 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 be unlikely with project development. Additionally, because adequate safety procedures and precautions are in place and would continue with implementation of the Manteca WQCF and Collection System Master Plan Updates, the potential for accidental release and exposure to hazardous materials would be considered **less than significant**.

IMPACT 4.6-2 Hazards and Hazardous Materials—Emission or Handling of Hazardous Materials or Waste Near a School. *Existing safety practices and health and safety programs currently in effect would continue to be implemented with expansion of the Manteca WQCF and Collection System Master Plan Updates. Because adequate safety procedures and precautions are in place and would continue with implementation of the Manteca WQCF and Collection System Master Plan Updates, and the project would reduce the use of acutely hazardous materials at the WQCF, this impact would be* ***less than significant****.*

In general, accident hazards and public health risks occur if industries using acutely hazardous materials are situated close to receptors such as schools, hospitals, residential areas or day care centers. Residential areas exist within 0.5 mile of the WQCF, whereas the nearest school and hospital are located approximately 0.75 mile from the WQCF. Sensitive receptors would not be affected by the proposed collection system and recycled-water distribution pipelines because the pipelines would be buried underground and would not convey hazardous materials.

Because the handling and storage of acutely hazardous materials (i.e., chlorine and sulfur dioxide) at the Manteca WQCF does not occur within one-quarter mile of off-site receptors, implementation of the proposed project would significantly reduce the use of acutely hazardous materials, and adequate safety procedures and precautions are in place for handling hazardous materials, impacts on off-site sensitive receptors would be **less than significant**.

IMPACT 4.6-3 Hazards and Hazardous Materials—Interference with an Adopted Emergency Response Plan or Emergency Evacuation Plan. *The Manteca WQCF has a Hazardous Materials Management Plan in place and implementation of this plan would continue with proposed project implementation. Also, the proposed project would not interfere with implementation of an adopted emergency response plan or emergency evacuation plan, and project contractors would be required to prepare a Construction Traffic Management Plan. Therefore, emergency response plan or emergency evacuation plan impacts would be* ***less than significant****.*

The HMMP was developed pursuant to guidelines provided by SJCOES. The plan provides instructions for reporting emergency events and notifying key response personnel and authorities in the event of a release, and methods to be used to mitigate a release, including spill containment, cleanup, and sources of technical advice. The project would not result in the construction of any permanent structures that would restrict emergency access to the WQCF, nor would construction result in the permanent blockage of any public roadways. The proposed WQCF improvements would not obstruct project area roadways, and standard construction practices would be employed to ensure that emergency access is provided at all times.

Pipeline and pumping station construction could temporarily partially obstruct project area roadways, which could increase response times for emergency vehicles (see Section 4.11, "Transportation and Circulation"). However, project contractors would be required to prepare a Construction Traffic Management Plan and submit the plan to the City of Manteca Public Works Department for review and approval. The plan would identify the timing of construction and the timing of elements that would result in the full or partial blockage of local roadways, and specify the measures that would be implemented to minimize traffic-related impacts.

Because the Manteca WQCF has an HMMP, implementation of the HMMP would continue with WQCF expansion, and the Manteca WQCF and Collection System Master Plans Update Project would not permanently interfere with emergency evacuation routes or emergency response plans, this impact would be **less than significant**.

IMPACT 4.6-4 Hazards and Hazardous Materials—Potential Wildfire Hazard. *The project area is not located in a designated wildland fire area or a High Fire Hazard Severity Zone. Therefore, the project would not expose people or structures to significant risk of loss or injury involving wildland fires. This impact would be* ***less than significant****.*

The California Department of Forestry and Fire Protection identify wildland fire areas and Very High Fire Hazard Severity Zones for all counties in California. None of these areas or zones are located in or near the City of Manteca (California Resources Agency 2003). In addition, the project area is located within and adjacent to established urban areas. Therefore, the project would not expose people or structures to significant risk of loss of injury involving wildland fires. This impact would be **less than significant**.

4.6.4 MITIGATION MEASURES

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

4.6-1. Creation of a Significant Hazard to the Public or the Environment.

4.6-2. Emission or Handling of Hazardous Materials or Waste Near a School.

4.6-3. Interference with an Adopted Emergency Response Plan or Emergency Evacuation Plan

4.6-4. Potential Wildfire Hazard.

4.6.5 LEVEL OF SIGNIFICANCE AFTER MITIGATION

All of the project's hazards and hazardous materials impacts would be less than significant. No mitigation measures are required.

4.7 GEOLOGY, SOILS AND SEISMICITY

This section describes current conditions in the project area relative to geology, soils, and seismicity; analyzes potential environmental impacts; and recommends mitigation measures to reduce significant or potentially significant impacts to less-than-significant levels. Paleontological impacts are addressed in Section 4.8, "Paleontological Resources."

4.7.1 ENVIRONMENTAL SETTING

PHYSIOGRAPHIC SETTING

The project area is located at the northern end of the San Joaquin Valley. Together, the San Joaquin Valley and the Sacramento Valley constitute the Great Valley of California. The Great Valley Geomorphic Province is located between the Sierra Nevada Geomorphic Province on the east and the Coast Range Geomorphic Province on the west.

The Great Valley is composed of thousands of feet of sedimentary deposits that have undergone periods of subsidence and uplift over millions of years. During the Jurassic (approximately 206 million years Before Present [B.P.]) and Cretaceous (approximately 144 million years B.P.) periods of the Mesozoic era, the Great Valley existed in the form of an ancient ocean. By the end of the Mesozoic era, the northern portion of the Great Valley began to fill with sediment as tectonic forces caused uplift of the basin. Geologic evidence suggests that the Sacramento Valley and San Joaquin Valley gradually separated into two separate water bodies as uplift and sedimentation continued. By the time of the Miocene epoch (approximately 24 million years ago), sediments deposited in the Sacramento Valley were mostly of terrestrial origin. In contrast, the San Joaquin Valley continued to be inundated with water for another 20 million years, as indicated by marine sediments dated to the late Pliocene epoch (approximately 5 million years ago). Most of the surface of the Great Valley is covered with Recent (Holocene) (less than 10,000 years ago) and Pleistocene (10,000 to 1.5 million years old) alluvium. This alluvium is composed of sediments from mountains of the Sierra Nevada to the east and the Coast Ranges to the west that were carried by water and deposited on the valley floor. Siltstone, claystone, and sandstone are the primary types of sedimentary deposits.

LOCAL GEOLOGY

The project vicinity spans the U.S. Geological Survey (USGS) Manteca and Lathrop 7.5-Minute Quadrangles. The topography of the project vicinity is relatively flat, with elevations ranging from approximately 20 feet above mean sea level in the western portion of the project area to approximately 50 feet above mean sea level in the eastern portion of the project area (a distance of approximately five miles).

Most of the sedimentary deposits in the project area accumulated in a marine environment during alternating cycles of deposition and erosion over many thousands of years. Fluctuations of glacial meltwaters in the Sierra Nevada account for the deposition of alluvial-fan deposits in the northern San Joaquin Valley, and are generally correlated with the Pleistocene-age Modesto (approximately 40,000 years B.P.) and Riverbank Formations (approximately 300,000 years B.P.). In addition, Holocene sediments are continually being deposited on the Valley Floor and in tributaries to the Sacramento-San Joaquin Delta as a result of sediment transport and deposition by rivers, streams, and creeks (Olmsted and Davis 1961, Atwater 1982, Helley and Harwood 1985, Page 1974). Near surface sediments at the Manteca wastewater treatment plant site have been deposited primarily during flood stages of the Stanislaus and San Joaquin River systems, prior to the arrival of present-day flood control systems (Kleinfelder 1997).

Much of the area surrounding the City of Manteca is covered by Holocene dune sand deposits (Wagner et al. 1991). Inland dunes usually exist in the form of ridges, small hills, and knolls found on ancestral lake beds and outwash plains.

Because the project would be located on relatively flat land in the San Joaquin Valley, and a review of geologic maps and literature indicates the project site is not located within or near a landslide hazard area, this issue will not be further addressed in this Draft EIR.

RECREATIONAL GEOLOGIC FEATURES

Recreational geologic resources typically include areas of rock or mineral collecting, volcanoes, surface hydrothermal features, or surface expression of geologic features unique enough to generate recreational interests of the general public (e.g., natural bridges, caves, features associated with glaciation, and geomorphic features such as waterfalls, cliffs, canyons, and badlands). Based on a review of available geological literature, topographic maps, and a field visit to the site, there are no known recreational geologic resources associated with the project area.

REGIONAL SEISMICITY AND FAULT ZONES

The northern San Joaquin Valley has generally not been seismically active in the last 10,000 years. Most faults in the project region with known or estimated activity during the Holocene epoch are generally located in the Bay Area, approximately 40 miles to the west, and lie within the Coast Ranges geomorphic province, as shown in Table 4.7-1.

Table 4.7-1
Regional Fault Activity During the Holocene Epoch

Faults Active in Holocene Time in the Vicinity of the Project Area	Distance from Project Area	Probable Maximum Magnitude[1]	Location
Great Valley	23 miles	6.7	Coast Ranges, western margin of San Joaquin Valley
Greenville/Marsh Creek	38 miles	6.9	Coast Ranges, Bay Area
Ortigalita	40 miles	6.9	Coast Ranges, Bay Area
Calaveras	60 miles	6.8	Coast Ranges, Bay Area
Hayward	63 miles	7.1	Coast Ranges, Bay Area
Concord	63 miles	6.9	Coast Ranges, Bay Area
Green Valley	65 miles	6.9	Coast Ranges, Bay Area
San Andreas (1838 Event)	65 miles	7.9	Coast Ranges, Bay Area

[1] A measure of earthquake size calculated on the basis of seismic moment called Moment Magnitude (Mw). The earthquake magnitude values here are expressed as Richter scale values. The Richter scale is a logarithmic scale that expresses the magnitude of an earthquake in terms of the amount of energy generated, with 1.5 indicating the smallest earthquake that can be felt, 4.5 an earthquake causing slight damage, and 8.5 a very damaging earthquake.
Source: Jennings 1994, Helley and Harwood 1987, Kleinfelder 2005

The fault closest to the project site that has been active during the Holocene epoch is the Great Valley Fault System, a series of blind-thrust faults located along the western edge of the San Joaquin Valley. A number of earthquakes have been attributed to this fault system during the last 100 years, including the 1892 Vacaville – Winters earthquake (although some researchers dispute the Great Valley fault as the source for this earthquake), the 1881 West San Joaquin Valley earthquakes, the 1983 Coalinga earthquake, and the 1985 Kettlemen Hills earthquake (Toppozada 1987, Kleinfelder 2005). Only the 1983 Coalinga earthquake resulted in surface ground rupture.

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is fault ground rupture, also called surface faulting. Surface ground rupture along faults is generally limited to a linear zone a few meters wide. Structures built over an active fault can be torn apart if the ground ruptures. The Alquist-Priolo Earthquake Fault Zoning Act is intended to prevent the construction of buildings used for human occupancy on the surface trace of active faults. There are no Earthquake Fault Zones subject to the Alquist-Priolo Act in Manteca (California Geological Survey 2005). Common secondary seismic hazards include ground shaking, liquefaction, and subsidence, which are discussed below.

SEISMIC GROUND SHAKING

The most important geologic hazard that could affect the project vicinity is the risk to life and property from an earthquake generated by active and potentially active faults in the Bay Area and along the western margin of the San Joaquin Valley.

Seismic ground shaking is the most likely seismic hazard to affect the project area. According to the California Building Standards Code (CBC), 1998 edition, the project area is located in Seismic Zone 3. This location implies a minimum horizontal acceleration of 0.3 g (where "g" is the acceleration of gravity) for use in earthquake resistant design.

Ground motions can be estimated by probability of occurrence at specified hazard levels. The intensity of ground shaking depends on the distance from the earthquake epicenter to the site, the magnitude of the earthquake, site soil conditions, and the characteristic of the source. The Probabilistic Seismic Hazard Assessment for the State of California (Petersen et al. 1996), published by the USGS and the California Geological Survey (formerly the California Department of Conservation, Division of Mines and Geology), identifies the seismic hazard based on a review of these characteristics and historical seismicity throughout California. The results of these studies suggest there is a 10% probability that the peak horizontal acceleration experienced at the site would exceed 0.2 g in 50 years. In addition, the California Geological Survey's Probabilistic Seismic Hazards Mapping Ground Motion webpage was consulted to estimate site-specific probabilistic ground acceleration for the project area. Based on the latitude and longitude for Manteca, peak horizontal ground acceleration with a 10% probability of being exceeded in 50 years was calculated for firm rock, soft rock, and alluvium. These calculations found that there is a 1-in-10 probability that an earthquake will occur within 50 years that will result in a peak level of ground shaking exceeding 0.28g on alluvium, 0.24g on soft rock, and 0.22g on firm rock (California Geological Survey 2006b). Damage to a single-family dwelling typically begins at 0.2 g (Rogers et al. 1996).

The CBC specifies more stringent design guidelines where a project would be located adjacent to Class "A" or "B" faults as designated by the California Probabilistic Seismic Hazard Maps (Cao et al. 2003). Faults with an "A" classification are capable of producing large-magnitude (M) events (M greater than 7.0), have a high rate of seismic activity (e.g., having slip rates greater than 5 millimeters per year), and have well constrained paleoseismic data (e.g., evidence of displacement within the last 700,000 years). Class "B" faults are those that lack paleoseismic data necessary to constrain the recurrence intervals of large-scale events. Faults with a "B" classification are capable of producing an event of magnitude 6.5 or greater. The Great Valley Fault System is a Type B fault. Based on preliminary segmentation of the Great Valley Fault System, a 30-kilometer-long segment with a characteristic earthquake magnitude of 6.7 (Richter scale) is indicated approximately 23 miles west of the project vicinity. A review of the available data indicates that no Class A or B faults are located within 20 miles of the project area.

No Seismic Hazard Zones have been identified for Manteca (California Geological Survey 2006a).

Table 4.7-2 shows the seismic source description, magnitude, and slip rate for various CBC fault classes.

Table 4.7-2 1998 California Building Code - Seismic Source Type			
Seismic Source Type	Seismic Source Description	Seismic Source Definition	
		Maximum Moment Magnitude, M	Slip Rate, SR (mm/year)
A	Faults that are capable of producing large-magnitude events that have a high rate of seismic activity	M * 7.0	SR * 5
B	All faults other than Types A and C	M * 7.0 M < 7.0 M * 6.5	SR < 5 SR > 2 SR < 2
C	Faults that are not capable of producing large-magnitude earthquakes and that have a relatively low rate of seismic activity	M < 6.5	SR * 2
Source: 1998 California Building Code			

GROUND FAILURE/LIQUEFACTION

Liquefaction is a process by which water-saturated materials (including soil, sediment, and certain types of volcanic deposits) lose strength and may fail during strong ground shaking. Liquefaction is defined as "the transformation of a granular material from a solid state into a liquefied state as a consequence of increased pore-water pressure" (Youd 1992). This behavior is most commonly induced by strong ground shaking associated with earthquakes. In some cases, a complete loss of strength occurs and catastrophic ground failure may result.

Soil liquefaction occurs when ground shaking from an earthquake causes a sediment layer saturated with groundwater to lose strength and take on the characteristics of a fluid, thus becoming similar to quicksand. There are four types of ground failure or collapse of soil structures that commonly result from liquefaction: lateral spread, flow failure, ground oscillation, and loss of bearing strength.

One consequence that may result from the occurrence of liquefaction is an associated surface expression. If the seismic event occurs over an extended duration, the liquefied soils may migrate toward the surface, resulting in ejection and subsequent sand boiling at the surface.

Liquefaction poses a hazard to engineered structures. The loss of soil strength can result in bearing capacity insufficient to support foundation loads, increased lateral pressure on retaining or basement walls, and slope instability. Factors determining the liquefaction potential of a given site are soil type, the level and duration of possible seismic ground motions, the type and consistency of soils, and the depth to groundwater. Loose sands and peat deposits are susceptible to liquefaction, whereas clayey silts, silty clays, and clays deposited in fresh water environments are generally stable under the influence of seismic ground shaking. Age also is a factor in the potential of soils to liquefy, with Holocene deposits (from approximately the last 10,000 years) being the most sensitive to liquefaction.

According to the geotechnical engineering report for the Wastewater Quality Control Facility (WQCF) site prepared by Kleinfelder (1997), groundwater was encountered in borings at depths of 8 to 12 feet below the existing site grade. In previous investigations, groundwater was encountered as high as three feet below grade. Based on field explorations, laboratory tests, and engineering analysis, the report found that the potential for liquefaction at the site exists. In addition, the report also states that the potential for differential settlement of surface structures due to liquefaction beneath the site is high due to the presence of loose clean sands and high groundwater. In a 2004 addendum to the 1997 report, it is reported that the potential for liquefaction generated by more distant faults to the east, west, and southwest is considered remote. However, test results show that

interbedded, two to five foot thick strata of medium-dense silty and “clean” sand within the upper 40 feet of subgrade soils may be susceptible to liquefaction (Kleinfelder 1997, 2004).

SUBSIDENCE, SETTLEMENT AND LATERAL SPREADING

Land surface subsidence can be induced by both natural and human phenomena. Natural phenomena include: subsidence resulting from tectonic deformations and seismically induced settlements; soil subsidence from consolidation, hydrocompaction, or rapid sedimentation; subsidence from oxidation or dewatering of organic-rich soils, and subsidence related to subsurface cavities. Subsidence related to human activity includes subsurface fluid or sediment withdrawal. Pumping of water for residential, commercial and agricultural uses from subsurface water tables causes more than 80% of the identified subsidence in the U.S. (Galloway et al. 1999).

Lateral spreading is the horizontal movement or spreading of soil toward an open face, such as a streambank, the open side of fill embankments, or the sides of levees. The potential for failure from lateral spreading is highest in areas where there is a high groundwater table, where there are relatively soft and recent alluvial deposits, and where creek banks are relatively high.

By 1970, subsidence in excess of one foot had affected one-half of the San Joaquin Valley (more than 5,200 square miles of farmland). The maximum subsidence, over 28 feet, was recorded near Mendota. Land subsidence in the San Joaquin Valley since the 1970s has generally slowed from reductions in groundwater pumping and the subsequent recovery of groundwater levels as a result of a greater emphasis on surface water irrigation. In the late 1980s, pumping of groundwater during a period of extended drought resulted in rapid decline in groundwater levels and renewed subsidence (Galloway et al. 1999).

TIDAL WAVES AND SEISMIC SEICHES

Earthquakes may affect open bodies of water in two ways: by creating seismic sea waves and by creating seiches. Seismic sea waves (often called “tidal waves”) are caused by abrupt ground movements (usually vertical) on the ocean floor in connection with a major earthquake. Because of the distance of the project area from the ocean (i.e., greater than 20 miles), seismic sea waves would not be a factor.

A seiche is a sloshing of water in an enclosed or restricted water body such as a basin, river, or lake. It is caused by earthquake motion; the sloshing can occur for a few minutes or several hours. In 1868, for example, an earthquake along the Hayward fault in the San Francisco Bay area is known to have generated a seiche along the Sacramento River.

The project area is approximately two miles from the San Joaquin River, and is located in an area of relatively flat topography. A high percentage of Delta levees are subject to overtopping and subsequent failure, and seiches in the Delta could be damaging to the areas protected by those levees. Although the San Joaquin River is lined by levees in the region, the risk of damage to the project area from a levee break is minimal. None of the earthquakes caused by faults listed in Table 4.7-1 are known to have resulted in seismic seiche events along the river. In addition, the potential for damaging seiches is considered very low to negligible because of the absence of a deep, large open body of water adjacent to or in the project area. Therefore, the risk of seiche is considered low.

SOIL RESOURCES

Soil properties can affect the construction and maintenance of roads, building foundations, and infrastructure. Among these properties are permeability, shrink-swell potential, water retention capacity, and corrosion potential.

The project area is located at the northern end of the San Joaquin Valley, approximately two miles east of the San Joaquin River. Surface soils at the project area consist of terrace deposits formed by ancient channels of the Stanislaus River (Atwater 1982) and more recent alluvial deposits of the San Joaquin River. These soils are

moderately-deep to very-deep, and drainage ranges from partially drained to moderately well-drained on the majority of these soils. The water table is relatively high (City of Manteca 2003a).

Identification of soil types and their distribution was accomplished primarily through a review of maps provided by the U.S. Soil Conservation Service (now called the Natural Resources Conservation Service [NRCS]). Exhibit 4.7-1 provides a detailed map of the surficial soils in the project area. Table 4.7-3 provides a detailed summary of the physical and chemical characteristics of each soil type identified from the project area. A discussion of soil characteristics is presented below.

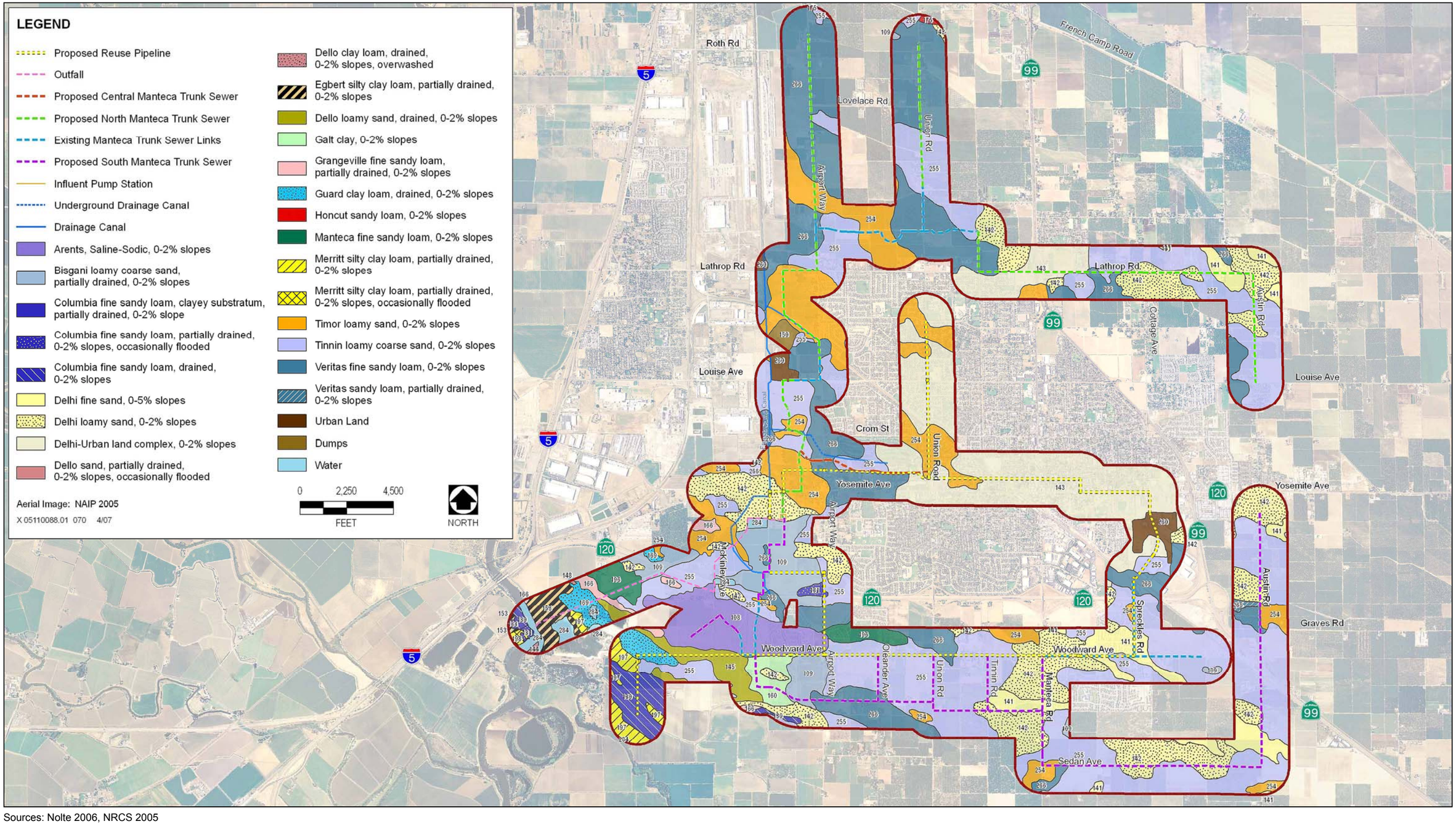
108 Arents, 0 to 2% slopes—This soil is found in areas on alluvial fans or fan terraces where ripping, cutting, or filling has altered the landscape. Included in this unit are small areas of Manteca, Timor, and Bisgani solid and medium textured soils that do not have a hardpan and are not saline-sodic. They are moderately deep or deep to a hardpan or are very deep. The surface layer is grayish brown and brown sandy loam or loam about 10 inches thick. The upper 30 inches of the underlying material is mottled loam and clay loam, and the next 10 inches is a cemented hardpan. The lower part to a depth of 60 inches is stratified loamy sand and sandy loam. The soils are saline-sodic throughout. These soils are somewhat poorly drained and nearly level. Permeability is moderate or moderately slow. Runoff is slow, and the hazard of water erosion is slight. The soils are subject to rare flooding. This soil type has a low shrink-swell potential. Most areas are used for irrigated crops or pasture, and this unit may provide wetland functions and values. Limitations include a high water table.

109 Bisgani loamy course sand, 0 to 2% slopes—This soil is found on low alluvial fans and formed in alluvium derived from granite rock sources. The soil is very deep and is poorly drained. The surface layer is gray loamy course sand about 11 inches thick. The underlying material to about 60 inches is mottled loamy course sand. In some areas, the surface layer is loamy sand. Included in the unit are small areas of Grangville, Manteca, and Veritas soils. Permeability is rapid in this soil. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil type has a low shrink-swell potential. Most areas are used for irrigated crops. A few areas are used as irrigated pasture or for homesite development. If used for homesite development, the main limitations are the high water table and the rapid permeability.

141 Delhi Fine Sand, 0 to 5% slopes—This soil is very deep, somewhat excessively drained, nearly level soil is on dunes. It formed in wind-modified alluvium derived from granite rock sources. The surface layer is typically fine sand about 10 inches thick. The underlying material to a depth of about 60 inches is fine sand. In some areas the surface layer is loamy sand or loamy course sand. Included in the unit are small areas of Tinnin and Veritas soils. Permeability is rapid, runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very severe. This soil type has a low shrink-swell potential. Most areas are used for irrigated crops, orchards, and vineyards, and a few areas are used for homesite development. The main limitation for homesite development is the rapid permeability in the substratum.

142 Delhi Loamy Sand, 0 to 2% slopes—This soil is found on floodplains, alluvial fans, and terraces, and formed in wind modified alluvium derived from granitic rock sources. Delhi loamy sand is a very deep, somewhat excessively drained that grades downward from a brown sand, fine sand, loamy fine sand, or loamy sand to a light yellowish-brown sand or loamy sand at depths of 70 inches. Runoff is negligible to slow, permeability is rapid, and there is only a slight hazard of water erosion. However, the wind erosion hazard is severe. This soil type has a low shrink-swell potential. In San Joaquin County, the primary use for Delhi loamy sand is orchards, vineyards, and alfalfa.

143 Delhi-Urban Land Complex, 0 to 2% slopes—This nearly level map unit is on dunes, and is 50 percent Delhi loamy sand and 35 percent urban land. The soil is very deep and somewhat excessively drained. It formed in wind-modified alluvium derived from granitic rock sources. The surface layer is typically loamy sand about 16 inches thick. The upper 10 inches of the underlying material is loamy sand, and the lower part to a depth of 60 inches is pale brown sand. Permeability is rapid, runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil type has a low shrink-swell potential. Most areas of this unit are used for urban development, and a few are used for irrigated crops, orchards, or vineyards.



Sources: Nolte 2006, NRCS 2005

Project Area Soils **Exhibit 4.7-1**

Table 4.7-3
Soil Mapping Unit Descriptions

Map[1]	Soil Series Name	Depth (inches)	USDA texture	Shrink-Swell Potential	Permeability (in/hr)	Erosion Factors[2]		Wind Erodibility Group[3]	pH	Plasticity Index[4]
						K	T			
108	Arents	no data	no data	no data	no data	no data		no data	no data	no data
109	Bisgani	0–11	Loamy coarse sand	Low	6.0–20	0.17	5	2	7.4–8.4	NP
		11–60	Coarse sand, loamy sand, loamy course sand	Low	6.0–20	0.17			7.4–8.4	NP
141	Delhi	0–10	Fine sand	Low	6.0–20	0.20	5	1	6.1–7.8	NP
		10-60	Sand, loamy sand, fine sand	Low	6.0–20	0.20			6.1-7.8	NP
142	Delhi	0-16	Loamy sand	Low	6.0–20	0.24	5	2	6.1–7.8	NP
		16-26	Loamy sand, loamy fine sand	Low	6.0–20	0.24			6.1-7.8	NP
		26-60	Sand, loamy sand, fine sand	Low	6.0-20	0.20			6.1-7.8	NP
143	Delhi	0–16	Loamy sand	Low	6.0–20	0.24	5	2	6.1–7.8	NP
		16–26	Loamy sand, loamy fine sand	Low	6.0–20	0.24			6.1-7.8	NP
		26-60	Sand, loamy sand, fine sand	Low	6.0-20	0.20			6.1-7.8	NP
160	Galt	0-25	Clay	High	0.06-0.2	0.24	2	8	6.6-7.3	20-40
		25-34	Clay, silty clay	High	0.06-0.2	0.24			6.6-8.4	20-40
		34-60	Cemented	---	---	---			---	---
254	Timor	0–14	Loamy sand	Low	6.0–20	0.17	3	2	6.6–7.8	NP
		14–56	Loamy sand, loamy coarse sand, sand	Low	6.0–20	0.17			7.4–8.4	NP
		56–60	Cemented	---	---	---			---	---

Table 4.7-3
Soil Mapping Unit Descriptions

Map[1]	Soil Series Name	Depth (inches)	USDA texture	Shrink-Swell Potential	Permeability (in/hr)	Erosion Factors[2]		Wind Erodibility Group[3]	pH	Plasticity Index[4]
						K	T			
255	Tinnin	0–28	Loamy coarse sand	Low	6.0–20	0.17	5	2	6.1–7.8	NP
		28–53	Loamy coarse sand, loamy sand	Low	6.0–20	0.17			6.1–7.8	NP
		53–75	Loamy coarse sand, loamy sand, sand	Low	6.0–20	0.17			6.6–8.4	NP
260	Urban Land	---	---	---	---	---	---	---	---	---
266	Veritas	0–15	Fine sandy loam	Low	2.0–6.0	0.28	3	3	7.4–8.4	NP-10
		15–54	Sandy loam, fine sandy loam	Low	2.0–6.0	0.32			7.4–8.4	NP-10
		54–70	Cemented	---	---	---			---	---

[1] Soil map numbers refer to numbers shown on Exhibit 4.7-1 (Soils Map of Project Area).
[2] K is a measurement of relative susceptibility to sheet and rill erosion by water. It ranges from 0.10 to 0.64, with lower values representing a lower susceptibility to erosion.
T represents soil loss tolerance, which is defined as the maximum rate of soil erosion (wind and water) without reducing crop production or environmental quality. Values range from 1 to 5 tons of soil loss per acre per year, with 5 representing soils less sensitive to erosion.
[3] A measure of the susceptibility of soil to movement by wind. Groups are 1 through 8, with 8 being soil types not subject to soil blowing because of coarse fragments on the surface or surface wetness.
[4] Soils with a high plasticity index have a wide range of moisture content in which the soil performs as a plastic material. Larger PI values (e.g. 20-40) indicate highly plastic soils.
NP=Not plastic
--- Either not measured or not applicable.
Source: USDA Soil Conservation Service 1992.

153 Egbert silty clay loam, partially drained, 0 to 2% slopes—This very deep, poorly drained, nearly level soil is on flood plains. Permeability is slow in the Egbert soil. Available water capacity is very high. The shink-swell capacity is high. Most areas are used for irrigated crops, and a few areas are used for homesite development.

160 Galt Clay, 0 to 2% slopes—This moderately well drained, nearly level soil is on basin rims and in basins, and is formed in alluvium derived from mixed rock sources. The surface layer is grayish brown and dark grayish brown clay about 25 inches thick, and the upper 9 inches of the subsoil is dark grayish brown clay. The lower part to a depth of 60 inches is a variegated light yellowish brown, dark grayish brown, and white, weakly cemented hardpan. Permeability is slow, and the shrink-swell potential is high. Depth to the water table is more than six feet, but water may be very briefly perched above the hardpan. Runoff is slow, and the hazard of water erosion is slight. Most areas are used for irrigated crops, and a few areas are used as irrigated pasture or for homesite development.

169 Guard clay loam, drained, 0 to 2% slopes—This very deep, poorly drained, nearly level soil is formed in alluvium derived from mixed rock sources. Permeability is slow in the Guard soil and available water capacity is high. Most areas are used for irrigated crops.

254 Timor Loamy Sand, 0 to 2% slopes—This soil type is found on low fan terraces, and formed from alluvium derived from granitic rock. Timor loamy sand grades downward from a grayish brown loamy sand to a light gray, strongly cemented to indurated hardpan at depths ranging from 30 to 60 inches below the surface. Water may be perched above the hardpan following winter storm events, and during years of heavy rainfall, the soil is subject to periodic flooding. The soil is moderately well drained, runoff is slow, and there is only a slight hazard of water erosion. However, the wind erosion hazard is severe. This soil type has a low shrink-swell potential. The extremely rapid permeability rate makes this soil unsuitable for septic systems. The primary use of this soil type in San Joaquin County is irrigated crops or irrigated pasture.

255 Tinnin Loamy Coarse Sand, 0 to 2% slopes—Tinnin loamy coarse sand is a deep, well drained soil found on alluvial fans, and is derived from granitic rock sources. The soil grades downward from a grayish brown loamy coarse sand to a pale brown mottled loamy coarse sand at depths of 75 inches. Runoff is slow and there is only a slight hazard of water erosion. However, the wind erosion hazard is severe. This soil type has a low shrink-swell potential. The extremely rapid permeability rate makes this soil unsuitable for septic systems. The primary use of this soil type in San Joaquin County is irrigated crops, orchards, or vineyards.

260 Urban Land—Urban land consists of closely built-up areas in cities where streets, parking lots, buildings, and other structures cover more than 85 percent of the surface.

266 Veritas Fine Sandy Loam, 0 to 2% slopes—This moderately well-drained soil is found on low fan terraces, and formed from alluvium derived from mixed rock sources. The soil grades downward from a brown fine sandy loam to a grey, cemented hardpan at a depth of approximately 70 inches below the surface. A hardpan is present at depths of 40 to 60 inches below the surface. Water may be perched above the hardpan following winter storm events, and during years of heavy rainfall, the soil is subject to periodic flooding. Runoff is slow and there is only a slight hazard of water erosion. Wind erosion poses a moderate hazard. This soil type has a low shrink-well potential. The primary use of Veritas fine sandy loam in San Joaquin County is irrigated crops, orchards, or vineyards.

SHRINK-SWELL POTENTIAL

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture; soils swell when wet and shrink when dry. If the shrink-swell potential is rated moderate to high, volume changes can result in damage over time to building foundations, underground utilities, and other subsurface facilities if they are not designed and constructed appropriately to resist the changing soil conditions. Soils with high clay content tend to be most affected by shrink and swell. The potential for soil to undergo shrink and swell is greatly enhanced by the presence of a fluctuating, shallow groundwater table. Volume changes of expansive soils can result in the

consolidation of soft clays following the lowering of the water table or the placement of fill. The Galt Clay soil type south of the WQCF site (see Exhibit 4.7-1) is considered expansive because of its high clay content, high plasticity index, and high shrink-swell potential (NRCS 1992). In addition, the Arents soil type south of the WQCF, and the Guard the Egbert soil types along the effluent outfall pipeline alignment are also considered expansive soils (San Joaquin County 1999).

SEEPAGE AND SOIL MOISTURE

As described above, groundwater at the WQCF site was encountered at depths of 8 to 12 feet below the existing site grade and was encountered as high as three feet below grade in previous investigations. Throughout the project area, soil permeability is generally rapid, but surface runoff is slow. Combined with high groundwater levels during the winter and spring months, slow surface runoff could create saturated surface soil conditions and high soil moisture content.

CORROSION POTENTIAL

Corrosion is the gradual degradation of materials through electrochemical processes resulting from the interaction between chemical properties of the soil (e.g., pH, resistivity, and sulfate and chloride concentrations) and metal, concrete, or stone. Based on a review of available geotechnical reports, no soil testing to evaluate the potential for corrosion has been conducted at the WQCF site and along proposed collection system alignments. In addition, it does not appear that any laboratory testing by a corrosion engineer has been completed, so no definitive conclusion can be reached regarding the soil corrosion potential in the project area.

MINERAL RESOURCES

There are a number of natural gas fields within San Joaquin County, although the majority are located in and around the Sacramento-San Joaquin River Delta. The project area is approximately 4 miles southeast of Lathrop Gas, a large natural gas field that was actively producing 1,121,100 Mcf (a unit of measurement equal to 1,000 cubic feet) in 1998. McMullin Ranch Gas, approximately 2 miles south of the project site, is another large natural gas field which produced 63,258 Mcf in 1998. Given the uncertainty in locating oil and gas reserves, the high cost of exploratory well drilling, the fact that the project area does not lie within an existing oil or gas production field, it is unlikely that natural gas reserves would be encountered.

In compliance with the California Surface Mining and Reclamation Act (SMARA), the California Department of Conservation, Division of Mines and Geology (CDMG) has established the classification system shown in Table 4.7-4 to denote both the location and significance of key extractive resources. Lands are included in one of four categories based on available information indicating their potential to contain mineral deposits. Not all lands in the state have been classified by the CDMG. Mineral Resource Zones (MRZs) have been designated to indicate the significance of mineral deposits.

Table 4.7-4
CDMG Mineral Land Classification System

Classification	Description
MRZ-1	Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence
MRZ-2	Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists
MRZ-3	Areas containing mineral deposits, the significance of which cannot be evaluated from existing data
MRZ-4	Areas where available data is inadequate for placement in any other MRZ zone

Source: CGS 2000

According to the CDMG, the project area is classified as MRZ-3, an area where the significance of mineral deposits cannot be evaluated from existing data. The closest sand and gravel mines in the vicinity of the project area are both owned by Brown Sand, Inc. and have recently ceased operations: the Oakwood Lake Pit located on Woodward Avenue in Manteca, and the Mossdale Ranch site located in Lathrop, approximately 2 miles west of the project area.

REGULATORY SETTING

Federal Earthquake Hazards Reduction Act

In October 1997, the U.S. Congress passed the Earthquake Hazards Reduction Act to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." To accomplish this, the Act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA), by refining the description of the agency responsibilities, program goals, and objectives.

NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRPA designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Other NEHRPA agencies include the National Institute of Standards and Technology, National Science Foundation, and U.S. Geological Survey.

California Building Standards Code

The State of California provides minimum standard for building design through the California Building Standards Code (California Code of Regulations, Title 24). Where no other building codes apply, Chapter 29 regulates excavation, foundations, and retaining walls. The California Building Standards Code (CBC) also applies to building design and construction in the state and is based on the federal Uniform Building Code (UBC) used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC has been modified for California conditions with numerous more detailed and/or more stringent regulations.

The State earthquake protection law (California Health and Safety Code 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, and Appendix Chapter A33 regulates grading activities, including drainage and erosion control, and construction on unstable soils, such as expansive soils and liquefaction areas.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code Section 2690-2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

Alquist-Priolo Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed by the California Legislature to mitigate the hazard of surface faulting to structures. The main purpose of the act is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most development in fault zones established by the State Geologist. Before a project can be permitted in a designated Alquist-Priolo Fault Study Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

California Surface Mining and Reclamation Act

The California Surface Mining and Reclamation Act (SMARA) was enacted by the State Legislature to regulate activities related to mineral resource extraction. The Act requires the prevention of adverse environmental effects caused by mining, the reclamation of mined lands for alternative land uses, and the elimination of public health and safety hazards from the effects of mining activities. At the same time, SMARA encourages both the conservation and production of extractive mineral resources, requiring the State Geologist to identify and attach levels of significance to the State's varied extractive resource deposits. Under SMARA, the mining industry in California must adequately plan for the reclamation of mined sites for beneficial uses and provide financial assurances to guarantee that the approved reclamation will actually be implemented. The requirements of SMARA must be implemented by the local lead agency with permitting responsibility for the proposed mining project.

National Pollutant Discharge Elimination System Permit

In California, the State Water Resources Control Board administers the federal Environmental Protection Agency promulgated regulations (55 CFR 47990) requiring the permitting of stormwater-generated pollution under the National Pollutant Discharge Elimination System (NPDES). In turn, the Board's jurisdiction is administered through Regional Water Quality Control Boards (RWQCBs). Pursuant to these federal regulations, an operator must obtain a General Permit under the NPDES Stormwater Program for all construction activities with ground disturbance of one acre or greater. The General Permit requires the implementation of Best Management Practices (BMPs) to reduce pollutant loads into the waters of the State and measures to reduce sediment and erosion control. In addition, a Storm Water Pollution Protection Plan (SWPPP) must be prepared. The SWPPP addresses water pollution control during construction. SWPPPs require that all storm water discharges associated with construction activity, where clearing, grading and excavating results in soil disturbances must by law, be free of site pollutants.

City of Manteca General Plan

Geologic and Seismic Safety

The Safety Element of the City of Manteca General Plan (City general plan) outlines goals and policies associated with geology and soils. The following policies relate to the project:

- **Policy S-P-1:** The City shall require preparation of geological reports and/or geological engineering reports for proposed new development located in areas of potentially significant geological hazards, including potential subsidence (collapsible surface soils) because of groundwater extraction.

- **Policy S-P-3:** The City shall require new development to mitigate the potential impacts of seismic induced settlement of uncompacted fill and liquefaction (water-saturated soil) because of the presence of a high water table.

- **Policy S-P-5:** The City shall ensure that all public facilities, such as buildings, water tanks, and reservoirs, are structurally sound and able to withstand seismic shaking and the effects of seismically induced ground failure.

The Safety Element of the City general plan further states that all new development shall comply with the current CBC requirements and with California Health and Safety Code Section 19100 et seq. (Earthquake Protection Law).

Soils and Erosion Control

The Resource Conservation Element of the City general plan contains the following policy related to the project:

- **Policy RC-P-10:** Minimize soil erosion and loss of topsoil from land development activities, wind, and water flow.

The Resource Conservation Element of the City general plan further states that all new development shall comply with the current CBC requirements for construction standards for specific soil types, and with CBC Chapter 70 regulating grading activities including drainage and erosion control. The City requires site-specific land management and development practices for proposed development projects, including appropriate mitigation measures to avoid or reduce erosion.

Grading Permits

In the City of Manteca, grading and construction are regulated through grading permits in compliance with the requirements of the most current version of the California Building Standards Code.

4.7.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Evaluation of potential geologic and soil impacts was based on a review of documents pertaining to the project area, including the San Joaquin County General Plan 2010 (San Joaquin County 1992), the City of Manteca General Plan 2023 (2003b), geotechnical reports prepared by Kleinfelder, field review of the proposed project site, geologic and soils maps, and published and unpublished geologic literature. The San Joaquin County and City of Manteca general plans are available for review at the City of Manteca Community Development Department, and project-related geotechnical reports are available for review at the City of Manteca Public Works Department. Impacts related to geology and soils that would result from implementation of the proposed project were identified by comparing existing data and environmental documents.

THRESHOLDS OF SIGNIFICANCE

For the purpose of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines. A geology and soils impact is considered significant if implementation of the proposed project would do any of the following:

- expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving:
    - rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;

- strong seismic ground shaking;
- seismic-related ground failure, including liquefaction;
- landslides; or
- seismically-induced tidal waves or seiches;

- result in substantial soil erosion or loss of topsoil;
- be located on a geologic unit or soil that is unstable, or that would become unstable as a result of a project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, or liquefaction or collapse;
- be located on expansive soil, as defined in Table 18-1-B of the UBC (1997), creating substantial risks to life or property;
- have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water;
- result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state;
- result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan; or
- result in the destruction, covering, or modification of unique geologic, physical, or recreational features.

IMPACT ANALYSIS

The proposed project would have no impact associated with the following issues, and these issues will not be analyzed further in this Draft EIR:

- **Fault Ground Rupture:** There are no known active faults crossing the project area and the area is not located in an Alquist-Priolo Special Study Zone; therefore, fault ground rupture is unlikely.
- **Landslide:** Landsliding may result from strong ground shaking. Based on topographic and soil data, the risk of landslides is considered negligible for the project area.
- **Tsunamis:** The potential for tsunamis at the proposed project area is considered negligible because of the distance from the San Francisco Bay and the Pacific Ocean.
- **Seiche:** Seiche is an oscillation within an enclosed or restricted body of water caused by moderate ground motion, such as from an earthquake. The potential for damaging seiches is considered very low to negligible because of the absence of a deep, large open body of water adjacent to or in the project area.
- **Septic systems:** The proposed project does not include and would not use septic tanks or alternative wastewater disposal systems.

IMPACT 4.7-1 Geology, Soils, and Seismicity — Risks to People and Structures Caused by Strong Seismic Ground Shaking. *The project area is approximately 23 miles from the nearest potentially active fault and is located in CBC Seismic Zone 3. The proposed facilities would be designed to meet or exceed current state engineering and design criteria. Further, although not required by the CBC, the City would design its wastewater treatment facilities to protect against severe seismic events and natural disasters. Therefore, construction of the proposed project would not expose people and structures to seismic-related structural and nonstructural damage and associated hazards. This would be a* ***less-than-significant*** *impact.*

According to the California Geological Survey's Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, there are no type "A" or "B" faults located within 20 miles of the project area. The area is classified as being in Seismic Zone 3 in the 1997 edition of the UBC and the 1998 edition of the California Building Standards Code (CBC); for this reason, the level of anticipated seismic ground shaking is lower at the project area than in many areas within the state of California. The nearest potentially active fault is the Great Valley fault system, approximately 23 miles from the project area, which is estimated to have a maximum credible earthquake of 6.7 on the Richter scale.

Seismic activity in the nine-county San Francisco Bay Area (San Andreas, Hayward, and Calaveras faults) and the Great Valley Fault System could generate strong ground shaking in the project area. Because of this potential fault activity, ground shaking is a hazard for facilities in the San Joaquin Valley. Intensity of the ground shaking would depend on the magnitude of the earthquake, the distance from the epicenter, and the duration of shaking. The damage sustained and the degree of hazard depends on the seismic hazards of each specific site, the type of structure and its building materials, and construction quality. The project involves the construction of wastewater treatment plant improvements, trunk sewers, pumping stations, and an outfall pipeline. The proposed development would be anticipated to experience at least one major earthquake during the operational lifetime of the project. Although the project area would not likely experience a fault rupture, ground shaking could cause structural damage to buildings, wastewater treatment structures, pipelines, and other permanent improvements proposed as part of the project.

The City of Manteca and project engineers would be required to comply with the provisions of the CBC. Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure and combined with the gravity forces of dead-and-live loads. The CBC-prescribed lateral forces generally are substantially smaller than the expected peak forces that would be associated with a major earthquake. Therefore, when built according to CBC standards, structures are anticipated to:

- resist minor earthquakes without damage,
- resist moderate earthquakes without structural damage but with some nonstructural damage, and
- resist major earthquakes without collapse but with some structural as well as nonstructural damage.

Conformance to the current building code standards does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure would not collapse or cause loss of life in a major earthquake.

At this time, the CBC requirements (based on the probabilistic seismic event) are considered the design minimum. Because of the relatively close presence of the Great Valley fault, it is conceivable that the project area may experience ground shaking more severe than the CBC-specified ground shaking (produced by the more distant Greenville/March Creek fault), but the probability of occurrence is lower. In the event of a moderate to major seismic event along the Great Valley fault, ground shaking could result in lateral forces exceeding the capabilities of structures built to minimum CBC design standards.

Given these conditions, if project structures and facilities are not designed or constructed appropriately, a large seismic event could expose WQCF, pumping station, wastewater collection system, and recycled water

distribution system workers to a substantial risk of loss, injury, or death. The City's engineering design process for the project would ensure the development of structures that meet or exceed current state engineering and design standards. The CBC allows facilities to be designed using an alternative design basis from an approved national standard. For concrete tanks and similar structures, standard practice is to use ACI 350, "Code Requirements for Environmental Structures," in conjunction with ACI 350.3 "Seismic Design of Liquid-Containing Structures." Although not required by the code, the City designs wastewater treatment facilities as "essential facilities" and uses corresponding importance factors. An essential facility is defined by the CBC as a structure that is necessary for emergency operations subsequent to a natural disaster. This results in 25–50% higher structural design strengths. This same approach is used for the design of all tank structures under the latest version of ACI 350 and ACI 350.3, thereby reducing the inelastic damage that is likely to be seen in a major earthquake event. Because the City designs wastewater treatment facilities as "essential facilities" with 25–50% higher structural design strengths, construction of the proposed project would not expose people or structures to seismic-related structural and nonstructural damage and associated hazards. This would be a **less-than-significant** impact.

IMPACT 4.7-2 Geology, Soils, and Seismicity — Risks to People and Structures Caused by Seismic-Related Ground Failure. *Based on the underlying soil conditions in the project area and the shallowness of the groundwater table, construction of the proposed project has the potential to expose people or structures to seismic-related ground failure, including liquefaction and differential settlement. Therefore, this impact is considered potentially significant.*

Because the project area is located in the CBC's Seismic Zone 3, the level of anticipated seismic ground shaking is lower than for many other areas in California. However, strong ground shaking (corresponding to zone VII to VIII on the Modified Mercalli Scale) may still occur as a result of large, distant earthquakes, causing general alarm and moderate damage. In addition, Seismic Zone 3 implies a minimum horizontal acceleration of 0.3 g for use in earthquake resistant design (where damage to a single-family dwelling typically begins at 0.2 g).

Liquefaction occurs when saturated soil loses shear strength and deforms as a result of increased pore water pressure induced by strong ground shaking during an earthquake. As the excess pore pressure dissipates, volume changes are produced within the liquefied soil layer, which can manifest at the ground surface as settlement of structures, floating of buried structures, and failure of retaining walls. Soil types most susceptible to liquefaction are saturated, loose, and sandy soils. According to Kleinfelder reports (1997 and 2004), subsurface soils at the WQCF site include interbedded medium-dense silty and "clean" sand within the upper 40 feet of subgrade soils. In addition, groundwater levels were found to be high. Therefore, interbedded sand layers at the WQCF and pumping station sites, and along wastewater collection system, effluent outfall pipeline, and recycled water distribution system pipeline alignments may be susceptible to liquefaction in the event of a large magnitude earthquake along the nearest segments of the Great Valley fault. This potential for liquefaction would not be expected to be widespread in the project area given the discontinuous and localized nature of these sand layers at the WQCF site.

Soil permeability at the WQCF site is rapid, but surface runoff is very slow. High groundwater levels during the winter and spring months in combination with slow surface runoff could create saturated surface soil conditions and high soil moisture content. During strong ground shaking, saturated soils at the WQCF site could undergo liquefaction.

Given these conditions, if project structures and facilities are not designed or constructed appropriately, a large seismic event could expose WQCF, pumping station, wastewater collection system, and recycled water distribution system workers to a substantial risk of loss, injury, or death. Because strong ground shaking may occur at the project area as a result of distant earthquakes, subsurface soils at the WQCF site include interbedded medium-dense silty and "clean" sand, and project area groundwater levels are high, construction of the proposed project has the potential to expose people or structures to seismic-related ground failure, including liquefaction and differential settlement. This would be a **potentially significant** impact.

IMPACT 4.7-3 Geology, Soils, and Seismicity — Construction-Related Erosion Hazards. *Based on soil types and topography, excavation, movement, and grading of soil could result in erosion during project construction, particularly during periods of strong winds. This impact is considered* ***potentially significant****.*

Soils in the project area consist of a variety of soil types, including Bisgani loamy course sand, Delhi fine sand, Delhi loamy sand, Delhi-Urban land complex, Timor loamy sand, and Tinnin loamy course sand. Water erosion hazards associated with these soil types are slight. In addition, the relatively flat topography of the project area would minimize the potential for water erosion during a storm event. However, according to the NRCS (see Table 4.7-3), the wind erosion hazard associated with these soil types in the project area is severe, and could result in a loss of topsoil during the spring and summer months.

Project construction activities would involve trenching and the excavation and grading of soil. These activities could result in localized erosion during the construction buildout period. Construction activities would remove any vegetative cover and could expose disturbed areas to wind and storm events. Because the wind erosion hazard associated with project area soil types is severe, and construction activities could expose disturbed areas to wind and storm events, this would be a **potentially significant** impact.

IMPACT 4.7-4 Geology, Soils, and Seismicity — Risks to People and Structures Resulting from Unstable Soil Conditions. *Soils in the southwest portion of the project area have a very high clay content and are rated by the NRCS as highly plastic with a high shrink-swell potential. Therefore, it is possible that expansive soils identified in the southwest portion of the project area could damage wastewater collection system, effluent outfall, and recycled water distribution system pipelines and related structures. Because expansive soils are located in the southwest portion of the project area and groundwater levels in the project area are high, this would be a* ***potentially significant*** *impact.*

Expansive soils shrink and swell as a result of moisture change. These volume changes can result in damage over time to building foundations, underground utilities, and other subsurface facilities if they are not designed and constructed appropriately to resist the changing soil conditions. Volume changes of expansive soils also can result in the consolidation of soft clays following the lowering of the water table or the placement of fill.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture; soils swell when wet and shrink when dry. Soils with high clay content tend to be most affected by shrink and swell. The potential for soil to undergo shrink and swell is greatly enhanced by the presence of a fluctuating, shallow groundwater table.

The Galt clay soil type south of the WQCF site (Exhibit 4.7-1) is considered expansive because of its high clay content, high plasticity index, and high shrink-swell potential (NRCS 1992). In addition, the Arents soil type south of the WQCF, and the Guard the Egbert soil types along the effluent outfall pipeline alignment are also considered expansive soils (San Joaquin County 1999), and groundwater levels in the project area were found to be high (City of Manteca 2003a).

Therefore, it is possible that expansive soils identified in the southwest portion of the project area could damage wastewater collection system, effluent outfall, and recycled water distribution system pipelines and related structures. Because expansive soils are located in the southwest portion of the project area and groundwater levels in the project area are high, this would be a **potentially significant** impact.

IMPACT 4.7-5 Geology, Soils, and Seismicity — Risk of Structural Damage Caused by Corrosive Soils. *The corrosiveness of project area soils was not tested to determine whether the soils could cause damage to buried concrete slabs and foundations and buried metal pipes during the operation of the proposed project. However, because the City's engineering design process for the project would ensure the identification of corrosive soils and the implementation of project designs that would minimize damage to buried concrete slabs, foundations, or buried metal pipes, this impact would be* ***less than significant****.*

Corrosion is the gradual degradation of materials through electrochemical processes resulting from the interaction between chemical properties of the soil (e.g., pH, resistivity, and sulfate and chloride concentrations) and metal, concrete, or stone. Based on a review of available geotechnical reports, no soil testing to evaluate the potential for corrosion has been conducted at the WQCF site and along proposed wastewater collection system, recycled water distribution system, and effluent outfall pipeline alignments. In addition, it does not appear that any laboratory testing by a corrosion engineer has been completed, so no definitive conclusion can be reached regarding the soil corrosion potential in the project area. However, the City's engineering design process for the project would ensure the identification of corrosive soils and the implementation of project designs that would minimize damage to buried concrete slabs, foundations, and buried metal pipes. During the project design process, subsurface soil conditions would be characterized and a design-level geotechnical investigation conducted. Multiple soil borings would be staggered throughout the project site or along a pipeline route to capture any change in local soil conditions. Each soil boring would be logged by a geotechnical engineer and soil samples would be submitted for subsequent laboratory analysis of specific engineering properties and corrosivity. This process would reveal the presence or absence of problem soils, and would result in the development of specific engineering recommendations. For pipeline projects, recommendations would be made in the areas of trench design, backfill material, and pipeline selection. Methods to address corrosive soils include the use of cathodic protection, pipeline coatings or wrappings, use of non-metallic pipeline materials, and/or sacrificial anodes to eliminate long-term maintenance concerns. Because the City's engineering design process for the project would ensure the identification of corrosive soils and the implementation of project designs that would minimize damage to buried concrete slabs, foundations, or buried metal pipes, , this impact would be **less than significant**.

IMPACT 4.7-6 Geology, Soils, and Seismicity — Potential Removal of Mineral Resources. *Because sand resources in the project area would not be suitable for aggregate mining, the proposed project would result in* ***less-than-significant*** *impacts to mineral resources.*

The project area is located on land classified by the California Department of Mines and Geology as MRZ-3, an area where the significance of mineral deposits cannot be evaluated from existing data. Results from geotechnical explorations in 1997 (Kleinfelder) at the WQCF site indicated the presence of interbedded sand. Sand has been extracted from two mining sites in the project vicinity in the past, and sand and gravel mined in San Joaquin County is used for construction.

Although geotechnical reports prepared for project related elements did identify areas of clean sand, these occurred as a series of discontinuous, shallow lenses at various depths. In addition, Section 8 of the Manteca General Plan 2023 Draft Environmental Impact Report did not include any impacts associated with mineral resources (City of Manteca 2003a). Therefore, sand resources located in the project area including areas in the vicinity of the proposed wastewater collection system, effluent outfall, and recycled water distribution system pipeline alignments would not be suitable for economically viable mining activities. Because sand at the WQCF site occurs as a series of discontinuous shallow lenses, and no mineral resources impacts were documented in the general plan EIR prepared by the City of Manteca, this impact is considered **less-than-significant**.

4.7.3 MITIGATION MEASURES

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

4.7-1: Risks to People and Structures Caused by Strong Seismic Ground Shaking.

4.7-5: Risk of Structural Damage Caused by Corrosive Soils.

4.7-6: Potential Removal of Mineral Resources.

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

Mitigation Measure 4.7-2: Risks to People and Structures Caused by Strong Seismic-Related Ground Failure.

a. Before contract bidding for project construction, the approved project design plans and specifications, including grading and foundation plans, shall be reviewed by a soils engineer approved by the City. This review shall be completed to assess whether the recommendations in project geotechnical reports prepared by Kleinfelder are sufficient for construction of the buildings and facilities described in the final project design plans. If these measures are deemed insufficient, the geotechnical engineer shall prepare supplemental site-specific geotechnical report(s) with appropriate recommendations sufficient to ensure the safety of project structures and site occupants. These measures could include, but are not limited to, the construction of deep foundations, installation of driven piles, and extra reinforcement of foundation slabs. At a minimum, these measures shall demonstrate that the proposed project design would meet CBC and City design standards.

b. During project design and construction, all measures outlined in project geotechnical reports for the proposed project and, if necessary, measures included in the supplemental site-specific geotechnical report(s) shall be implemented to ensure that project structures and site occupants would be safe during seismic events.

c. The on-site soils will likely be saturated by rainfall in the winter and early spring months. If the construction schedule requires continued work during the wet months, the City shall consult with a qualified civil engineer and implement any additional recommendations provided, as conditions warrant.

Mitigation Measure 4.7-3: Construction-Related Erosion Hazards.

- A grading and erosion control plan shall be prepared by a California Registered Civil Engineer prior to issuance of any grading permits. The plan shall be consistent with the CBC grading requirements and shall include the site-specific grading required for new construction. The City shall ensure that the construction contractor is responsible for securing a source of transportation and deposition of excavated materials.

- BMPs for erosion and siltation prevention, as further described in Section 4.9, “Hydrology and Water Quality,” of this Draft EIR, will be implemented at proposed project areas during all construction activities. The City will consult with the Central Valley Regional Water Quality Control Board to acquire the appropriate regulatory approvals that may be necessary to obtain Section 401 water quality certification, State Water Board statewide NPDES stormwater permit for general construction activity, and any other necessary site-specific waste discharge requirements (WDRs) or waivers. As required under the NPDES stormwater permit for general construction activity, the City will prepare and submit the appropriate Notice of Intent (NOI) and prepare the SWPPP and any other necessary engineering plans and specifications for pollution prevention and control. The SWPPP and other appropriate plans shall identify and specify the use of erosion and sediment control BMPs, means of waste disposal, implementation of approved local plans, non-stormwater management controls, permanent post-construction BMPs, and inspection and maintenance responsibilities. BMPs will include dust control measures such as wetting the top layer of exposed soils and covering soil stockpiles, as necessary.

- The SWPPP would also specify the pollutants that are likely to be used during construction that could be present in stormwater drainage and non-stormwater discharges. A sampling and monitoring program would be included in the SWPPP that meets the requirements of State Water Board Order 99-08-DWQ to ensure that the BMPs are effective.

- Prior to issuance of any grading permits, construction techniques will be identified that would reduce the potential for runoff, and the plan shall identify the erosion and sedimentation control measures to be implemented. The SWPPP shall also specify spill prevention and contingency measures, identify the types of materials used for equipment operation, and identify measures to prevent or clean up spills of hazardous materials used for equipment operation and hazardous waste. Emergency procedures for responding to spills

shall also be identified. BMPs identified in the SWPPP shall be used in all subsequent site development activities. The SWPPP shall identify personnel training requirements and procedures that would be used to ensure that workers are aware of permit requirements and proper installation and performance inspection methods for BMPs specified in the SWPPP. The SWPPP shall also identify the appropriate personnel responsible for supervisory duties related to implementation of the SWPPP. All construction contractors shall retain a copy of the approved SWPPP on the construction site.

Mitigation Measure 4.7-4: Risks to People and Structures Resulting from Unstable Soil Conditions.

The City shall implement Mitigation Measure 4.7-2, described above, to reduce the risks to people and structures resulting from unstable soil conditions in the proposed project area.

4.7.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of the mitigation measures identified above, the project's geology and soils impacts would be reduced to a less-than-significant level because of required completion of site-specific geotechnical studies and implementation of construction and design measures developed in response to the studies. Implementation of these mitigation measures would also make the project consistent with the City's general plan goals and policies related to geology and soils (including Policies S-P-1, S-P-3, S-P-5, and RC-P-10).

4.8 PALEONTOLOGICAL RESOURCES

Paleontological resources (fossils) are the remains or traces of prehistoric animals and plants. This section assesses the potential for earthmoving activities associated with development in the project area to adversely affect scientifically important fossil remains. The analysis presented in this section conforms to Society of Vertebrate Paleontology criteria. This analysis includes a description of the local geologic setting, the impacts associated with implementation of the proposed project, and any recommended measures to mitigate the project's potential impacts.

4.8.1 ENVIRONMENTAL SETTING

GEOGRAPHIC LOCATION AND PHYSIOGRAPHIC ENVIRONMENT

The project area is located in the Great Valley Geomorphic Province of California, a large northwest-trending valley bounded by the Sierra Nevada to the east and south, the Coast Ranges to the west, and the Klamath Mountains to the north. The Great Valley is drained by the Sacramento and San Joaquin Rivers, which join and flow out of the province through the San Francisco Bay. This geomorphic province is an asymmetric trough approximately 400 miles long and 50 miles wide filled with a thick sequence of sediments ranging from Jurassic (180 million years ago) to Recent age. The sediments in the Great Valley vary between 5 and 10 kilometers in thickness and were derived primarily from erosion of the Sierra Nevada to the east, with lesser amounts of material from the Coast Ranges to the west.

For additional information on geographic location and physiographic setting, see Section 4.7, "Geology, Soils, and Seismicity."

REGIONAL AND LOCAL GEOLOGIC SETTING

Geology of the San Joaquin Valley has been described in some detail by authors such as Bartow (1991), Graham and Olson (1988), Page (1986), and Bailey (1966), among others. Geologic history and conditions are relevant to the evaluation of paleontological resources in that they influence the type of fossils that may be found (i.e., aquatic vs. terrestrial organisms) and the probability that any prehistoric remains would be subject to fossilization rather than normal decay. The depositional history of the upper San Joaquin Valley during the Quaternary period (approximately 1.8 million years Before Present [B.P.]) included several cycles related to fluctuations in regional and global climate that caused periods of deposition along the valley floor alternating with periods of subsidence and erosion. By the middle of the Pleistocene epoch (approximately 900,000 years B.P.), the seaway serving as a drainage outlet connecting the San Joaquin Valley with the Pacific Ocean had closed, leaving behind a large lake (the Corcoran lake) in the Central Valley. Meanwhile, continued uplift of the Sierra Nevada resulted in ongoing sediment deposition along the valley floor. Thus, the project region during the Pleistocene epoch consisted of stages of wetland and floodplain creation as tidewaters rose in the valley from the west, areas of erosion when tidewaters receded, deposition of alluvial fans that were reworked by wind to create extensive sand dunes, and alluvial fan deposition from streams emanating from the adjacent mountain ranges (Bartow 1991, Atwater 1982).

The proposed improvements at the wastewater quality control facility (WQCF), pipeline alignments for the proposed collection system and recycled-water distribution system, outfall pipeline, side-bank outfall structure, and pumping station sites span the U.S. Geological Survey (USGS) Manteca and Lathrop 7.5-minute quadrangles, and are underlain by Dune Sand and the Modesto Formation, which are described in greater detail below.

Dune Sand

Much of the area surrounding the city of Manteca is covered by Holocene-age (10,000 years old or younger) Dune Sand deposits (Wagner, Bortugno, and McJunkin 1991). Inland dunes usually exist in the form of ridges, small hills, and knolls found on ancestral lake beds and outwash plains.

Modesto Formation

Piper et al. (1939) were the first to publish detailed geologic maps in the southern Sacramento/northern San Joaquin Valley areas, and they designated the older alluvial Pleistocene deposits as the Victor Formation. However, in 1959, Davis and Hall proposed a subdivision of the Victor Formation into the Turlock Lake (oldest), Riverbank (middle), and Modesto (youngest) Formations. The type section of Modesto was designated along the south bluff of the Tuolumne River south of Modesto. Marchand and Allwardt (1981) proposed that the name Victor Formation be abandoned and that the Turlock Lake, Riverbank, and Modesto Formations be adopted as formal nomenclature for Quaternary deposits in the Sacramento and San Joaquin Valleys. Most later researchers have followed this recommendation.

In the San Joaquin Valley and in the project area in particular, the Modesto Formation forms alluvial fans of the Stanislaus River and can be divided into upper and lower members. Researchers differ as to the age of this formation: Marchand and Allwardt (1981) place the age between approximately 12,000 and 42,000 years B.P.; Atwater (1982) places the age from 9,000 to 73,000 years B.P., while Helley and Harwood (1985) follow Marchand and Allwardt's dating scheme. The upper member is composed primarily of unconsolidated, unweathered, coarse sand and sandy silt. The lower member of the Modesto Formation is composed of consolidated, slightly weathered, well-sorted silt and fine sand, silty sand, and sandy silt.

The Modesto Formation is underlain by various rock units reflecting the changing nature of depositional sediments, from alluvial fan to lacustrine to marine, including the Riverbank Formation (mid-Pleistocene), the Turlock Lake Formation (early Pleistocene), the Corcoran Clay (early Pleistocene), the Tulare Formation (Plio-Pleistocene), and the San Joaquin Formation (late Pliocene).

PALEONTOLOGICAL RESOURCE INVENTORY METHODS

A stratigraphic inventory and paleontological resource inventory were completed to develop a baseline paleontological resource inventory of the project area by rock unit, and to assess the potential paleontological productivity of each rock unit. Research methods included a review of published and unpublished literature, and complied with Society of Vertebrate Paleontology (1995) guidelines.

Stratigraphic Inventory

Geologic maps and reports covering the geology of the surrounding study area were reviewed to determine the exposed rock units and to delineate their respective distributions in the project study area.

Paleontological Resource Inventory

Published and unpublished geological and paleontological literature was reviewed to document the number and locations of previously recorded fossil sites from rock units exposed in and near the proposed project area and the surrounding region, as well as the types of fossil remains each rock unit has produced. The literature review was supplemented by an archival search conducted at the University of California Museum of Paleontology (UCMP) in Berkeley, California, on March 8, 2007.

PALEONTOLOGICAL RESOURCE ASSESSMENT CRITERIA

The potential paleontological importance of the proposed project site can be assessed by identifying the paleontological importance of exposed rock units within the project area. Because the areal distribution of a rock unit can be easily delineated on a topographic map, this method is conducive to delineating parts of the project area that are of higher and lower sensitivity for paleontological resources and to delineating parts of the project area that may require monitoring during construction.

A paleontologically important rock unit is one that has a high potential paleontological productivity rating and is known to have produced unique, scientifically important fossils. The potential paleontological productivity rating of a rock unit exposed at the project site refers to the abundance/densities of fossil specimens and/or previously recorded fossil sites in exposures of the unit in and near the project site. Exposures of a specific rock unit at the project site are most likely to yield fossil remains representing particular species in quantities or densities similar to those previously recorded from the unit in and near the project site.

An individual vertebrate fossil specimen may be considered unique or significant if it is identifiable and well preserved, and it meets one of the following criteria:

- a type specimen (i.e., the individual from which a species or subspecies has been described);
- a member of a rare species;
- a species that is part of a diverse assemblage (i.e., a site where more than one fossil has been discovered) wherein other species are also identifiable, and important information regarding life history of individuals can drawn;
- a skeletal element different from, or a specimen more complete than, those now available for its species; or
- a complete specimen (i.e., all or substantially all of the entire skeleton is present).

For example, identifiable vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare. The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions such as part of a research project. Marine invertebrates are generally common, well developed, and well documented. They would generally not be considered a unique paleontological resource.

The following tasks were completed to establish the paleontological importance of each rock unit exposed at or near the project area:

- The potential paleontological productivity of each rock unit was assessed, based on the density of fossil remains previously documented within the rock unit.
- The potential for a rock unit exposed at the project area to contain a unique paleontological resource was considered.

RESOURCE INVENTORY RESULTS

Stratigraphic Inventory

Regional and local surficial geologic mapping and correlation of the various geologic units in the vicinity of the project area has been provided at a scale of 1:500,000 by Bartow (1991), 1:250,000 by Wagner, Bortugno, and McJunkin (1991), and 1:62,500 by Atwater (1982).

Paleontological Resource Inventory and Assessment by Rock Unit

Dune Sand

By definition, to be considered a fossil, a specimen must be more than 10,000 years old. Because the Dune Sands are of Holocene age and are therefore 10,000 years old or younger, any specimens recovered from this formation would not be considered a fossil.

Modesto Formation

Vertebrate mammalian fossils have proved helpful in determining the relative age of alluvial fan sedimentary deposits (Albright 2000, Louderback 1951, Savage 1951). Mammalian inhabitants of the Pleistocene alluvial fan and floodplain included mammoths, horses, mastodons, camels, ground sloths, and pronghorns.

The Pleistocene epoch, known as the "great ice age," began approximately 1.8 million years ago. Surveys of late Cenozoic land mammal fossils in northern California have been provided by Hay (1927), Lundelius et al. (1983), Jefferson (1991a, 1991b), Savage (1951), and Stirton (1939). On the basis of his survey of vertebrate fauna from the nonmarine late Cenozoic deposits of the San Francisco Bay region, Savage (1951) concluded that two major divisions of Pleistocene-age fossils could be recognized: the Irvingtonian (older Pleistocene fauna) and the Rancholabrean (younger Pleistocene and Holocene fauna). These two divisions of Quaternary Cenozoic vertebrate fossils are widely recognized today in the field of paleontology. The age of the later Pleistocene, Rancholabrean fauna was based on the presence of bison and on the presence of many mammalian species that are inhabitants of the same area today. In addition to bison, larger land mammals identified as part of the Rancholabrean fauna include mammoths, mastodons, camels, horses, and ground sloths.

Remains of land mammals have been found in the project region at various localities in alluvial deposits referable to the Modesto Formation. Jefferson (1991a, 1991b) compiled a database of California late Pleistocene vertebrate fossils from published records, technical reports, unpublished manuscripts, information from colleagues, and inspection of museum paleontological collections at more than 40 public and private institutions. He listed a number of sites in San Joaquin County that have yielded Rancholabrean vertebrate fossils that could be referable to the Modesto Formation. Jefferson's information corresponds with the records in the UCMP database.

The closest identified vertebrate fossils to the project area are located approximately 2 miles northeast of the proposed north Manteca trunk sewer branch on Union Road, at Littlejohns Creek (UCMP V-5107). This site yielded seven specimens from Rancholabrean-age Columbian mammoth, horse, and an unidentified carnivore from sediments of the Modesto Formation. Approximately 3 miles west of the WQCF site, remains of a Pleistocene mammal were encountered in sediments of the Modesto Formation during construction activities associated with the River Islands project. Approximately 8 miles north of the WQCF site, in Stockton, locality V-4822 yielded a Rancholabrean-age horse specimen. Hay (1927) reported remains of camel, horse, and mammoth at another site in Stockton.

UCMP localities V-66150, V-3315, V-4809, V-4810, V-4808, V4819, and V-4807, along the Delta Mendota Canal west of Tracy (approximately 20 miles southwest of the project area), yielded numerous specimens from bison, mammoth, ground sloth, horse, and gopher. In the same area, the Wagner's Aqueduct site, V-70122, yielded three specimens from the class Osteichthyes (bony fishes). Localities V-4804 and V-4867 from the Reiche Gravel Pit, west of the Delta Mendota Canal, yielded three specimens of horse and mammoth remains. Locality V-66150 at the Tracy Gravel Pit yielded a specimen of Jefferson's ground sloth, while locality V-3315 at the Hetch Hetchy Tunnel yielded remains from a Rancholabrean-age camel. Finally, a site along Cometa Road, approximately 20 miles east of the project area (V-5039), yielded two Pleistocene horse specimens.

Specimens from sediments referable to the Modesto Formation have been reported at other locations throughout the Central Valley (UCMP 2004). The Tranquility site in Fresno County (UCMP V-4401), for example, has yielded more than 130 Rancholabrean-age fossils of fish, turtles, snakes, birds, moles, gophers, mice, wood rats,

voles, jackrabbits, coyote, red fox, grey fox, badger, horse, camel, pronghorn antelope, elk, deer, and bison from sediments referable to the Modesto Formation.

Results of a paleontological record search at the UCMP indicated no fossil remains within the immediate project area.

REGULATORY SETTING

Federal Plans, Policies, Regulations, Laws, and Ordinances

Paleontological resources are classified as nonrenewable scientific resources and are protected by several federal and state statutes, most notably by the Antiquities Act of 1906 (Public Law 59-209; 16 U.S. Code 431 et seq.; 34 Stat. 225), which calls for protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal lands. The project currently does not involve such lands.

State, Regional, and Local Plans, Policies, Regulations, Laws, and Ordinances

State requirements for paleontological resource management are found in Public Resources Code Chapter 1.7, Section 5097.5, Archeological, Paleontological, and Historical Sites. This statute specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources. The statute would apply to the project area only if the state or a state agency were to obtain ownership of project lands.

No state or local agencies have specific jurisdiction over paleontological resources on private lands. No state or local agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earth moving on state or private land in a project site.

The *City of Manteca General Plan 2023* does not contain any policies relating to paleontological resources (City of Manteca 2003).

Professional Standards

The Society of Vertebrate Paleontology (1995, 1996), a national scientific organization of professional vertebrate paleontologists, has established standard guidelines that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, specimen preparation, analysis, and curation. Most practicing professional paleontologists in the nation adhere to the Society of Vertebrate Paleontology's assessment, mitigation, and monitoring requirements, as specifically spelled out in its standard guidelines.

4.8.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

In its standard guidelines for assessment and mitigation of adverse impacts on paleontological resources, the Society of Vertebrate Paleontology (1995) established three categories of sensitivity for paleontological resources: high, low, and undetermined. Areas where fossils have been previously found are considered to have a high sensitivity and a high potential to produce fossils. In areas of high sensitivity that are likely to yield unique paleontological resources, full-time monitoring is typically recommended during any project-related ground disturbance. Areas that are not sedimentary in origin and that have not been known to produce fossils in the past typically are considered to have low sensitivity and monitoring is usually not needed during project construction. Areas that have not had any previous paleontological resource surveys or fossil finds are considered to be of undetermined sensitivity until surveys and mapping are performed to determine their sensitivity. After

reconnaissance surveys, observation of exposed cuts, and possibly subsurface testing, a qualified paleontologist can determine whether the area should be categorized as having high or low sensitivity. In keeping with the significance criteria of the Society of Vertebrate Paleontology (1995), all vertebrate fossils are generally categorized as being of potentially significant scientific value.

The significance of potential adverse impacts on paleontological resources under CEQA, resulting from project-related activities at the proposed project area, was determined using the criteria discussed above.

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on Appendix G of the State CEQA Guidelines, viewed in light of the Society of Vertebrate Paleontology guidelines. The proposed project would result in significant paleontological resources impacts if it would directly or indirectly destroy a unique paleontological resource or site. For the purposes of this DEIR, an individual vertebrate fossil specimen may be considered unique or significant if it is identifiable and well preserved, and it meets one of the following criteria:

- a type specimen (i.e., the individual from which a species or subspecies has been described);
- a member of a rare species;
- a species that is part of a diverse assemblage (i.e., a site where more than one fossil has been discovered) wherein other species are also identifiable, and important information regarding life history of individuals can be drawn;
- a skeletal element different from, or a specimen more complete than, those now available for its species; or
- a complete specimen (i.e., all or substantially all of the entire skeleton is present).

The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions (such as for a research project). Marine invertebrates are generally common; the fossil record is well developed and well documented, and they would generally not be considered a unique paleontological resource. Identifiable vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare.

IMPACT ANALYSIS

IMPACT 4.8-1 Paleontological Resources—Disturbance of Paleontological Resources During Earthmoving Activities. *Although no previously recorded paleontological sites are known to occur at the WQCF site, pumping station sites, or within the proposed collection system and recycled water distribution system pipeline routes, previously undiscovered paleontological resources could be present in sediments of the Modesto Formation that underlie the project area. In addition, fossils have been found at excavations in similar soils less than 2 miles from the project area. Therefore, construction activities could potentially disturb unknown subsurface paleontological resources. This would be a* ***potentially significant*** *impact.*

Based on the records search conducted at UCMP, there are no previously recorded fossil sites along the pipeline alignments for the proposed collection system and recycled-water distribution system, at the WQCF, along the proposed outfall pipeline route, or at the side-bank outfall structure. Some of the proposed pipeline routes would be located within Holocene-age Dune Sand deposits. These deposits are too young to contain fossils; therefore, project-related construction activities in the Dune Sands would have no impact on paleontological resources.

However, most of the proposed improvements would be located within sediments of the Modesto Formation, which is a rock unit of high paleontological sensitivity under the Society of Vertebrate Paleontology guidelines (1995, 1996). As discussed above under "Paleontological Resource Inventory and Assessment by Rock Unit," a vertebrate fossil site at Littlejohns Creek (UCMP V-5107), approximately 2 miles northeast of the proposed north Manteca trunk sewer branch on Union Road, has been recorded in sediments of the Modesto Formation. This site yielded seven specimens from Rancholabrean-age Columbian mammoth, horse, and an unidentified carnivore. Another vertebrate fossil specimen (Rancholabrean-age Columbian mammoth) was recovered from sediments of the Modesto Formation in the City of Lathrop, 3 miles west of the WQCF site. In addition, the occurrence of numerous Pleistocene vertebrate fossil remains in sediments referable to the Modesto Formation from the nearby cities of Stockton and Tracy, and at other locations throughout the Central Valley, suggests that the potential exists for uncovering additional similar fossil remains during construction-related earthmoving activities in the Modesto Formation at the project area. Because the potential exists for proposed earthmoving activities at the project area to uncover or disturb previously undiscovered paleontological resources, this would be a **potentially significant** impact.

4.8.3 MITIGATION MEASURES

The following mitigation measure is provided for the potentially significant impact of Impact 4.8-1:

Mitigation Measure 4.8-1: Disturbance of Paleontological Resources during Earthmoving Activities. For earthmoving activities at the project area, the City will implement the following measures:

(1) Before the start of construction activities, construction personnel involved with earthmoving activities shall be informed of the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction activities, and proper notification procedures should fossils be encountered. This training shall be prepared and presented by a qualified paleontologist or archaeologist.

(2) If paleontological resources are discovered during earthmoving activities, the construction crew shall immediately cease work in the vicinity of the find and the City Public Works Department shall be notified. The City will retain a qualified paleontologist to evaluate the resource and prepare a proposed recovery plan in accordance with Society of Vertebrate Paleontology guidelines (1995). The recovery plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recovery of identified resources will be implemented by the City before construction activities resume at the site.

Implementation of this mitigation measure would reduce impacts of earthmoving activities on paleontological resources to a **less-than-significant** level.

4.8.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of Mitigation Measure 4.8-1 would avoid and/or minimize adverse effects on paleontological resources through excavation, recovery, and preservation of any discovered resources during project construction activities. With implementation of the above mitigation, the project's paleontological impacts would be reduced to a less-than-significant level.

4.9 HYDROLOGY AND WATER QUALITY

This section evaluates water quality conditions of ground and surface waters in the project vicinity and the project's potential impacts on these water resources. This evaluation uses existing information from previously completed documents that address water resources in the project vicinity. These documents are hereby incorporated by reference into this DEIR.

***Manteca General Plan Background Report* (City of Manteca 1988)**. The *Manteca General Plan Background Report* is a supporting document to the City of Manteca General Plan that provides information on a range of topics (e.g., traffic, utilities, public services, housing, land use) which describe the physical and socioeconomic characteristics of the city and planning area. The background report does not contain policies and is intended to provide information that assists in the production of general plan policies that implement the long-term vision of the City of Manteca (City).

***City of Manteca General Plan 2023 Draft Environmental Impact Report* (City of Manteca 2003a)**. The Manteca General Plan 2023 DEIR is a program EIR for *the City of Manteca General Plan 2023* (City general plan). The EIR provides information to the public and decision makers of the potential significant environmental impacts of the City general plan, indicates mitigation measures which may reduce or avoid potential significant environmental impacts, and identifies reasonable alternatives. The EIR was certified by the City on October 6, 2003.

***City of Manteca Storm Drain Master Plan* (City of Manteca 2006)**. The City of Manteca maintains the existing city storm drain system, and expands the system as necessary as growth occurs. The *City of Manteca Storm Drain Master Plan* identifies the drainage facilities needed to meet the needs of the 2003 general plan, and includes a discussion of the existing system, outlines design criteria, and provides a detailed analysis of the storm drain system. The document also provides a summary of master plan improvements for each of the major city drain systems.

***City of Manteca Storm Water Management Program* (City of Manteca 2003b)**. The City of Manteca prepared the *City of Manteca Storm Water Management Program* document to meet the requirements for coverage under General Permit Number CAS000004, Water Quality Order No. 2003-0005-DWQ to meet federal National Pollutant Discharge Elimination System (NPDES) permit requirements. The program will be implemented to limit the discharge of pollutants from the City of Manteca storm sewer system. The program includes information on public education and outreach, construction site stormwater runoff control, and pollution prevention for municipal operations.

***Near- and Far-Field Dilution Analysis of the Manteca Wastewater Discharge* (RMA 2006)**. The dilution analysis report summarizes the results of a near- and far-field dilution analysis of the City of Manteca Wastewater Quality Control Facility (WQCF) discharge. The dilution analysis was completed using local and Deltawide versions of the 2-D depth-averaged models RMA 2 and RMA 11. The near field dilution simulations were performed for three river flow rates, three discharge rates, and two outfall scenarios. Far field tracer simulations were performed for 2 dry years and three discharge rates. This document is included as Appendix F.

***Antidegradation Analysis for Proposed Wastewater Quality Control Facility Discharge Modification* (LWA 2007)**. This report documents the City of Manteca WQCF antidegradation analysis for a projected discharge increase in permitted discharge capacity to the San Joaquin River from 9.87 to 27 million gallons per day (mgd) average dry-weather flow (ADWF). The analysis is intended to provide the Central Valley Regional Water Resources Control Board (RWQCB) with the information needed to determine whether to certify that the proposed permitted discharge increase is consistent with state and federal antidegradation policies. The analysis is comprises two main components: (1) a comparison of the projected receiving water quality to the water quality objectives and/or criteria used to protect designated beneficial uses, and (2) a socioeconomic analysis to establish the balance between the proposed action and the public interest. This document is included as Appendix C.

Copies of these reports are available for review at the City of Manteca Pubic Works Department during normal business hours (i.e., 8 a.m. to 5 p.m.). The proposed project would result in an increase in the quantity of treated effluent discharged from the Manteca WQCF into the San Joaquin River through the existing and proposed side-bank outfall located approximately one mile upstream of the Mossdale Bridge near the intersection of Interstate 5 and Highway 120. The future increased effluent discharge quantity from the WQCF could affect receiving water quality near the point of discharge and in downstream reaches of the San Joaquin River and the. This section evaluates the impacts to the beneficial uses of the lower portions of the San Joaquin River and the Delta that could result from project-related changes to the near-field and downstream water quality. Potential impacts to fisheries and aquatic biological resources of the lower San Joaquin River and Delta are discussed in Section 4.13, "Fisheries and Aquatic Resources," of this DEIR.

4.9.1 ENVIRONMENTAL SETTING

HYDROLOGY AND DRAINAGE

Sacramento–San Joaquin Delta

The Sacramento–San Joaquin Delta (Delta) forms the lowest part of the Central Valley, lying between the Sacramento and San Joaquin rivers and extending inland from the confluence of the two rivers to Sacramento and Stockton. The Delta is roughly bordered by the cities of Sacramento, Stockton, Tracy, and Pittsburg. Other cities within the Delta include Manteca, Lathrop, Antioch, Brentwood, Rio Vista, and Isleton. There are also about 14-unincorporated towns and communities in the Delta. The area receives runoff from over 45 percent of the State's land area including flows from 19 tributaries: the Sacramento, McCloud, Butte, Feather, Yuba, Bear, American, Merced, San Joaquin, Mokelumne, Cosumnes, Stanislaus, Tuolumne, Chowchilla, Fresno, Kings, Cache, Putah, and Calaveras rivers. The Delta is within the jurisdiction of six counties (Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo) and covers approximately 1,500 square miles interlaced with hundreds of miles of waterways (Department of Water Resources [DWR] 1993). The Delta is delineated by a legal boundary that includes the areas that historically were intertidal, along with supratidal portions of the floodplains of the Sacramento and San Joaquin rivers. Today's legal Delta extends between the upper extent of tidal effect (near the City of Sacramento on the Sacramento River and Vernalis on the San Joaquin River) and Chipps Island on the west (CALFED 1999).

The 290-mile-long San Joaquin Valley occupies the southern half of the Central Valley and has an average width of 130 miles. It covers approximately 32,000 square miles, or one-fifth of the surface area of California. The San Joaquin River Basin is bounded on the west by the Coast Ranges and on the east by the Sierra Nevada mountain range. The Tulare Lake Basin to the south is normally considered a separate drainage basin, but has contributed occasional flood flows and subsurface flows to the San Joaquin River during wet years (DWR 1995). The San Joaquin River itself is 330 miles in length and drains a watershed area of 13,540 square miles (CSLC 1993). It flows west from the Sierra Nevada, turns sharply north at the center of the valley floor, and flows north through the valley into the Sacramento–San Joaquin Delta. San Joaquin River monthly average flow ranges from 400 to 1,500 cubic feet per second (cfs) in dry years, 1,500 to 3,500 cfs in normal years and up to 20,000 cfs to 40,000 cfs in wet years (CALFED 1999). Major tributaries draining the Sierra Nevada and flowing into the San Joaquin River include the Fresno, Stanislaus, Merced, and Tuolumne rivers. The San Joaquin River flows through portions of Fresno, Madera, Merced, Stanislaus, San Joaquin, Contra Costa, and Sacramento Counties.

San Joaquin River Basin

San Joaquin River Basin hydrology is predominantly influenced by tributary inflows, agricultural diversions and return flows, and tidal flows. For the purpose of this antidegradation analysis, the Lower San Joaquin River can be divided into two main sections based on the presence or absence of tidal flows. The Lower San Joaquin River from Mendota Pool to Vernalis receives inflow from a variety of sources including eastside tributaries, dominated by reservoir releases; westside tributaries, dominated by agricultural return flows; groundwater recharge; and

discharges from wetlands and publicly owned wastewater treatment facilities. Diversions can remove a significant amount of San Joaquin River flow, especially during periods of below normal rainfall. The Lower San Joaquin River is not typically affected by tidal flows, being sufficiently upstream of the Pacific Ocean's tidal influence.

The second main section of the Lower San Joaquin River is the tidally influenced reach from Vernalis to its confluence with the Sacramento River near Collinsville. Major tributary inputs to this section are provided by the Cosumnes and Mokelumne rivers where their commingled flows enter the central Delta near Webb Tract. Significant nontributary inflows are provided from irrigation return flows that are pumped from adjacent agricultural lands into the San Joaquin River. The major diversion of San Joaquin River water occurs at the junction of Old River, where, depending on Delta hydraulics, up to 50% of San Joaquin flows may be diverted to the south Delta (Quinn and Tulloch 2002).

An understanding of the hydrology and hydrochemistry of the San Joaquin River can be gained through a review of the relative flow contributions made by eastside tributaries, westside tributaries, and other inflows. The major eastside tributaries include the Merced, Tuolomne, and Stanislaus rivers which join the Lower San Joaquin River upstream of Vernalis. There are also three minor eastside tributaries in the Basin, including Bear Creek, the eastside Bypass, and the Mariposa Bypass. There are nine significant streams and conveyances that drain the westside of the San Joaquin Basin and are tributary to the San Joaquin River. These tributaries include Panoche-Silver Creek, San Luis Drain, Salt Slough, Mud Slough, Spanish Grant Drain, Orestimba Creek, Hospital Creek, Ingram Creek, and Del Puerto Creek. Many of these streams are ephemeral, conveying rainfall runoff during the winter season and agricultural return flows during the summer months. The San Luis Drain is a concrete-lined conveyance that once formed part of a Valley Master Drain system providing drainage for the entire westside of the Basin. The Drain presently serves five agricultural water districts and conveys subsurface drainage water into Mud Slough, six miles upstream of the confluence with the San Joaquin River. Due to the Drain's importance to the hydrology of the San Joaquin River, it is considered a westside tributary (Quinn and Tulloch 2002).

A comparison of flow and TDS (salts) inputs into the San Joaquin River by a variety of sources is provided in Table 4.9-1. During the period 1985–1994, annual average flows from all eastside tributaries collectively accounted for 70% of the flow measured in the San Joaquin River at Vernalis. In contrast, westside tributaries contributed 4% of the flow measured at Vernalis. While eastside tributaries contributed approximately 17.5 times the flow of westside tributaries, the estimated TDS loading of the eastside tributaries was about three quarters of that provided by westside tributaries. This difference in TDS loading can be attributed to the fact that snow-melt comprises a large proportion of eastside flow volume, while return flows from agriculture and wetlands dominate westside hydrology. Tributary contributions not withstanding, all other sources collectively contributed 26% of total flow and 63% of estimated TDS loading in the San Joaquin River at Vernalis. The largest nontributary TDS loadings were made by groundwater (191,000 tons) and surface water return flows (150,000 tons). Municipal and industrial sources contributed minor discharge volumes (1%) and TDS loads (2-3%), similar in magnitude to contributions from subsurface return flows (Quinn and Tulloch 2002).

Surface Hydrology in the Project Area

The WQCF site and proposed pipeline alignments are located in the Central Valley within the central portion of San Joaquin County in the westernmost portion of City. Existing ground slopes in the area are relatively flat, with an elevation of approximately 25 feet above mean sea level. Average annual rainfall within the City is approximately 14 inches, with most of this rain occurring between November and March (Climate Zone 2006).

Major drainages in the project vicinity include Lone Tree Creek approximately 6 miles to the north, the Stanislaus River approximately 7 miles to the south, and the San Joaquin River approximately 2 miles west of the site. The nearest significant body of water is the San Joaquin River. Two agricultural ditches traverse the WQCF site in the western and southern portions of the project site and both are nonjurisdictional features under both state and federal regulations. The southwestern part of the proposed project area, including the WQCF site, is located in the 500-year floodplain. . Portions of the wastewater collection system, recycled water disposal system, and effluent

outfall pipelines are also located in the 500-year floodplain. No project components would be located in the 100-year floodplain (City of Manteca 2003a).

Table 4.9-1
Sources and Percent Contributions of Flow and TDS in the San Joaquin River at Vernalis (1985–1994)

Source	Discharge[1] (Acre-Feet x 1000)	Percent Contribution	TDS Load[2] (Tons x 1000)	Percent Contribution
Eastside Tributaries	1,323	70	148	16
Groundwater	90	5	191	20
Westside Tributaries	68	4	201	21
Grassland Wetlands	60	3	74	8
Groundwater Inflow	11	1	77	8
Westside Surface Returns	70	4	57	6
Subsurface Return Flows (Main Stem San Joaquin River)	11	1	25	3
Surface Return Flows (Main Stem San Joaquin River)	250	13	150	16
Municipal and Industrial	15	1	14	2
Total	1,899	100	938	100

Notes:
TDS = total dissolved solids
[1] 10-year mean annual flow calculated from 1985–1994.
[2] 10-year mean annual load calculated from 1985–1994.
Source: Quinn and Tulloch 2002

The WQCF site and proposed pipeline alignments are located in an inundation area for three dams located within the Manteca vicinity. The project site could be subject to flooding if the Tulloch Dam (located 36 miles east), San Luis Dam (located 46 miles south), or New Melones Dam (located 41 miles east) failed (City of Manteca 1988). The California Government Code (Section 8589.5) requires local jurisdictions to adopt emergency evacuation procedures for populated inundation areas. The local Office of Emergency Services prepared a Dam Failure Plan that includes a description of dams, direction of floodwaters, responsibilities of local jurisdictions, and evacuation plans (City of Manteca 2003a). Because an adequate evacuation plan exists in case of a dam failure that could affect the project site, flooding issues related to dam failure are not discussed further in this EIR.

The WQCF site and proposed pipeline alignments are not located near an open body of water and therefore would not be subject to adverse effects associated with a seich; this issue is therefore not addressed further in this EIR. The effluent outfall pipeline and outfall structure would not be affected by a seich because the outfall pipeline and associated structure would be constructed underground. The project area is not located near the ocean and therefore would not be subject to adverse effects associated with a tsunami; this issue is therefore not addressed further in this EIR.

Storm water drainage is provide in the city by a system of gravity storm drain lines that terminate at detention or retention facilities to provide storage to attenuate peak flows. There are currently 32 detention basins located in the city with up to 65 additional detention basins planned for the future (City of Manteca 2006). Most stormwater is pumped into the South San Joaquin Irrigation District (SSJID) drains. There are currently 38 drainage pump stations in the city with an additional pump station planned for each proposed detention basin. SSJID operates drainage facilities that traverse the City of Manteca and carry a portion of the City's stormwater drainage. Water

in the SSJID drainage system flows west through laterals into the French Camp Canal located at the western boundary of the city which eventually flows north into the French Camp Slough and ultimately drains into the San Joaquin Delta, which is located northwest of the city. Existing road and railroad crossings of the French Camp Canal are undersized (i.e., they constrain the flow and can cause the back up of water) and require modification (e.g., expansion) to accommodate future peak buildout flows from the City of Manteca (City of Manteca 2003a). The City is planning to implement these new facilities through its Storm Drain Master Plan (2006).

The WQCF site and portions of the wastewater collection system, effluent outfall, and recycled water distribution system pipelines in the southwest portion of the project area are located in the French Camp Outlet Canal (FCOC) and Drain 7 subsheds. The FCOC flows from south to north along the Union Pacific Railroad (UPRR) tracks from north of State Route 120 (SR 120) to the French Camp Slough. The FCOC collects water from all city drains and laterals and is the backbone of the city's stormwater drainage system. The Drain 7 serves approximately 1,600 acres from the Spreckles complex north of SR 120 to the southernmost portion of the FCOC.

Groundwater Hydrology in the Project Area

The City is located in the Eastern San Joaquin County Groundwater Basin (ESJCGB), a sub-basin of the San Joaquin Valley Groundwater Basin. DWR classified the ESJCGB as a basin in a critical condition of overdraft in DWR Bulletin 118-80 (City of Manteca 2005).

Groundwater levels historically drop during severe drought periods and recover in subsequent wet periods; however, the Manteca area has experienced a long-term drop in groundwater levels resulting from local groundwater pumping and severe overdraft in the central and eastern portions of the groundwater basin. The City of Manteca continues to reduce overdraft of groundwater supplies and maintain historical reliability of groundwater resources by limiting groundwater usage to meet the safe aquifer yield for the area identified as 1.0 acre-foot per acre per year by the City's Public Works Department Engineering Division (City of Manteca 2006).

The City of Manteca historically extracted groundwater at a rate of approximately 2.4 acre-feet per acre per year. Recent groundwater extraction rates for the City are shown in Table 4.9-2. As shown in Table 4.9-2, the City of Manteca relied exclusively on groundwater resources for domestic water supplies from the years 2000 through 2004.

Table 4.9-2
City of Manteca Groundwater Extraction Rates

	Year				
	2000	2001	2002	2003	2004
Acre-Feet per Year	12,609	12,974	13,516	14,451	14,933
Percent of Total Water Supply	100	100	100	100	100

Source: City of Manteca 2005

Within the Manteca area, groundwater levels are relatively high as a result of the low topographic elevation and proximity to the San Joaquin River and Delta channels to the west. High groundwater can be influenced by water levels in the San Joaquin River, subsurface groundwater flow from areas of higher elevation to the east, and local irrigation practices. Groundwater recharge also may occur as a result of irrigation of agricultural lands and infiltration from streams flowing west out of the Sierra Nevada. The recharge occurs in areas with permeable materials that allow infiltration of water along streams, alluvial fans, and foothill areas (City of Manteca 2003b).

Local Water Supplies

The City of Manteca currently provides domestic water to its customers through a network of wells and transmission lines that extract groundwater from underlying aquifers and distribute the water throughout the City. The City recently began receiving domestic water supplies from the SSJID's South County Surface Water Supply Project (SCSWSP), which conveys surface water to the City for municipal use. The SCSWSP is a joint project between SSJID and the Cities of Manteca, Lathrop, Escalon, and Tracy to supply treated potable water to these cities. The SCSWSP involves the 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 began supplying surface water supplies to the City of Manteca in 2005 and is expected to provide sufficient surface water supplies to meet the City's future water demands. For additional information regarding local water supplies, the SCSWSP, and groundwater pumping, see Section 4.10, "Public Services and Utilities."

WATER QUALITY

National Drinking Water Standards (Maximum Contaminant Levels)

National drinking water standards include primary and secondary drinking water standards. Drinking water contaminant levels are reported as Maximum Contaminant Levels (MCLs). MCLs are legally enforceable standards based on health risk or nonhealth concerns such as odor or taste. National Primary Drinking Water Regulations (NPDWRs or primary standards) are legally enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water. National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are nonenforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. The United States EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

Groundwater Quality

The City's wells currently produce groundwater that meets or exceeds the State Department of Health Services (DHS) recommended drinking water quality standards (City of Manteca 2003a). Some areas of the City's groundwater basin are subject to saltwater intrusion from the Delta and adverse water quality impacts from infiltration of area runoff from urban and agricultural areas. Saline intrusion is the possible result of excessive groundwater withdrawal from aquifers. The extent of saline intrusion in the Manteca area is not well defined but is known to be located west of the City of Lathrop. Saline intrusion is an important issue related to the reliability of the existing groundwater system as it could result in well abandonment or water treatment to maintain existing water quality.

Several other known contaminants have the potential to affect the quality of groundwater for domestic use in the Manteca area (UWMP 2000). The concentrations of these have remained relatively stable, but have the potential to increase as a result of groundwater movement. They are:

Nitrate

Elevated levels of nitrate (as NO_3) are found at six city wells at 30 milligrams per liter (mg/l) or higher. If these levels were to increase above the MCL of 45 mg/l, production would have to stop from the source well and modified with screening of the upper portion of the aquifer where higher concentrations are found, or treating the water. The source of the nitrate is believed to be from past agricultural activities in the area.

Arsenic

Arsenic levels exceed the MCL of 10 micrograms per liter (µg/l) at 12 of the 16 city wells, which have concentrations of 12 to 19 µg/l l. Arsenic treatment has been initiated at each well to lower levels to below the MCL, and will be installed in any new wells constructed that exceed the MCL.

Manganese

There is no primary MCL for Manganese. The city has one well that exceeds the secondary MCL of 50 µg/l. This well has been installed with a filter to bring it into compliance. The secondary MCL addresses the aesthetic characteristics of water (e.g. taste and odor).

Organic Chemicals

Ethylene dibromide (EDB), dibromochloropropane (DBCP) and perchloroethylene (PCE) have been detected at low levels in seven of the city's wells. EDB and DBCP, agricultural chemicals that have been used in the surrounding area, are below the MCL in all but one well, which has been fitted with an activated carbon filter to remove the EDB and DBCP. PCE has been detected at one well at levels below the MCL. Concentrations of EDB and DBCP are expected to decline over time, as they have not been used for 20 years. PCE is also expected to decline as use of this chemical is more closely regulated.

Factors Affecting Groundwater Quality

In general, groundwater quality can be affected by unlined WWTP solids storage basins, land disposal sites, on-site wastewater treatment systems (OWTS) such as septage pits, and agriculture, including irrigation, fish, and dairy farming. It is reasonable to suspect that leachate from these sources may contain elevated levels of inorganic ions and salts, nitrogen in the form of nitrate or ammonia, and potentially other contaminants such as trace metals or organic compounds. Soil particles provide an effective barrier to the transmission of many chemical parameters through physical filtration, chemical complexation, or biological decay processes. However, the specific constituents that may be discharged to groundwater, concentrations of constituents in leachate, and fate in the underlying aquifers can cause potential risks to groundwater.

Surface Water Quality

San Joaquin River Water Quality

The water quality of the lower San Joaquin River drainage and the Sacramento–San Joaquin Delta has been heavily affected by human activities. Land use in the Sacramento–San Joaquin Delta is dominated by agriculture (about 538,000 acres), while urban and commercial property account for about 64,000 acres of developed land (DWR 2005). The use of pesticides and fertilizers has altered water quality, with pesticides sometimes reaching levels acutely toxic to sensitive invertebrates. Agriculture and urban/stormwater runoff are the predominant sources of contaminants in the San Joaquin Basin, as shown on Table 4.9-4. Agricultural return flows sometimes contain high concentrations of dissolved solids (i.e. salinity) and trace elements that can degrade water quality. Watersheds that feed the river and Delta contribute pollutants and stressors that produce or exacerbate water quality problems. Construction of the Stockton Deep Water Channel and channeling of the San Joaquin River system have created an area of reduced dissolved oxygen near Stockton. Contaminants on the 303(d) impaired waters list for the lower San Joaquin River drainage and the Sacramento–San Joaquin Delta are shown in Table 4.9-6.

Data from the Delta monitoring locations of long-term comprehensive surface water quality evaluation programs shown on Table 4.9-11 were compiled for three different water years for eighteen parameters (see constituents in

bold typeface presented in Table 4.9-12), based on availability of data and detection of the constituent in WQCF effluent. Monitoring data from these evaluation programs is summarized in Appendix D.

Manteca WQCF Effluent Quality

The Schedule A improvements (see Project Description Section 3.3, "Project Background and History") increased WQCF capacity to 7.5 mgd ADWF. Schedule B improvements increased the treatment capacity of the plant from 7.5 mgd to 9.87 mgd ADWF. Recent water quality monitoring data for the WQCF effluent are shown in Table 4.9-3. This data reflect implementation of the recent Schedule A and B improvements.

Table 4.9-3
Existing Manteca WQCF Effluent Quality

Constituent	Units	Project Effluent Quality[1]
Biochemical Oxygen Demand (BOD)	mg/l	15
Total Suspended Solids (TSS)	mg/l	15
Total Coliform	MPN/100 mL	23
Turbidity	NTU	8
Settleable Solids	mg/l	0.1
Chlorine Residual	mg/l	0.01
Oil and Grease	mg/l	2.1
Aluminum	µg/L	150
Electrical Conductivity (EC)	µmhos/cm	1100
Ammonia (as N)	mg/l	2.1
Arsenic	µg/l	12.5
Copper	µg/l	9
Cyanide	µg/l	7
Iron	µg/l	47
Manganese	µg/l	15
Methylene Blue Active Substances (MBAS)	µg/l	160
Nitrate (as N)	mg/l	10
Nitrite (as N)	mg/l	1
Bis(2-ethylhexyl)phthalate	µg/l	3.48
Bromodichloromethane	µg/l	1.98
Dibromochloromethane	µg/l	0.47
Mercury	µg/l	0.028
2,4,6-Trichlorophenol	µg/l	3.28

[1] Unless noted otherwise, all concentrations represent projected mean values taken from the 2007 City of Manteca WQCF Master Plan Update (Nolte 2006).

[2] Concentration represents median value taken from analysis of WQCF effluent evaluated as part of the WQCF Special Studies Monitoring Program

Source: LWA 2007

REGULATORY SETTING

HYDROLOGY

Groundwater Hydrology

California groundwater law is extremely complicated because of the variety of groundwater rights recognized in the state. Groundwater is classified as either a subterranean stream or 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, and are regulated by the SWRCB. Percolating groundwater is subject to general court-enforced principles of groundwater law, which recognizes overlying and appropriative rights. This latter category of groundwater can be regulated by ordinances adopted at the local level but is generally not subject to SWRCB regulation or oversight. Groundwater underlying the City of Manteca is classified as percolating groundwater.

Regional and Local Plans, Policies, Regulations, and Ordinances

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 U.S. Army Corps of Engineers (USACE), in coordination with federal, state, and local agencies, groups, and organizations in California's Central Valley, to develop a comprehensive plan for flood damage reduction and environmental restoration for the Sacramento and San Joaquin River basins. The comprehensive study is a regionwide planning effort and not a regulatory program; however, consistency with its goals and objectives is important for any project affecting flood control in the Sacramento–San Joaquin River basins. The proposed project site is located in the Lower San Joaquin River Region of the comprehensive study area.

City of Manteca General Plan 2023

The *City of Manteca General Plan 2023* (City of Manteca 2003a) includes policies to maintain adequate service in the City's drainage system and to protect both surface and groundwater resources from contamination. The following policies are relevant to this analysis:

Public Facilities and Services Element

- **Policy PF-P-27:** The City shall require the dedication and improvement of drainage detention basins as a condition of development approval according to the standards of the Drainage Master Plan. The responsibility for the dedication and improvement of detention basins shall be based on the prorated share of stormwater runoff resulting from each development.

The Resource Conservation Element (Water Quality) of the City of Manteca General Plan provides policies to protect both surface and groundwater resources from contamination (City of Manteca 2003a). The following policies may be relevant to the project:

- **Policy RC-P-11:** Minimize pollution of waterways and other surface water bodies from urban runoff.

- **Policy RC-P-12:** Protect the quality of Manteca's groundwater.

The City's General Plan also includes provisions that new industrial development with a significant potential to adversely affect San Joaquin River water quality or groundwater quality shall not be approved; that buffer areas between waterways and urban development shall be maintained to protect water quality and riparian areas; that

BMPs shall be utilized to limit urban pollutants from entering water courses; and that compliance with the RWQCB regulations and standards to maintain and improve groundwater quality in Manteca shall be required.

City of Manteca Storm Drain Master Plan

The City of Manteca's Storm Drain Master Plan (May 2006) is based on the City's Drainage Design Criteria supplemented by the SSJID's requirements and standards, San Joaquin County's Improvement Standards, and the County Hydrology Manual. These standards are further supplemented by design practices of other cities and counties and by the *California Stormwater Quality Association Stormwater Best Management Practice Handbook* (City of Manteca 2004).

The policies and criteria included in the Storm Drain Master Plan (SDMP) are designed to guide and set minimum standards for the design of storm drainage conveyance, retention facilities, and drainage pump stations in the city. Storm drain design must conform to the City of Manteca's current SDMP and standard Plans and Specifications (City of Manteca 2004).

The City's SDMP includes the following drainage requirements and design standards that are relevant to the project:

1. all stormwater improvements shall comply with the requirements of the SSJID agreement with the City;

2. operation of stormwater facilities shall comply with SSJID requirements to eliminate uncontrolled inflows to drains and laterals;

3. pump stations shall be designed with a minimum of one standby pump;

4. detention basin pump stations shall be designed to discharge the 10-year, 48-hour storm volume; and

5. minimum pipe diameter of storm drains shall be 12 inches.

WATER QUALITY

Numerous State and federal acts, rules, plans, policies, and programs define the framework for regulating water quality in California. The following discussion focuses on water quality requirements, as they are applicable to the Manteca WQCF and receiving water quality in the San Joaquin River.

Federal Water Quality Rules, Regulations, Plans and Policies

Clean Water Act and Associated Programs

The U.S. Environmental Protection Agency (EPA) is the primary federal agency responsible for water quality management. The Clean Water Act of 1972 (CWA) is the primary federal law that governs and authorizes water quality control activities by the EPA as well as the states. The law authorizes EPA to set point-source effluent limits for industry and publicly owned treatment works (POTWs) and requires states (or EPA in the event of default by states) to set water quality standards for contaminants in surface waters. The CWA also authorizes EPA to delegate many permitting, administrative, and enforcement aspects of the law to State governments. In such cases, however, EPA still retains oversight responsibilities. In California, such responsibility has been delegated to the State, which administers the CWA through the State Water Resources Control Board (SWRCB) and the nine RWQCBs.

Water Quality Criteria and Standards

Under federal law, the 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 CWA, 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 the 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. In California, the EPA has designated the SWRCB and its nine RWQCBs with authority to identify beneficial uses and adopt applicable water quality objectives. Beneficial uses for applicable water bodies in the assessment area are shown in Table 4.9-4. The applicable water quality criteria are shown in Table 4.9-5.

Table 4.9-4
Beneficial Uses Designated for the Sacramento–San Joaquin River Delta

Municipal and Domestic Supply (MUN)
Agricultural Supply: Irrigation (AGR)
Agricultural Supply: Stock Watering (AGR)
Industrial Process Supply (PROC)
Industrial Service Supply (IND)
Water Contact Recreation: Contact Recreation (REC 1)
Noncontact Water Recreation (REC 2)
Warm Freshwater Habitat (WARM)
Cold Freshwater Habitat (COLD)
Migration of Aquatic Organisms: Warm Water (MIGR)
Migration of Aquatic Organisms: Cold Water (MIGR)
Fish Spawning, Warm Water (SPWN)
Wildlife Habitat (WILD)
Navigation (NAV)
Source: CVRWQCB 2006a

Table 4.9-5
Applicable Water Quality Objectives and/or Criteria for the San Joaquin River and Sacramento–San Joaquin Delta

Classification	Constituent	Most Stringent Water Quality Objective or Criteria		Reference
		Value	Unit	
Bacteriological	Fecal Coliform	200/100 mL	MPN	Basin Plan
Conventional	BOD	N/A	N/A	N/A
	Chlorine Residual	0.011	mg/l	Draft TRC Policy of CA[1]
	Dissolved Oxygen	5	mg/l	Basin Plan

Table 4.9-5
Applicable Water Quality Objectives and/or Criteria for the San Joaquin River and Sacramento–San Joaquin Delta

Classification	Constituent	Most Stringent Water Quality Objective or Criteria		Reference
		Value	Unit	
Conventional	Electrical Conductivity (April–August)	700	µmhos/cm	Basin Plan
	Electrical Conductivity (September–March)	1,000	µmhos/cm	Basin Plan
	MBAS	500	µg/l	Title 22 MCL (secondary MCL)[2]
	Oil and Grease	Narrative	–	Basin Plan
	pH	$6.5 \leq pH \leq 8.5$	std. units	Basin Plan
	Settleable Solids	Narrative	–	Basin Plan
	Temperature	Narrative	°F	California Thermal Plan[3]
	TSS	Narrative	–	Basin Plan
	Turbidity	20% increase	NTU	Basin Plan
Metal	Aluminum, Total	87	µg/l	USEPA National Recommended Water Quality Criterion (Chronic)[4]
	Arsenic, Dissolved	10	µg/l	Basin Plan, Table III-1
	Copper, Dissolved	10	µg/l	Basin Plan, Table III-1
	Cyanide, Total	5.2	µg/l	California Toxics Rule (Freshwater, Chronic)
	Iron, Dissolved	300	µg/l	Basin Plan, Table III-1
	Manganese, Dissolved	50	µg/l	Basin Plan, Table III-1
	Mercury, Total	0.051	µg/l	California Toxics Rule (Human Health)
Nutrient	Ammonia as N (June–September)	0.62	mg/l	U.S. EPA 1999 Update of Ambient Water Quality Criteria for Ammonia (30-day average)[4]
	Ammonia as N (October–May)	5.62	mg/l	U.S. EPA 1999 Update of Ambient Water Quality Criteria for Ammonia (1-hour average)[5]
	Nitrate as N	10	mg/l	Title 22 MCL (Primary)/ Basin Plan[2]
	Nitrite as N	1	mg/l	Title 22 MCL (Primary)/ Basin Plan[2]

Table 4.9-5 Applicable Water Quality Objectives and/or Criteria for the San Joaquin River and Sacramento–San Joaquin Delta				
Classification	Constituent	Most Stringent Water Quality Objective or Criteria		Reference
		Value	Unit	
Organic	2,4,6-Trichlorophenol	2.1	µg/l	California Toxics Rule (Human Health, Water & Organisms)
	Bis(2-ethylhexyl)phthalate	1.8	µg/l	California Toxics Rule (Human Health, Water & Organisms)
	Bromodichloromethane	0.56	µg/l	California Toxics Rule (Human Health, Water & Organisms)
	Dibromochloromethane	0.41	µg/l	California Toxics Rule (Human Health, Water & Organisms)

[1] Draft Total Residual Chlorine and Chlorine-Produced Oxidants Policy of California, June 2006.
[2] Incorporated into the Basin Plan by reference (CVRWQCB 2006a).
[3] California Thermal Plan (SWRCB 1972).
[4] Numeric criterion used to interpret narrative water quality objective based on a pH of 8.4 std. units and a temperature of 26 °C; cited in National Pollutant Discharge Elimination System (NPDES) No. CA0081558 (CVRWQCB 2004).
[5] Numeric criterion used to interpret narrative water quality objective based on a pH of 8 std. units; cited in NPDES No. CA0081558 (CVRWQCB 2004).

Permit Program for the National Pollutant Discharge Elimination System

The NPDES permit program was established in the CWA to regulate municipal and industrial discharges to surface waters of the United States. Federal NPDES permit regulations have been established for broad categories of discharges, including point-source municipal waste discharges and nonpoint-source stormwater runoff. NPDES permits generally identify 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. The RWQCBs in California are responsible for implementing the NPDES permit system (see additional information below).

Section 401 Water Quality Certification or 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 requirement is delegated by the SWRCB to the nine RWQCBs.

Industrial Waste Pretreatment Requirements

Under the CWA, EPA was required to establish pretreatment standards to prevent the discharge of any pollutant into a publicly owned treatment works (POTW) that would interfere with, pass through untreated, or otherwise be incompatible with such treatment works. Each POTW discharging over 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 CWA. EPA is responsible for enforcing the National Pretreatment Program at the federal level. In California,

Pretreatment Program enforcement is the responsibility of the RWQCB. The Manteca WQCF implements an Industrial Waste Pretreatment Program to regulate and control the discharge of constituents of concern.

Section 303(d) Impaired Waters List

Section 303(d) of the CWA requires States to develop lists of water bodies (or sections of water bodies) that will not attain water quality standards after implementation of minimum required levels of treatment by point-source dischargers (i.e., municipalities and industries). Section 303(d) requires States to develop a Total Maximum Daily Load (TMDL) for each of the listed pollutants and water bodies. A TMDL is the amount of loading that the water body can receive and still meet water quality standards. The TMDL can also act as a plan to reduce loading of a specific pollutant from various sources to achieve compliance with water quality objectives. The TMDL must include an allocation of allowable loadings to point and nonpoint sources, with consideration of background loadings and a margin of safety. Generally, NPDES permit limitations for listed pollutants must be consistent with the load allocation identified in the TMDL.

The most recently approved (1998) CWA Section 303(d) list for California identifies the Delta waterways as water-quality impaired for a number of constituents is shown on Table 4.9-6. The State has completed a public process to update the 303(d) list (SWRCB Resolution No. 2006–0079). The SWRCB has submitted revisions to EPA for approval. The recommended changes include the addition of 53 new water bodies and pollutants to the list; removal of 3 water bodies and pollutants from the list; refinement of identified impaired reaches; and changes in TMDL development priorities. No changes to the water bodies and constituents listed in Table 4.9-6 were proposed. However, Group A pesticides in Delta waterways were identified as requiring further assessment prior to the RWQCB making a recommendation for de-listing (RWQCB 2001).

Table 4.9-6
2006 Section 303(d) Listed Pollutants for the San Joaquin River and Sacramento–San Joaquin Delta

Pollutant/Stressor	Central Portion	Eastern Portion	Export Area	Southern Portion	Stockton Ship Channel	Western Portion
Chlorpyrifos	X		X	X		
DDT	X	X	X	X	X	X
Diazinon	X		X	X		
Dioxin					X[1]	
Electrical Conductivity			X	X		X
Exotic Species	X	X	X	X	X	X
Furan Compounds					X[1]	
Group A Pesticides [2]	X	X	X	X	X	X
Mercury	X	X	X	X	X	X
Pathogens					X[1]	
PCBs					X[1]	
Unknown Toxicity [3]	X	X	X	X	X	X

[1] This listing was previously under Stockton Turning Basin, upper (Port Turning Basin). In order to consolidate listings for same areas, all listings for Stockton Turning Basin on the 2002 303(d) list are now included under the Delta Waterways (Stockton Ship Channel) sub-region.
[2] One or more Group A Pesticides (Group A pesticides include aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, BHC (including Lindane), endosulfan, and toxaphene).
[3] Toxicity is known to occur, but the constituent(s) causing toxicity is unknown.
Source: RWQCB 2006 303(d) list. Adapted from Manteca 2007

Potential sources of the 303(d) listed contaminants for the San Joaquin River and Delta area, and estimated completion dates for their TMDL implementations, are shown in Table 4.9-7.

Table 4.9-7 Potential Sources and Proposed TMDL Completion Dates for San Joaquin River and Sacramento-San Joaquin Delta Section 303(d) Listed Pollutants		
Pollutant/Stressor	Potential Sources	Proposed TMDL Completion
Chlorpyrifos	Agriculture, Urban Runoff/Storm Sewer	2019
DDT	Agriculture	2011
Diazinon	Agriculture, Urban Runoff/Storm Sewer	2019
Dioxin	Point Source	2019
Electrical Conductivity	Agriculture	2019
Exotic Species	Source Unknown	2019
Furan Compounds	Contaminated Sediments	2019
Group A Pesticides [1]	Agriculture	2011
Mercury	Resource Extraction (abandoned mines)	2006
Pathogens	Urban Runoff/Storm Sewer, Recreational and Tourism Activities (nonboating)	2008
PCBs	Point Source	2019
Unknown Toxicity [2]	Source Unknown	2019

[1] One or more Group A Pesticides (Group A pesticides include aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, BHC (including Lindane), endosulfan, and toxaphene).
[2] Toxicity is known to occur, but the constituent(s) causing toxicity is unknown.
Source: RWQCB 2006 303(d) list. Adapted from Manteca 2007

National Toxics Rule and California Toxics Rule

In 1992, pursuant to the CWA, EPA promulgated the National Toxics Rule (NTR) to establish numeric criteria for priority toxic pollutants for California. The NTR established water quality standards for 42 pollutants not covered, at that time, under California's statewide water quality regulations. As a result of a court-ordered revocation of California's statewide water quality control plan for priority pollutants in September 1994, EPA initiated efforts to promulgate additional numeric water quality criteria for California. In May 2000, EPA issued the California Toxics Rule (CTR) that promulgated numeric criteria for priority pollutants not included in the NTR. The CTR documentation (FR 65 31682, May 18, 2000) "carried forward" the previously promulgated standards of the NTR, thereby providing a single document listing California's fully adopted and applicable water quality criteria for priority pollutants.

Federal Antidegradation Policy

The federal antidegradation policy is designed to protect existing uses and the level of water quality necessary to protect existing uses, and provide protection for higher quality and national water resources. The federal policy directs States to adopt a statewide policy that includes the following primary provisions (40 CFR 131.12):

> (1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
>
> (2) Where the quality of waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located…

(3) Where high quality waters constitute an outstanding National resource, such as waters of National and States parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was passed in 1974 (Public Law 93-523) to regulate the Nation's drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources—rivers, lakes, reservoirs, springs, and groundwater.

The SDWA authorizes EPA to set national health-based standards for drinking water to protect against both naturally occurring and human-made contaminants of concern that may be found in drinking water. Contaminants of concern relevant to domestic water supplies are defined as those that pose a public health threat or that alter the aesthetic acceptability of the water. Drinking water contaminant levels are reported as MCLs. MCLs are legally enforceable standards based on health risk or nonhealth concerns such as odor or taste. National Primary Drinking Water Regulations (NPDWRs or primary standards) are legally enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water. National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are nonenforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water.

EPA sets national standards for drinking water based on science to protect against health risks, considering available technology and costs. These National Primary Drinking Water Regulations set enforceable primary and secondary MCLs for particular contaminants in drinking water or require ways to treat water to remove contaminants. 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.

Stage 1 Disinfectants and Disinfection Byproducts Rule

Amendments to the SDWA in 1996 require EPA to develop rules to balance the risks between microbial pathogens and disinfection byproducts (DBPs). The Stage 1 Disinfectants and Disinfection Byproducts Rule (40 CFR Parts 9, 141, and 142), announced in December 1998, is the first of a set of rules under the 1996 SDWA amendments. The Stage 1 Disinfectants and Disinfection Byproducts Rule applies to all community and nontransient, noncommunity water systems that treat their water with a chemical disinfectant for either primary or residual treatment. The rule establishes maximum residual disinfectant level goals and maximum residual disinfectant levels for three chemical disinfectants—chlorine, chloramine, and chlorine dioxide. It also establishes maximum contaminant level goals and MCLs for total trihalomethanes, haloacetic acids, chlorite, and bromate.

Interim Enhanced Surface Water Treatment Rule

The Interim Enhanced Surface Water Treatment Rule (40 CFR Parts 9, 141, and 142), was also announced in December 1998, as another rule developed to balance the risks between microbial pathogens and DBPs under the 1996 SDWA amendments. The Interim Enhanced Surface Water Treatment Rule applies to public water systems that use surface water or groundwater under the direct influence of surface water (GWUDI) and serve at least 10,000 people. In addition, States are required to conduct sanitary surveys for all surface water and GWUDI systems, including those that serve fewer than 10,000 people. The final rule includes treatment requirements for waterborne pathogens, e.g., *Cryptosporidium*. In addition, systems must continue to meet existing requirements for *Giardia lamblia* and viruses. Specifically, the rule includes:

- Maximum contaminant level goal (MCLG) of zero for *Cryptosporidium,*
- 2-log *Cryptosporidium* removal requirements for systems that filter,

- Strengthened combined filter effluent turbidity performance standards,
- Individual filter turbidity monitoring provisions,
- Disinfection profiling and benchmarking provisions,
- Systems using groundwater under the direct influence of surface water now subject to the new rules dealing with *Cryptosporidium,*
- Inclusion of *Cryptosporidium* in the watershed control requirements for unfiltered public water systems,
- Requirements for covers on new finished water reservoirs, and
- Sanitary surveys, conducted by States, for all surface water systems regardless of size.

STATE AND LOCAL PLANS, POLICIES, REGULATIONS, AND LAWS

California State Water Resources Control Board

In California, the SWRCB has broad authority over water quality control issues for the state. The SWRCB is responsible for developing statewide water quality policy and exercises the powers delegated to the state by the federal government under the CWA. Other state agencies with jurisdiction over water quality regulation in California include the DHS (for drinking water regulations), the California Department of Pesticide Regulation, the California Department of Fish and Game (DFG), 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 Central Valley RWQCB is responsible for the water bodies in the project vicinity.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) of 1969 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 SWRCB and RWQCBs to adopt and periodically update water quality control plans (also called Basin Plans). 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. The act also requires waste dischargers to notify the RWQCBs of their activities through the filing of Reports of Waste Discharge (RWD) and authorizes the SWRCB and RWQCBs to issue and enforce waste discharge requirements (WDRs), NPDES permits, Section 401 water quality certifications, or other approvals. The RWQCBs also have authority to issue waivers to RWD/WDRs for broad categories of "low threat" discharge activities that have minimal potential for adverse water quality effects when implemented according to prescribed terms and conditions.

Water Quality Control Plan for the Sacramento–San Joaquin River Basins

The Water Quality Control Plan for the Sacramento–San Joaquin River Basins (Basin Plan), adopted by the Central Valley RWQCB in 1998, identifies the beneficial uses of water bodies and provides water quality objectives and standards for surface waters and groundwaters of the Sacramento River and San Joaquin River basins, including the Delta. State and federal laws mandate the protection of designated "beneficial uses" of water bodies. State law defines beneficial uses as "domestic; municipal; agricultural and industrial supply; power

generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code Section 13050[f]). Additional protected beneficial uses of the San Joaquin River include groundwater recharge and freshwater replenishment.

The Basin Plan contains specific narrative and numeric water quality objectives for a number of physical properties (e.g., temperature, turbidity, and suspended solids), biological constituents (e.g., coliform bacteria), and chemical constituents of concern, including inorganic parameters, trace metals, and organic compounds. Water quality objectives for toxic priority pollutants (i.e., select trace metals and synthetic organic compounds) are included in the Basin Plan and the California Toxics Rule (CTR) that was adopted in May 2000.

1995 Bay-Delta Water Quality Control Plan

The proposed project is within the legal boundary of the San Francisco Bay/Sacramento–San Joaquin Delta (Delta). The Central Valley Project (CVP) and State Water Project (SWP) are currently responsible for maintaining water quality in the Delta to standards established by the SWRCB as stipulated in the 1995 Bay-Delta Water Quality Control Plan (Bay-Delta Plan) (SWRCB 1995). This plan supersedes both the Water Quality Control Plan for the Delta and Suisun Marsh, adopted August 1978 and the Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento–San Joaquin Delta, adopted May 1991. As with other State water quality control plans, the Bay-Delta Water Quality Control Plan identifies the beneficial uses to be protected, the water quality objectives for reasonable protection of the beneficial uses, and a program of implementation for achieving the water quality objectives.

Among the various criteria described in the Bay-Delta Plan are specific numeric standards for Delta inflow and outflow chloride, and electrical conductivity (EC) at various locations in the Delta (Table 4.9-8), numeric objectives for other water quality constituents, numeric operational constraints for the CVP and SWP, a narrative objective to protect salmon, and a narrative objective to protect brackish tidal marshes in Suisun Marsh. EC standards in the Delta exist for agricultural, fish, and wildlife beneficial uses. EC is a measure of water's ability to conduct an electric current, and is an indirect measure of the concentration of dissolved salts in water.

The Bay-Delta Plan is the substantive regulatory authority over Delta hydrologic conditions. Compliance with the standards is maintained, in part, by regulating the releases from CVP and SWP reservoirs upstream of the Delta. During certain months of certain years, a major portion of inflow to the Delta is affected by CVP and SWP regulation.

Table 4.9-8
Sacramento San Joaquin Delta Water Quality Control Plan Standards for Delta Inflow and Outflow, Chloride, and Electrical Conductivity.

Location	Parameter	Standard	Description
Contra Costa Canal at Pumping Plant #1	Chloride (Cl-)	240 days [a]	Maximum mean daily ≤ 150 mg/l Cl- for at least the number of days shown during the calendar year
Contra Costa Canal at Pumping Plant #1	Chloride (Cl-)	250 mg/l	Maximum mean daily (mg/l)
Sacramento River at Emmaton	Electrical Conductivity (EC)	0.45 EC [b]	Maximum 14-day running average of mean daily EC (mmhos/cm) Apr 1 through Aug 15
West Canal at mouth of Clifton Court Forebay and Delta Mendota Canal at Tracy Pumping Plant	Electrical Conductivity (EC)	1.00 EC	Maximum monthly average of mean daily EC (mmhos/cm)
Sacramento River at Collinsville	Electrical Conductivity (EC)	8.00 EC [c]	Maximum monthly average of both daily high tide EC values (mmhos/cm)

Table 4.9-8 Sacramento San Joaquin Delta Water Quality Control Plan Standards for Delta Inflow and Outflow, Chloride, and Electrical Conductivity.			
Location	Parameter	Standard	Description
Sacramento River at Rio Vista	Flow Rate	4,500 cfs [d]	Minimum monthly average flow rate (cfs)
Delta Outflow	Net Delta Outflow Index	8,000 cfs [e]	Minimum Monthly average (cfs). For the May-Jan objectives, if the value is less than or equal to 5,000 cfs, the 7-day running average shall not be less than 1,000 cfs below the value; if the value is greater than 5,000 cfs, the 7-day running average shall not be less than 80% of the value.

[a] Number of days per year is dependent on water year type. Wet ⇒ 240 days; Above Normal ⇒ 190 days; Below Normal ⇒ 175 days; Dry ⇒ 165 days; Critical ⇒ 155 days.

[b] EC standard is relaxed before August 15 depending on water year type. Wet ⇒ no relaxation; Above Normal ⇒ on July 1 relaxed to 0.63; Below Normal ⇒ on June 20 relaxed to 1.14; Dry ⇒ on June 15 relaxed to 1.67; Critical ⇒ on April 1 relaxed to 2.78

[c] EC standard varies by month. October ⇒ 19.0; November-December ⇒ 15.5; January ⇒ 12.5; February-March ⇒ 8.0; April-May ⇒ 11.0

[d] Flow rate varies by month and water year type. September ⇒ all year types = 3,000 cfs; October ⇒ Wet, Above Normal, Below Normal & Dry year types = 4,000 cfs; October ⇒ Critical year type = 3,000 cfs; November & December ⇒ Wet, Above Normal, Below Normal & Dry year types = 4,500 cfs; November & December ⇒ Critical year type = 3,500 cfs

[e] Index varies by month and water year type. January ⇒ all year types = 4,500 cfs or 6,000 cfs depending on Eight River Index; February through June ⇒ all year types = variable between 7,100 cfs and 4,000 cfs depending on Eight River Index; July ⇒ Wet & Above Normal year types = 8,000 cfs; July ⇒ Below Normal year type = 6,500 cfs; July ⇒ Dry year type = 5,000 cfs; July ⇒ Critical year type = 4,000 cfs; August ⇒ Wet, Above Normal & Below Normal year types = 4,000 cfs; August ⇒ Dry year type = 3,500 cfs; August ⇒ Critical year type = 3,000 cfs; September ⇒ all year types = 3,000 cfs; October ⇒ Wet, Above Normal, Below Normal & Dry year types = 4,000 cfs; October ⇒ Critical year type = 3,000 cfs; November & December ⇒ Wet, Above Normal, Below Normal & Dry year types = 4,500 cfs; November & December ⇒ Critical year type = 3,500 cfs

Source: LWA 2007

Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan) and SWRCB Resolution 5-00-192 (if any Exception)

The Thermal Plan sets limits for "thermal waste" and "elevated temperature waste" discharged into coastal and interstate waters and enclosed bays and estuaries of California (SWRCB 1975). The Thermal Plan also empowers RWQCBs, with SWRCB concurrence, to grant an exception from the plan's specific water quality objectives (SWRCB 1975). Estuarine waters are considered to extend from "*a bay or the open ocean to the upstream limit of tidal action*" (SWRCB 1975). The San Joaquin River is subject to tidal action and, therefore, the Thermal Plan's water temperature differential objectives for effluent and receiving waters generally apply to discharges within this reach of the river.

Objective 5A(1)a of the Thermal Plan prohibits a waste discharge to estuaries that exceeds the natural receiving water temperature by more than 20ºF. Objective 5A(1)b prohibits a waste discharge that would cause more than a 1ºF (0.56ºC) rise in more than 25% of the receiving water cross-section at the discharge location. Objective 5A(1)c states that no discharge shall cause a surface water temperature rise of more than 4°F above the natural receiving water temperature at any time.

Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

The *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (also referred to as the Statewide Implementation Plan, or SIP) (SWRCB 2000) applies to discharges of toxic pollutants into inland surface waters, enclosed bays, and estuaries. The policy describes methods for setting effluent limits in NPDES permits from NTR and CTR standards and priority pollutant objectives established in Basin Plans using one of several methods, including: (1) TMDL waste load allocation procedures; (2) steady-state modeling; and (3) dynamic modeling. The policy also establishes certain monitoring requirements and chronic toxicity control provisions, and includes special provisions for certain types of discharges.

SWCRB Resolution No. 68-16 (Statement of Policy with Respect to Maintaining High Quality Waters in California)

The goal of State Water Board Resolution No. 68-16 ("Statement of Policy With Respect to Maintaining High Quality Waters in California") is to maintain high quality waters where they exist in the State. State Board Resolution No. 68-16 states, in part:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) pollution or a nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

The SWRCB has interpreted Resolution No. 68-16 to incorporate the federal antidegradation policy, which is applicable if a discharge that began after November 28, 1975 will lower existing surface water quality (RWQCB 1998).

Water Reclamation Regulations

Wastewater reclamation 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 reclaimed water. The regulations establish acceptable levels of constituents in reclaimed water for a range of uses and prescribe means for assurance of reliability in the production of reclaimed water. DHS has jurisdiction over the distribution of reclaimed wastewater and the enforcement of Title 22 regulations. The RWQCBs are responsible for issuing waste discharge requirements (including discharge prohibitions, monitoring, and reporting programs). The Manteca WQCF is currently permitted to reclaim up to 5 mgd of wastewater under Waste Discharge Requirements Order No. 97-146, adopted June 20, 1997 (RWQCB 1997).

NPDES Permits and WDRs

The SWRCB and Central Valley RWQCB have adopted specific NPDES permits for a variety of activities that have potential to discharge wastes to waters of the state. The SWRCB's statewide stormwater permit for general construction activity (Order 99-08-DWQ, as amended) is applicable to all land-disturbing construction activities that would disturb more than one acre. The SWRCB has also issued a general NPDES stormwater permit for industrial discharges (General Industrial Permit).

These General Permits require (1) submittal to the Central Valley RWQCB of a Notice of Intent (NOI) to discharge, and (2) preparation of a stormwater pollution prevention plan (SWPPP) that identifies and describes the best management practices (BMPs) to be implemented at the site to minimize pollution from stormwater runoff. The Central Valley RWQCB may also issue site-specific WDRs, or waivers to WDRs, for certain waste discharges to land or waters of the state. In particular, Central Valley RWQCB Resolution R5-2003-0008 identifies activities subject to waivers of WDRs and/or WDRs for a variety of activities, including minor dredging activities and construction dewatering activities that discharge to land. For example, the Central Valley RWQCB's general NPDES permit for construction dewatering activity (Order 5-00-175) authorizes direct discharges to surface waters up to 250,000 gallons per day for no more than a 4-month period each year.

Construction activities subject to the general construction activity permit include clearing, grading, stockpiling, and excavation. Dischargers are required to eliminate or reduce nonstormwater discharges to storm sewer systems and other waters. The permit also requires dischargers to consider the use of permanent post-construction BMPs that would remain in service to protect water quality throughout the life of the project. All NPDES permits also have inspection, monitoring, and reporting requirements. In response to a court decision, the Central Valley RWQCB implemented mandatory water quality sampling requirements in Resolution 2001-046 for visible and nonvisible contaminants in discharges from construction activities.

Water quality sampling is now required if the activity could result in the discharge of turbidity or sediment to a water body that is listed as impaired under Section 303(d) because of sediment or siltation, or if a release of a nonvisible contaminant occurs. Where such pollutants are known or should be known to be present and have the potential to contact runoff, sampling and analysis is required. NPDES permits require the implementation of design and operational BMPs to reduce the level of contaminant runoff. Types of BMPs include source controls, treatment controls, and site planning measures.

Discharges subject to the SWRCB's NPDES general permit for construction activity must develop and implement a SWPPP. The SWPPP includes a site map and description of construction activities and identifies the BMPs that would be employed to prevent soil erosion and discharge of other construction-related pollutants (e.g., petroleum products, solvents, paints, cement) that could contaminate nearby water resources. A monitoring program is generally required to ensure that BMPs are implemented according to the SWPPP and are effective at controlling discharges of stormwater-related pollutants.

Manteca WQCF NPDES Permit

The Manteca WQCF presently operates and discharges treated effluent to the San Joaquin River under the requirements of a NPDES permit issued by the Central Valley RWQCB in Order No. R5-2004-0028 and as amended by Order No. R5-2005-0110. The permit includes three sets of effluent limitations for discharge to the San Joaquin River based on the design treatment capacity of the WQCF as it undergoes its scheduled improvements. The permit contains effluent limitations for design treatment capacities of 6.95, 8.11, and 9.87 mgd. Table 4.9-9 presents the effluent limits for the 9.87 mgd design treatment capacity contained in the City's NPDES permit. A copy of the permit is included in Appendix E.

Table 4.9-9
Adopted Effluent Limits for City's WQCF Discharge to the San Joaquin River at a 9.87 MGD ADWF Design Treatment Capacity

Constituent	Units	Monthly Average	Weekly Average	1-Hour Average	Daily Maximum
BOD[1]	mg/l	10[2]	20[2]	—	30[2]
TSS	mg/l	10[2]	20[2]	—	30[2]
Total Coliform	MPN/100 mL	—	2.2[(3)]	—	23/240[4]
Turbidity	NTU	—	—	2[(5)]	5/10[6]
Settleable Solids	ml/l	0.1	—	—	0.2

Table 4.9-9
Adopted Effluent Limits for City's WQCF Discharge to the San Joaquin River at a 9.87 MGD ADWF Design Treatment Capacity

Constituent	Units	Monthly Average	Weekly Average	1-Hour Average	Daily Maximum
Chlorine Residual	mg/l	—	0.01[7]	0.02	—
Oil and Grease	mg/l	10	—	—	15
Aluminum[8]	µg/l	71	—	—	140
Electrical Conductivity[9]	µmhos/cm	1000	—	—	—
pH	pH units	—	—	—	6.5 to 8
Ammonia as N (June–September)	mg/l	2.1	—	—	4.4
Ammonia as N (October–May)	mg/l	2.8	—	—	5.6
Arsenic	µg/l	10	—	—	—
Copper	µg/l	7.9	—	—	10.4
Cyanide	µg/l	3.7	—	—	10
Iron	µg/l	300	—	—	—
Manganese	µg/l	50	—	—	—
MBAS	µg/l	500	—	—	—
Nitrate as N	mg/l	10	—	—	—
Nitrite as N	mg/l	1	—	—	—
Bis(2-ethylhexyl)-phthalate	µg/l	22	—	—	44
Bromodichloromethane[10]	µg/l	30	—	—	47
Dibromochloromethane[10]	µg/l	7	—	—	16
Mercury	lbs/year	0.69	—	—	—
2,4,6-Trichlorophenol	µg/l	34	—	—	69

Notes:
mg/l = milligrams per liter
µg/l = micrograms per liter
NTU = nephlometric turbidity units
MPN = most probable number
lbs/yr = pounds per year
µmhos/cm = microhmos per centimeter
[1] 5-day, 20°C biochemical oxygen demand (BOD).
[2] To be ascertained by a 24-hour composite sample.
[3] Weekly median.
[4] Does not exceed 23 in more than one sample in any 30-day period. No sample shall exceed 240.
[5] Does not exceed an average of 2 NTU within a 24-hour period.
[6] Does not exceed 5 NTU more than 5 percent of the time within a 24-hour period and 10 NTU at any time.
[7] Expressed as 4-day average.
[8] Compliance with effluent limitations for aluminum specified in Order No. R5-2004-0028 shall be determined using acid soluble methods of measurement. The Discharger may conduct a water effect ratio study to develop a site-specific objective, and upon adoption and approval of a Basin Plan amendment, the permit may be reopened and the aluminum limitation reconsidered.
[9] Effluent limitation adopted by State Water Resources Control Board in Order WQ 2005-0005.
[10] Effluent limitation adopted by RWQCB in Resolution No. R5-20050110.
Source: LWA 2007

Stormwater NPDES Permit

The CWA also established a framework for regulating municipal and industrial stormwater discharges under the NPDES Program. In November 1990, the EPA published regulations establishing NPDES permit requirements for specified categories of industries, including wastewater treatment plants. Phase 1 of the permitting program applied to municipal discharges of stormwater in urban areas where the population exceeded 100,000 persons. Phase 1 also applied to stormwater discharges from a large variety of industrial activities, including general construction activity if the project would disturb more than 5 acres. Phase 2 of the NPDES stormwater permit regulations, which became effective in March 2003, required that NPDES permits be issued for construction activity for projects that disturb between 1 and 5 acres. Phase 2 of the municipal permit system (known as the NPDES General Permit for Small MS4s) requires small municipal areas of less than 100,000 persons to develop stormwater management programs.

Title 27, Division 2

Title 27, Division 2 of the California Code of Regulations regulates water quality aspects of waste discharge to land. The regulations establish waste management requirements for waste treatment, storage, or disposal in landfills, surface impoundments, waste piles, land treatment facilities, and other waste management units. They include minimum standards for proper management of each waste category. Waste management units at the Manteca WQCF that are currently subject to Title 27 regulations include the dedicated land disposal areas (DLDs) and a landfill formerly used for disposal of grit and screenings. The solids storage basins (SSBs) are not specifically regulated under Title 27, but are regulated under WDRs. The WDRs include a groundwater monitoring program, which is designed to determine if leakage from solids storage and disposal facilities has occurred and if it could affect groundwater quality.

4.9.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Hydrology

Analysis of potential impacts related to hydrology is based on information obtained from the City of Manteca Storm Drain Master Plan (May 2006) and site investigations. Because the project would not require increased potable water and would not construct any groundwater wells, no impacts to the underlying groundwater basin would occur and this issue is not analyzed further in this EIR. The project site is not located near the ocean and as a result would not be subject to flood-related effects associated with a tsunami. The only project facilities that would be located above ground near an open body of water would be the proposed outfall structure. This structure would be designed to withstand the effects of flood inundation; therefore, impacts to project facilities as a result of a seismically induced seiche would not occur and this issue is not evaluated further in this EIR. Because the project is not locted in a 100-year flood zone and would not construct any housing, the project would not result in any direct impacts related to placing people and/or structures in a 100-year flood hazard area. Because the local Office of Emergency Services prepared a Dam Failure Plan that provides an adequate evacuation plan in case of a dam failure, the project would not expose people or structures to a significant flooding risk resulting from the failure of dam. These impacts are not evaluated further in this EIR.

Water Quality

Selection of Water Quality Constituents

Water quality constituents were selected for quantitative near- and far-field analyses based on availability of adequate detected data in effluent and one or more of the following conditions (Table 4.9-10):

- City of Manteca WQCF received an effluent limitation for a particular constituent in Order No. R5-2004-0028,
- Constituent was identified as a pollutant/stressor on the proposed 2006 Clean Water Act Section 303(d) list for select Delta waterways,
- Constituent for which an adopted TMDL exists downstream of WQCF discharge, and
- Constituent is an historic pollutant of concern in the Sacramento–San Joaquin Delta

Table 4.9-10
Sources of Surface Water Quality Data used in Near-Field and Far-Field Analyses

Data Source and Monitoring Program	Monitoring Location(s)	Monitoring Date Range(s)
Self-monitoring data: City of Manteca WQCF NPDES self-monitoring program	WQCF R-1	Apr. 2004 – Sept. 2004 (dry) Oct. 2005 – June 2006 (wet)
13267 monitoring data: City of Manteca WQCF monitoring data collected pursuant to California Water Code §12367	WQCF R-1	Jan. 2002 – Jan. 2003 (dry)
Special studies monitoring data: City of Manteca WQCF monitoring data collected to determine reasonable potential for exceedance of dissolved metals objectives	WQCF R-1	Nov. 2005 – July 2006 (wet)
Thermal Plan Exception Study: City of Manteca WQCF monitoring data collected in support of the City's Thermal Plan Exception Analysis	San Joaquin River at Mossdale Bridge	Apr., Sept., Dec. 2002 (dry)
DWR-MWQI: California Department of Water Resource Municipal Water Quality Investigations Program	San Joaquin River at Mossdale Bridge, Contra Costa Pumping Plant #1[1], Old River near Byron, Delta Pumping Plant Headworks, Delta Mendota Canal Intake at Lindemann Road	Oct. 1989 – Sept. 1994 (crit) Oct. 2000 – Sept. 2004 (dry)
DO Study-DWR: California Department of Water Resources data collected as part of San Joaquin River Dissolved Oxygen Study	Stockton Ship Channel Turning Basin	Oct. 2000 – Oct. 2001(dry)
DO Study-Stockton: City of Stockton data collected as part of San Joaquin River Dissolved Oxygen Study	Stockton Ship Channel Turning Basin, San Joaquin River at RWCF-R8[2]	Oct. 2000 – Sept. 2001(dry)
DO Study-UOP: University of the Pacific data collected as part of San Joaquin River Dissolved Oxygen Study	Stockton Ship Channel Turning Basin	June 2001 – Oct. 2001 (dry)
Stockton RWCF self-monitoring: City of Stockton Regional Wastewater Control Facility NPDES self-monitoring program	San Joaquin River at RWCF-R8[2]	Jan. 2004 – Sept. 2004 (dry)

"crit" – Data were collected during a critical water year; "dry" – Data were collected during a dry/below normal water year;
"wet" – Data were collected during a wet water year.
[1] Contra Costa Pumping Plant #1 is also known as Contra Costa Water District Intake at Rock Slough.
[2] San Joaquin River at RWCF-R8 is also known as San Joaquin River at Navigation Light 18.
Source: LWA 2007

Thirty-three water quality parameters (near-field and far-field) were initially identified for evaluation based on the four criteria listed above. Eighteen parameters were ultimately selected for near-field and/or far-field analysis (see constituents in bold typeface presented in Table 4.9-11) based on availability of data and detection of constituent in WQCF effluent. Therefore, the remaining 15 parameters were removed from evaluation because they either behave in a nonconservative manner and their downstream receiving water concentrations cannot be reliably estimated (e.g., total coliform, turbidity, chlorine residual, etc.), were not detected in WQCF effluent or lacked data that would allow for an evaluation.

Table 4.9-11
Water Quality Constituents Identified for Near-Field and Far-Field Analyses

Constituent	Monitoring Location	Data Source(s)	Selected for Analysis
Biochemical Oxygen Demand (BOD)	San Joaquin River at Mossdale Bridge	DWR-MWQI	**Near-Field**
Total Suspended Solids (TSS)	WQCF R-1	Special studies monitoring data	**Near-Field**
Total Coliform	WQCF R-1	WQCF self-monitoring	No, nonconservative parameter(1)
Turbidity	WQCF R-1	WQCF self-monitoring	No, nonconservative parameter(1)
Settleable Solids	–	No data available	No
Chlorine Residual	WQCF R-1	WQCF self-monitoring	No, nonconservative parameter(1)
Oil and Grease	–	No data available	No
Aluminum, Total	WQCF R-1	13267 monitoring data, Self-monitoring data	**Near-Field**
Electrical Conductivity	WQCF R-1	13267 monitoring data, Self-monitoring data	**Near-Field**
	Multiple Delta locations	DWR-MWQI, DO Study-Stockton, DO Study-UOP, Stockton RWCF self-monitoring	**Far-Field**
Dissolved Organic Carbon	Multiple Delta locations	DWR-MWQI, DO Study-Stockton, DO Study-DWR	**Far-Field**
Dissolved Oxygen	Stockton Ship Channel	Regression model(2)	**Far-Field**
Ammonia as Nitrogen	WQCF R-1	13267 monitoring data, Self-monitoring data	**Near-Field**
Arsenic, Dissolved	WQCF R-1	13267 monitoring data	**Near-Field**
Copper, Dissolved	WQCF R-1	13267 monitoring data	**Near-Field**
Cyanide, Total	WQCF R-1	13267 monitoring data	**Near-Field**
Iron, Dissolved	WQCF R-1	Special studies monitoring data	**Near-Field**
Manganese, Dissolved	WQCF R-1	Special studies monitoring data	**Near-Field**
Methylene Blue Active Substances (MBAS)	WQCF R-1	13267 monitoring data	**Near-Field**

Table 4.9-11 Water Quality Constituents Identified for Near-Field and Far-Field Analyses			
Constituent	Monitoring Location	Data Source(s)	Selected for Analysis
Nitrate as Nitrogen	WQCF R-1	13267 monitoring data	**Near-Field**
	Multiple Delta locations	DWR-MWQI	**Far-Field**
Nitrite as Nitrogen	WQCF R-1	13267 monitoring data	**Near-Field**
Bis(2-ethylhexyl)phthalate	WQCF R-1	Self-monitoring data	No, constituent nondetect in effluent; detection limit > WQO
Bromodichloromethane	WQCF R-1	13267 monitoring data, Self-monitoring data	No, new UV disinfection process will bring effluent concentration of parameter below the level of detection
Dibromochloromethane	WQCF R-1	13267 monitoring data, Self-monitoring data	No, new UV disinfection process will bring effluent concentration of parameter below the level of detection
Mercury	WQCF R-1	13267 monitoring data, Self-monitoring data	**Near-Field**
2,4,6-Trichlorophenol	WQCF R-1	Self-monitoring data	No, constituent nondetect in effluent; detection limit > WQO
Temperature	San Joaquin River transects between WQCF R-1 and WQCF R-2, inclusive	Self-monitoring data, Thermal Plan Exception Study data	**Near-Field**
Chlorpyrifos	–	13267 monitoring data	No, constituent nondetect in effluent
DDT	–	13267 monitoring data	No, constituent nondetect in effluent
Diazinon	–	13267 monitoring data	No, constituent nondetect in effluent
Dioxin	–	No data available	No
Furan Compounds	–	No data available	No
Group A Pesticides	–	13267 monitoring data	No, constituent nondetect in effluent
PCBs	–	13267 monitoring data	No, constituent nondetect in effluent

[1] Constituent is considered a nonconservative parameter and inappropriate for the calculation of blended effluent-river concentrations in the near-field.
[2] Regression model for change in Stockton Ship Channel DO is extended version of model utilized in DEIR for Manteca WQCF Phase III/IV Expansion
Source: LWA 2007

Near-Field Analysis

The near-field water quality impacts assessment evaluates the effects of increasing WQCF discharge, from the existing permitted 9.87 mgd to a proposed 27 mgd effluent flow rate (LWA 2007). Because the construction of WQCF improvements is scheduled to occur in two phases, with the completion of the first phase resulting in a discharge capacity of 17.5 mgd, water quality impacts were estimated for this incremental discharge stage. Near-field effects on San Joaquin River water quality will occur between the point of discharge and WQCF monitoring location R-3 (approximately 1-mile downstream of the City's discharge) where advanced treatment effluent and ambient river water is well-mixed as determined by recent hydrodynamic modeling conducted by the City (RMA 2006). Near-field water quality impacts were estimated using the following parameters, which characterize WQCF effluent and San Joaquin River water quality:

- projected WQCF effluent quality after Phase III expansion;
- ambient river concentrations calculated from dry/below normal water years, where possible;
- current permitted and proposed future WQCF effluent flowrates; and
- average late summer/early fall San Joaquin River flows observed during historic critical and dry water years.

The estimated near-field water quality impacts were calculated using the following mass balance equation:

$$C_{downstream} = \frac{\left((C_{upstream})(Q_{upstream})\right) + \left((C_{eff})(Q_{eff} \times 1.55)\right)}{\left(Q_{upstream} + (Q_{eff} \times 1.55)\right)}$$

Where $C_{downstream}$ = San Joaquin River concentration, downstream of discharge at R-3
$C_{upstream}$ = San Joaquin River concentration, upstream of discharge at R-1
C_{eff} = WQCF effluent concentration
$Q_{upstream}$ = San Joaquin River flow (cfs), upstream of discharge at Vernalis
Q_{eff} = WQCF effluent flow (mgd)

Projected average effluent concentrations resulting from proposed Phase III improvements to the WQCF (improvements that would result in a capacity of 9.87 mgd) were used to estimate future impacts of the WQCF discharge on San Joaquin River water quality (Table 4.9-12). In other words, the modeled effluent constituent concentrations mixed with San Joaquin River that would occur with buildout of the WQCF (27 mgd) were compared to projected effluent concentrations (mixed with the San Joaquin River) that would occur at a discharge rate of 9.87 mgd because this is the current permitted discharge rate authorized by the RWQCB. Where possible, median (50th percentile) receiving water concentrations were calculated using data collected at WQCF Station R-1 (see Exhibit 4.9-1). The median concentration is used for the receiving water because the analysis is strictly based on evaluating the change in receiving water quality. Ambient R-1 concentrations serve as a basis for comparing the magnitude of future change in receiving water quality due to the project. The analysis and results for each constituent specified in Table 4.9-11 selected for near-field analysis are summarized in Appendix D.

Constituents were evaluated under both critical and dry/below normal flow conditions corresponding to critical and dry/below normal water years, respectively. For the critical water year, a San Joaquin River flowrate of 600 cubic feet per second (cfs) was chosen as representative of extremely low flow conditions based on historic monthly average flows calculated for the San Joaquin River at Vernalis during fall 1991 and 1992; both years classified as critical by the DWR hydrologic classification scheme (LWA 2006a). Similarly, a flow of 1,250 cfs was chosen as representative of dry/below normal water year flow conditions based on San Joaquin River at Vernalis flows measured during fall 2002; a year classified as a dry water year (LWA 2006a). Due to agreements currently in place to provide water for migration of anadromous fish species in the Delta (1995 Bay-Delta Plan; SWRCB, 1995; and the Revised Water Right Decision 1641; SWRCB, 2000), as well as future San Joaquin River flow objectives that may be set forth in a future Bay-Delta Plan, future San Joaquin River flows should be similar to or greater than those observed during historic dry water years during future rainfall-limited years. Evaluating changes in San Joaquin River water quality due to an increase in WQCF effluent discharge under critical water

year flow conditions therefore represents a conservative approach to the assessment of potential impacts of the proposed project on the receiving water quality.

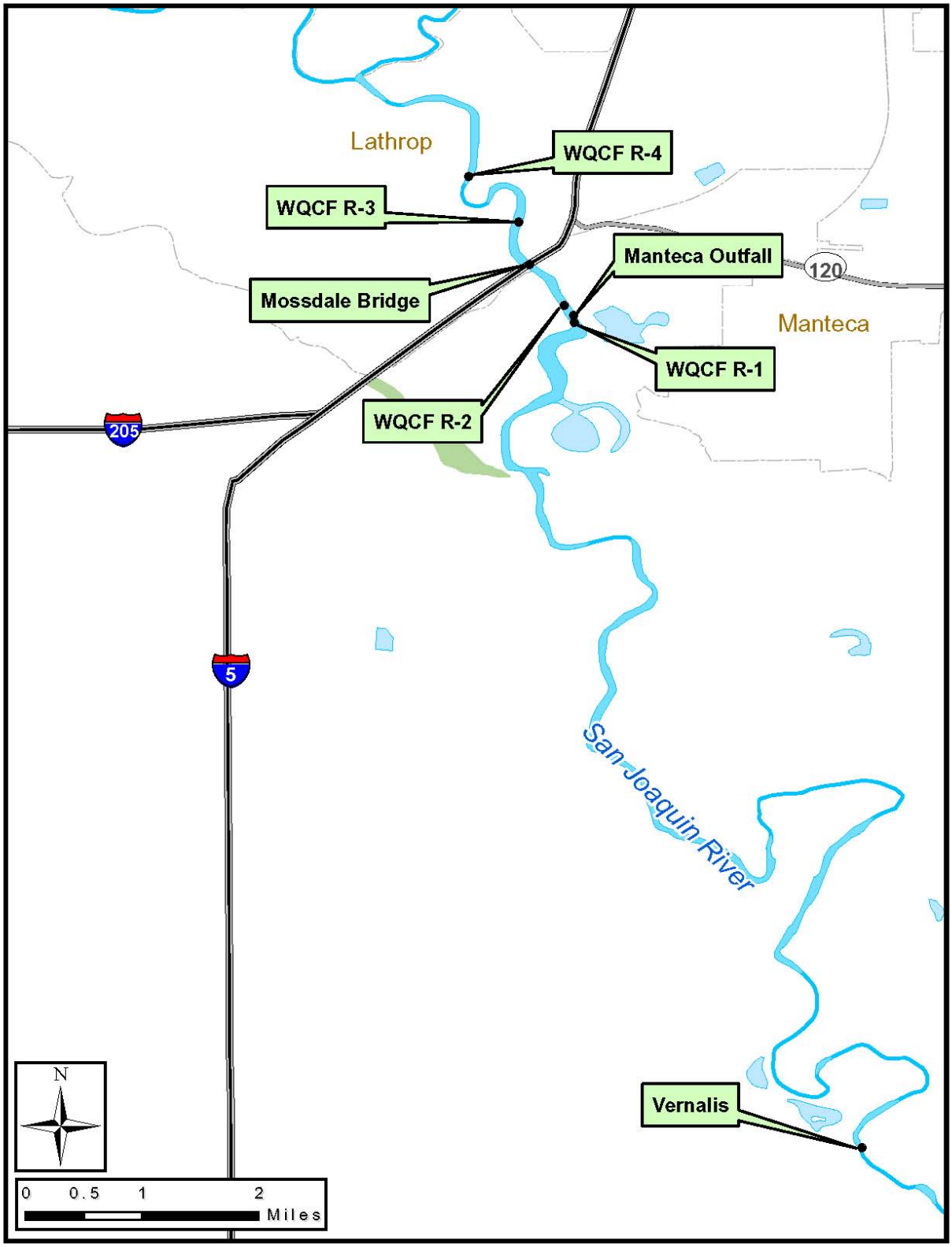
Table 4.9-12
Projected Manteca WQCF Effluent Quality after Phase III Expansion

Constituent	Units	Project Effluent Quality[1]
Biochemical Oxygen Demand (BOD)	mg/l	7
Total Suspended Solids (TSS)	mg/l	<10
Total Coliform	MPN/100 mL	<2.2
Turbidity	NTU	<2
Settleable Solids	mg/l	0.1
Chlorine Residual	mg/l	0.01
Oil and Grease	mg/l	2.1
Aluminum	µg/l	150
Electrical Conductivity (EC)	µmhos/cm	825
Ammonia (as N)	mg/l	1.5
Arsenic	µg/l	8
Copper	µg/l	7
Cyanide	µg/l	1
Iron	µg/l	50
Manganese	µg/l	10
Methylene Blue Active Substances (MBAS)	µg/l	160
Nitrate (as N)	mg/l	5
Nitrite (as N)	mg/l	1
Bis(2-ethylhexyl)phthalate	µg/l	3.48
Bromodichloromethane	µg/l	Nondetect in effluent (< 0.2 µg/l)
Dibromochloromethane	µg/l	Nondetect in effluent (< 0.3 µg/l)
Mercury	µg/l	0.010
2,4,6-Trichlorophenol	µg/l	3.28

[1] All concentrations represent projected mean values taken from City of Manteca WQCF Master Plan Update (Nolte 2007).
Source: LWA 2007

Far-Field Impacts Analysis

The far-field water quality impacts assessment evaluates the effects of increasing WQCF discharge, from the permitted 9.87 mgd to a proposed 27 mgd effluent flow rate, on specific Delta locations where surface water is diverted for eventual use as drinking water and in the Stockton Deep Water Ship Channel (LWA 2007). Far-field water quality impacts were estimated using (1) historic WQCF effluent quality, (2) projected WQCF effluent quality after Phase III expansion, (3) current permitted and proposed future WQCF effluent flow rates; and (4) modeled percent contribution of WQCF effluent at select Delta locations under representative critical and dry/below normal water years. Estimated far-field water quality impacts were then evaluated as the change in



City of Manteca WQCF Outfall and San Joaquin River Monitoring Locations Providing Data for Near-Field Water Quality Impacts Analysis **Exhibit 4.9-1**

concentration of a parameter at a Delta location of interest due to an increase in WQCF effluent flow rate from the permitted 9.87 mgd to the proposed 27 mgd. The Delta monitoring locations for which far-field water quality impacts were modeled are shown in Exhibit 4.9-1.

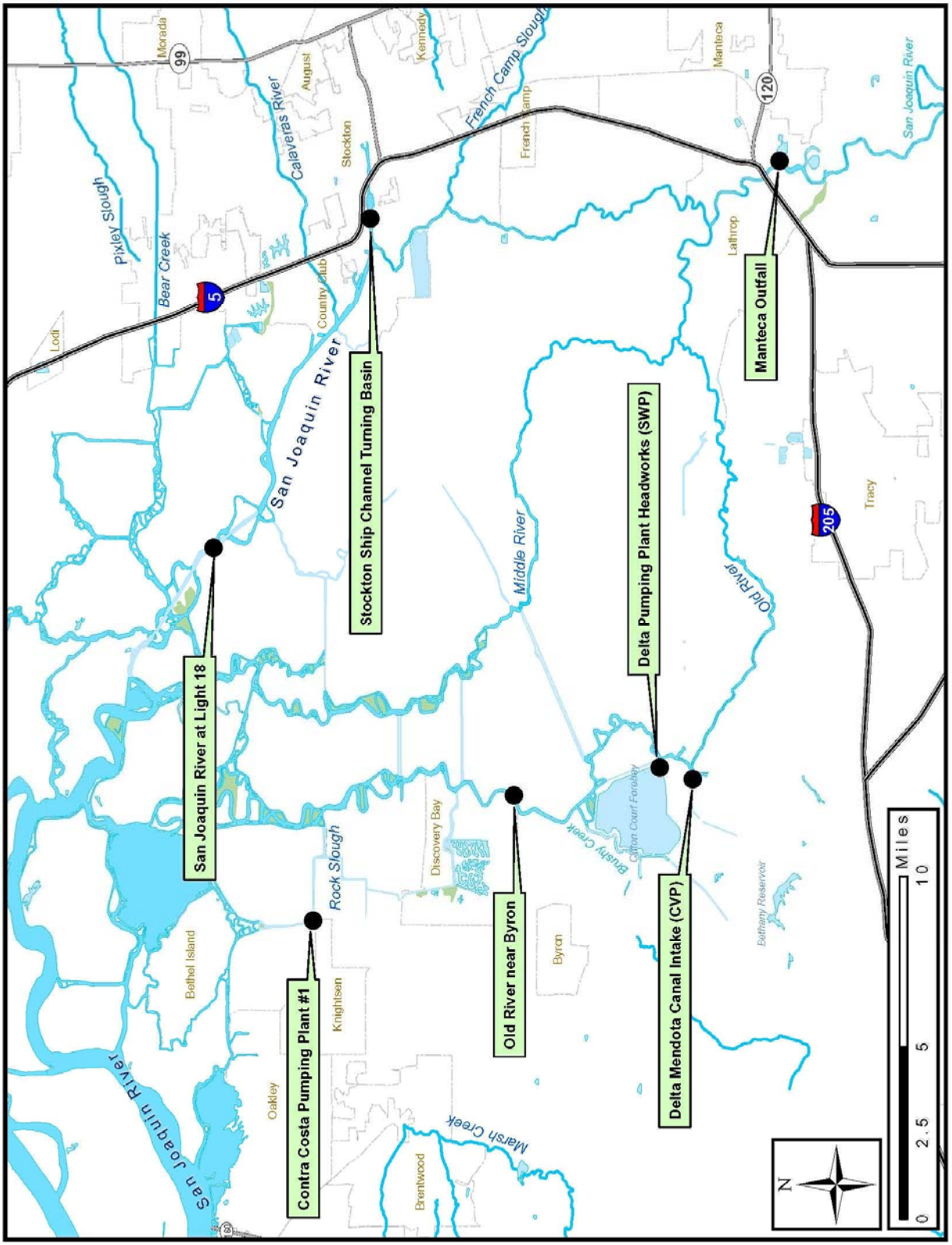
The fraction or percentage of WQCF effluent present at various locations within the Sacramento–San Joaquin Delta (Delta) was modeled to provide an indication of the far-field impacts of the proposed project on Delta water quality. Six locations within the Delta (see Exhibit 4.9-2) were chosen as far-field sites for the evaluation of water quality impacts due to increased WQCF discharge. Sites were selected to provide pre- and postproject water quality estimates at several drinking water export locations and the Stockton Deep Water Ship Channel (DWSC). Because of the limited availability of water quality data sets at the various Delta locations of interest covering the same time periods, only electrical conductivity (EC), nitrate, dissolved organic carbon (DOC), and dissolved oxygen (DO) were selected for far-field analysis. EC is a useful water quality parameter because it serves as a surrogate for salts, while nitrate and DOC are constituents of concern for the treatment of drinking water. To estimate far-field EC, nitrate, and DOC concentrations, the Delta hydrologic model is used to calculate the percent contribution of WQCF effluent at the various Delta locations. Dissolved oxygen is treated separately from the other constituents in the current analysis because the physical transfer of oxygen from the atmosphere and biological consumption of oxygen during respiration greatly affect the concentration DO can not be considered conservative, and the area of greatest concern for this parameter is the DWSC. The calculated effluent fractions facilitate the use of a mass balance model to estimate changes in the selected water quality parameters due to an increase in WQCF discharge. Historic Delta water quality data and historic Manteca effluent data were then used to estimate water quality in the Delta under two WQCF discharge scenarios: 17.5 mgd and 27 mgd.

The analysis and results for each constituent specified in Table 4.9-11 for near-field and far-field analysis are summarized on individual fact sheets in an antidegradation analysis report (LWA 2007) which is included as Appendix C to this DEIR.

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines. The proposed project would result in significant hydrology and water quality impacts if it would:

- 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;
- 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.
- 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 RWQCB Basin Plan or statewide water quality control plans, or federal rulemakings to establish water quality standards in California;
- 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 on- or off-site or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- 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;



Sacramento–San Joaquin Delta Monitoring Locations evaluated for Far-Field Water Quality Impacts Analysis **Exhibit 4.9-2**

- increase levels of any priority pollutant or other regulated water quality parameter in a water body such that the water body would be expected to more frequently exceed state and/or federal numeric or narrative water quality objectives, resulting in adverse effects on one or more beneficial uses;
- cause violation of existing requirements of the City's NPDES permit that serve to avoid significant environmental impacts;
- otherwise substantially degrade water quality.

IMPACT ANALYSIS

Hydrology

IMPACT 4.9-1 Hydrology and Water Quality—Effects on Potential On-site and Off-site Flooding Risk from Increased Stormwater Runoff. *The project would result in the generation of minor volumes of additional stormwater; however, adequate stormwater capacity would be available to covey increased stormwater generated by the project, and the project would not increase the potential for on-site or off-site flooding during storm events. This would be a* ***less-than-significant*** *impact.*

The proposed project involves construction of new facilities designed to increase the wastewater treatment capacity of the existing WQCF and wastewater collection system, effluent outfall, and recycled water distribution system pipelines to serve the city's urban growth areas. The proposed pipelines would be located below ground and would not result in the installation of any impervious surfaces. As such, these facilities would not result in a substantial increase in stormwater runoff in the project area. Minor amounts of additional impervious surfaces (e.g., buildings, structures) would be constructed to house new facilities at the WQCF site and at the proposed wastewater pumping station sites. The additional runoff caused by the increase in impervious surfaces would lead to a minor increase in localized stormwater runoff compared to existing conditions. Additional stormwater would be directed to the on-site stormwater system at the WQCF and to the neighborhood stormwater systems where proposed wastewater pump stations would be located. These stormwater facilities could adequately accommodate the minor volumes of stormwater generated by proposed facilities. Because adequate capacity is available to convey the minor volumes of stormwater generated by the project, the project would not increase the potential for off-site flooding risks during storm events. Therefore, the project would result in a **less-than-significant** impact related to flooding risks from increased stormwater runoff.

IMPACT 4.9-2 Hydrology and Water Quality—Reduction in Groundwater Recharge. *The City of Manteca does not serve as a substantial groundwater recharge area. Therefore, proposed development would result in a* ***less-than-significant*** *groundwater recharge impact.*

The WQCF site and proposed pipeline alignments do not contain streams or alluvial fan conditions that could function as substantial groundwater recharge areas and construction of minor amounts of impervious surfaces at the WQCF site or wastewater pumping station sites are not expected to affect overall groundwater supplies or recharge rates. Further, undeveloped areas in the proposed project area and agricultural lands located to the west, north, and south of the project area would continue to provide limited amounts of groundwater recharge. The City of Manteca General Plan DEIR concluded that no areas in the Manteca area provide a substantial source of groundwater recharge (City of Manteca 2003a). Therefore, implementation of the project is not anticipated to substantially affect groundwater recharge rates in the area. This would be a **less-than-significant** groundwater recharge impact.

IMPACT 4.9-3 Hydrology and Water Quality—Effects of Potential Off-site Flooding Risk from Increased Treated Effluent Discharge. *Project implementation would increase the amount of treated effluent discharged into the San Joaquin River; however, the incremental amount of treated effluent (i.e., up to 17.13 mgd)*

discharged into San Joaquin River would not be substantial in relation to the total flow rate of the San Joaquin River. Therefore, the project would not cause flooding downstream of the WQCF along the San Joaquin River. This is considered a ***less-than-significant*** *impact.*

Implementation of the project would result in the discharge of up to an additional 17.13 million gallons of treated effluent into the San Joaquin River per day. The amount of water flowing in the San Joaquin River near the project site is estimated to be 1,899,000 acre-feet per year. The increased amount of treated effluent that would be discharged into the San Joaquin River from implementation of the project would account for approximately 1.0% of the total water flowing in San Joaquin River (1.899 million acre-feet per year = 1,695 million gallons per day; 17.13 mgd / 1,695 mgd = 1.0%). Because the increased flows in the San Joaquin River from the treated effluent discharged from the project are minor in comparison to the overall volume of water in the river, lands downstream of the project site are not expected to be exposed to increased flooding risk. Therefore, the project would result in a **less-than-significant** impact related to off-site flooding risks.

Surface Water Quality Impacts

The results of the near-field and far-field water quality analyses described above are presented in this section. For a number of parameters (total suspended solids (TSS), turbidity, coliform organisms, etc.) the impact of the discharge of effluent from the Manteca WQCF into the San Joaquin River (San Joaquin River) would result in a localized improvement in water quality, because their low levels in the discharge compared to higher levels in the San Joaquin River would have a localized diluting effect within the mixing zone. For example, the 50th percentile TSS level in the San Joaquin River at sampling station R-1 (just upstream of the WQCF discharge) is 26.7 mg/l. The existing effluent level is 10 mg/l and the projected effluent concentration level after Phase III completion would be 10 mg/l.

This subsection provides impact assessments for constituents of concern for which quantitative water quality modeling was performed. For a detailed description of the water quality modeling approach, see Appendix D. Near-field, zone-of-initial-mixing water quality concerns center upon: (1) the potential for discharge-driven exceedances of applicable water quality standards; and (2) plumes of elevated contaminant concentrations and temperature that could adversely impact fish and/or other aquatic biota and thus certain aquatic life uses. No municipal/domestic, industrial, or irrigation diversions occur from the San Joaquin River within the zone of initial mixing; therefore, potential project-specific water quality impacts to these beneficial uses were based primarily on the far-field (i.e., fully mixed) modeling results. Hence, the potential for project-specific water quality impacts to recreational uses were assessed using the far-field (i.e., fully mixed) modeling results. Finally, project-specific changes to near-field and far-field water quality would have no effect on the navigation beneficial use.

Near-Field Impacts

IMPACT 4.9-4 Hydrology and Water Quality—Effects of Proposed Project Discharge on Biochemical Oxygen Demand (BOD) Concentrations in Receiving Waters. *The project is projected to reduce effluent BOD concentrations compared to the existing WQCF discharge concentrations and projected concentrations would be below the City's existing adopted NPDES effluent limitation, which has been established by the RWQCB to be protective of water quality. Therefore, this impact is considered* ***less than significant****.*

The consumptive oxygen demand of BOD reduces ambient dissolved oxygen (DO) levels in the river, and therefore a connection exists between BOD and DO concentrations. The influence of the WQCF BOD input is most strongly expressed as an oxygen demand downstream of the City's wastewater outfall. Therefore the impact of WQCF effluent on DO levels in the San Joaquin River is addressed in the Far-Field Impacts Analysis, which incorporates the near-field BOD analysis. See Impact 4.9-19 below.

There is no adopted water quality objective for BOD in the San Joaquin River. The incremental change in BOD concentration and mass loading in the San Joaquin River due to an increase in WQCF effluent discharged from

the current permitted rate (9.87 mgd) to the proposed rate (27 mgd) would be minor. The projected effluent concentration under the proposed project would be 7 mg/l, which is below the current 10 mg/l adopted effluent limitation for BOD as described in the City's existing NPDES permit. Because the project is projected to reduce BOD effluent concentrations compared to the existing WQCF discharge concentrations and projected concentrations would be below the City's existing adopted NPDES effluent limitation, which has been established by the RWQCB to be protective of water quality, this impact is considered **less than significant**.

IMPACT 4.9-5 Hydrology and Water Quality—Effects of Proposed Project Discharges on Total Suspended Solids (TSS) Concentrations in Receiving Waters. *The proposed WQCF upgrades would be designed and operated to comply with the NPDES permit effluent limits for TSS, which are, based on the lowest criteria determined to be protective of beneficial uses. Projected TSS concentration in the effluent would be less than TSS concentration in the San Joaquin River; the WQCF effluent would have a diluting effect and would result in a slight decrease in the TSS concentration in the San Joaquin River. Thus, the project-related effluent discharges to the San Joaquin River would not adversely affect beneficial uses. This impact is considered* ***less than significant****.*

There is no numerical water quality objective for TSS in the San Joaquin River. The Basin Plan narrative objective for suspended material is as follows: "Waters shall not contain suspended material in concentrations that cause or adversely affect beneficial uses." Manteca WQCF NPDES self-monitoring data from the San Joaquin River were analyzed from monitoring location R-1 just upstream of the WQCF discharge (see Exhibit 4.9-1). Data corresponding to a wet water year were used to calculate the effect of WQCF effluent TSS in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd. The use of wet water year TSS data (dry/below normal water year data were not available) may have imparted a slightly high bias to the calculation of downstream, estimated TSS concentrations in the San Joaquin River because of increased TSS in runoff to the San Joaquin River. As such, the projections for future TSS concentrations measured during dry/below normal water years in the San Joaquin River might be slightly lower, relative concentrations than presently estimated.

Projected ambient TSS effluent concentrations at a 9.87 mgd discharge rate would be approximately 25.3 mg/l under critical (600 cfs) flow conditions. The proposed project would implement tertiary filtration, which would result in the more efficient removal of TSS from the wastewater stream. TSS concentrations discharged with full buildout of the WQCF (27 mgd) are projected to be 10 mg/l at the point of discharge. Because the projected WQCF effluent TSS concentration (10 mg/l) is lower than the ambient TSS concentration in the San Joaquin River (25.7 mg/l Station R-1 50th percentile value), increasing WQCF effluent discharge will have a diluting effect on receiving water concentrations. Existing TSS mass loading to the river is 83,114 pounds per day (lbs/day) under critical (600 cfs) conditions and 173,154 lbs/day under dry/below normal (1,250 cfs) conditions. The proposed project is projected to result in in-stream TSS loads of 24.7 lbs/day and 25.2 lbs/day under critical and dry/below normal conditions, respectively, which is less than 1 percent of existing TSS loads to the river.

Because projected TSS loadings from the effluent would be less than TSS concentrations in the San Joaquin River, the WQCF effluent would have a diluting effect and would result in a slight decrease in the TSS concentration in the San Joaquin River. The project would assist in reducing the concentration of suspended material in the river and complying with the Basin Plan narrative water quality objective. Furthermore, NPDES permit effluent limitations will be sufficiently stringent to provide the intended level of protection to the beneficial uses of the San Joaquin River. Therefore this impact is considered to be **less than significant**.

IMPACT 4.9-6 **Hydrology and Water Quality—Effects of Proposed Project Discharges on Total Aluminum Concentrations in Receiving Waters.** *The proposed WQCF upgrades would be designed and operated to comply with the NPDES permit effluent limits for total aluminum. Available science indicates that effluent limits substantially greater than the proposed discharge concentrations under the project would be sufficiently protective of the beneficial uses of the San Joaquin River. Because the project's discharge concentrations of aluminum would be substantially below discharge concentrations shown by available scientific studies to be protective of water quality, the project would result in* ***less-than-significant*** *aluminum impacts.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River were analyzed from monitoring location R-1 just upstream of the WQCF discharge (see Exhibit 4.9-1). Data corresponding to dry/below normal water years were used to calculate the estimated water quality effect of WQCF effluent total aluminum discharges to the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd.

The current NPDES effluent limitation for total aluminum is 71 ug/l based on a pH of 8.4 and a temperature of 26°C (CVRWQCB 2004) on a monthly average, which is below the U.S. EPA chronic ambient water quality criterion for total aluminum (87 μg/l). This criterion is often used by the RWQCB to interpret the narrative toxicity objective contained in the Basin Plan. The daily maximum NPDES effluent limitation for aluminum is 140 μg/l.

Past water quality data collected from the WQCF indicate that aluminum concentrations in the existing effluent – and the San Joaquin River – exceed these limitations. Therefore, the City is exploring various compliance options to meet these effluent limits, and has been granted the opportunity by the RWQCB to assess compliance with the aluminum effluent limits using the acid soluble method for aluminum analysis and/or by conducting a Water Effects Ratio (WER) to develop a site specific objective (SSO). Based on the data collected to date, the acid-soluble measurement does not appear to be useful or applicable to compliance measurement because the analysis of the acid-soluble portion of a total metal commonly does not result in significantly lower values of the total metal when compared to the analysis of the metal without acidification. In addition, the RWQCB does not allow the use of dissolved aluminum for compliance purposes. The proposed project is projected to produce treated effluent with an average daily total aluminum concentration of 150 μg/l at the point of discharge under buildout (27 mgd) conditions.

During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge would slightly decrease total aluminum concentrations in the San Joaquin River downstream of the discharge compared to permitted discharge rates (9.87 mgd) as shown in Table 4.9-13. Further, proposed discharge concentrations (743.7 to 757.6 μg/l) would be below existing measured aluminum concentrations (785.1 μg/l at R-1, 50% concentration) and would have a diluting effect in river concentrations. A slight increase in total aluminum mass loading to the river is also projected. While the modeling indicates that estimated concentrations of total aluminum in the river exceed EPA chronic ambient water quality criterion (87 μg/l) for the metal (Table 4.9-13), the current U.S. EPA chronic water quality criterion for total aluminum as applied to the San Joaquin River is believed to be over restrictive and over protective of beneficial uses because the criterion does not take into account the local water quality characteristics (high pH and high hardness) that reduce the toxicity of aluminum to aquatic life. The 87 μg/L U.S. EPA chronic criterion is based on toxicity tests using striped bass and brook trout in water with pH between 6.5 and 6.6 and hardness concentrations (as $CaCO_3$) of less than 10 mg/L (striped bass) and 12.3 mg/L (brook trout). WER studies conducted since this time and anecdotal evidence support the conclusion that aluminum is substantially less toxic at the higher pH and hardness values that are typical in the San Joaquin River. (LWA 2007).

Table 4.9-13 Estimated Impact of Total Aluminum from WQCF Discharge in the San Joaquin River at WQCF R-3						
Aluminum Total		San Joaquin River Flowrate (cubic feet per second)		Manteca WQCF Effluent Flowrate (million gallons per day)		
R-1 50th % concen. (µg/l)[1]	**785.1**					
Projected effluent concen. (µg/l)	**150**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		2,539	5,290	12.3	21.9	33.8
Est. downstream R-3 river concentration (µg/l) at 600 cfs				769.3	757.6	743.7
Est. downstream R-3 river concentration (µg/l) at 1,250 cfs				777.4	771.6	764.5

[1] 50th percentile statistic calculated using the following data set:
Data Period: January 2002–September 2004; Sample Size, n = 14; Percent Detected Data = 100%
Source: LWA 2007

The City prepared a WER study (City of Manteca 2007) and submitted the results of this study to the RWQCB. The results of the study recommended a WER of 22.7 for direct adjustment of the chronic objective (i.e., 22.7 times the current objective of 87 µg/l) resulting in an effluent limit of 1,975 µg/l for aluminum would be acceptable and sufficiently protective of the beneficial uses of the San Joaquin River. This WER would also be applicable to the corresponding acute objective. The WQCF discharge at full buildout (27 mgd) would have an average daily total aluminum concentration of 150 µg/l at the point of discharge, which is substantially below the effluent limit identified in the WER study. Although the RWQCB has not adopted a new effluent limit for aluminum as of the date of publication of this EIR, available science indicates that effluent limits substantially greater than the proposed discharge concentrations under the project would be sufficiently protective of the beneficial uses of the San Joaquin River. Because the project's discharge concentrations of aluminum would be substantially below discharge concentrations shown by available scientific studies to be protective of water quality, the project would result in **less-than-significant** aluminum impacts.

IMPACT 4.9-7 Hydrology and Water Quality—Effects of Proposed Project Discharges on Electrical Conductivity Concentrations in Receiving Waters. *Because the project would result in minor increases in EC in the San Joaquin River at full buildout (27 mgd) and effluent concentrations would be below established EC water quality objectives during agricultural and nonagricultural seasons, the project would not result in significant EC water quality impacts. Therefore, the project's near-field EC impacts would be* ***less than significant.***

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent electrical conductivity (EC) in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd. Due to the seasonal EC objectives contained in the Sacramento–San Joaquin Delta Basin Plan, available EC data were divided into two groups for the purpose of the present near-field analysis: April through August data set with a seasonal objective of 700 umhos/cm;(micromhos per centimeter – the standard measure of electrical conductivity in freshwater) and September through March data set with a seasonal objective of 1000 umhos/cm. Although discharge of treated wastewater to the Delta or its tributaries under an NPDES permit can marginally affect EC in the southern Delta, previous State Board decisions and water quality control plans do not mention or consider treated effluent discharges as a source of salinity in the southern Delta (SWRCB 2005).

The incremental change in near-field EC (measured at R-3, see Exhibit 4.9-1) in the San Joaquin River resulting from an increase in WQCF effluent discharged from the current permitted rate (9.87 mgd) to the proposed rate

(27 mgd) is approximately 5.1 to 10.1 umhos/cm during the months of April through August (agricultural season) and 0.8 to1.5 umhos/cm during the months of September through March (nonagricultural season) during critical and dry/below normal water years, respectively. Total EC measurements would range from 583 to 591.2 umhos/cm from April through August and 787.2 to 788.4 umhos/cm during September through March, which are substantially below established EC water quality objectives. Additionally, the City's potable water supply is expected to reduce EC concentrations compared to pre-August 2005 conditions as a result of blending surface water from the South County Water Supply Program (which has low EC values) with the City's groundwater. The blending of surface water with groundwater for the potable water supply has significantly decreased the EC measured in WQCF effluent when comparing pre- and post-August 2005 plant effluent measurements (LWA 2006b).

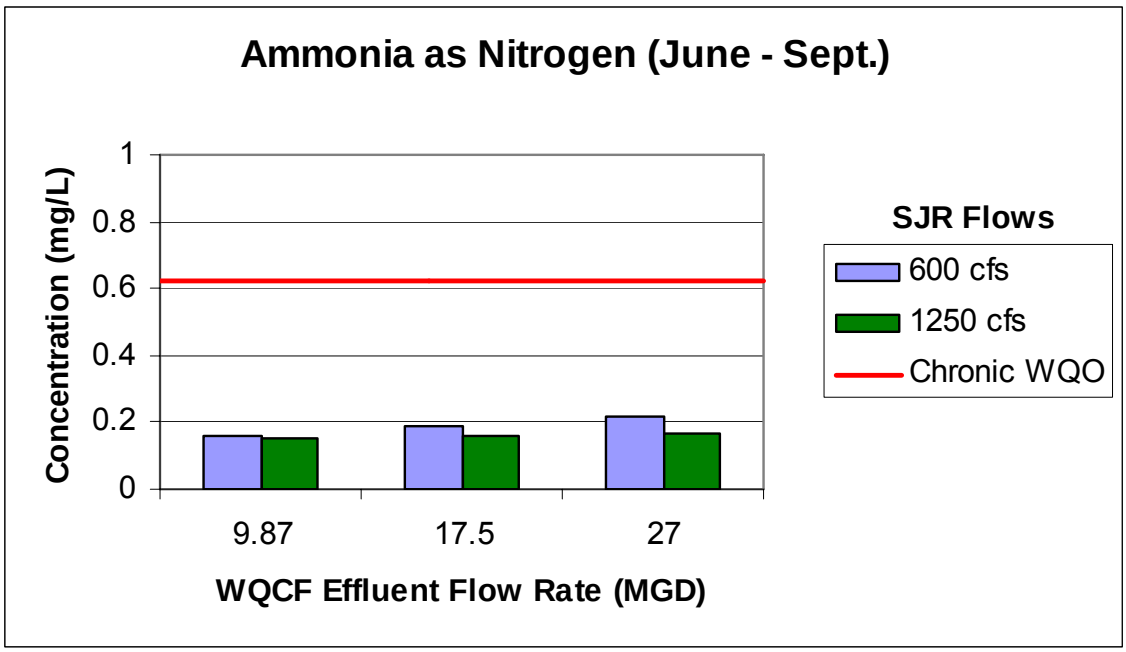
Because the project would result in minor increases in EC in the San Joaquin River at full buildout (27 mgd) and effluent concentrations would be below established EC water quality objectives during agricultural and nonagricultural seasons, the project would not result in significant EC water quality impacts. the project's near-field EC impacts would be **less than significant**.

IMPACT 4.9-8 Hydrology and Water Quality—Effects of Proposed Project Discharges on Ammonia (as Nitrogen) Concentrations in Receiving Waters. *The near-field modeling analysis indicates that projected, median ammonia concentrations in the San Joaquin River would be below the more stringent U.S. EPA ambient water quality criteria for ammonia. Concentrations would be lower than the chronic criterion of 0.62 mg/l during the June through September time period and substantially lower than the acute criterion of 5.62 mg/l during the October through May time period. Therefore, the project's near-field ammonia impacts would be less than significant.*

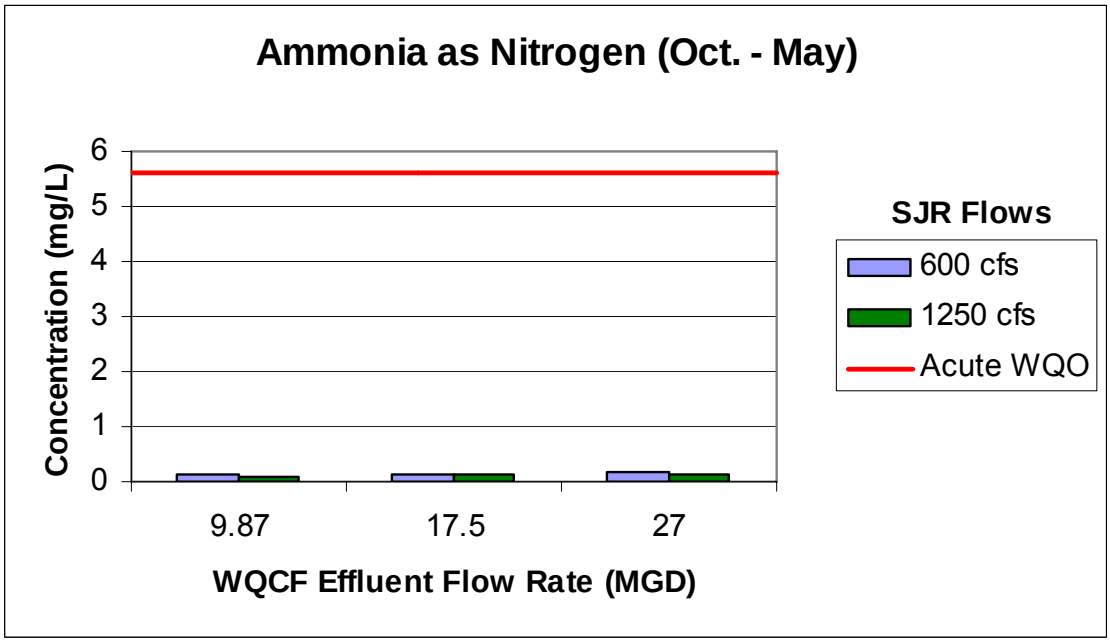
Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent ammonia in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd. The proposed treatment processes are projected to produce treated effluent having an average ammonia concentration of 1.5 mg/l at the outfall.

Due to the seasonal variation of U.S. EPA ambient water quality criteria for ammonia, two data sets, June through September and an October through May, were used for the near-field analysis. The acute and chronic criteria for ammonia as promulgated by U.S. EPA 1999 Update of Ambient Water Quality Criteria for Ammonia are used by the RWQCB to interpret the Basin Plan's narrative toxicity objective. Using pH and temperature values previously used by the RWQCB in WDR Order No. R5-2004-0028, a chronic criterion of 0.62 mg/l ammonia was calculated and applied to the San Joaquin River during June through September based on an ambient pH of 8.4 standard units and an ambient temperature of 26 °C. Similarly, an acute criterion of 5.62 mg/l ammonia, nontemperature dependent, was calculated and applied to the San Joaquin River during October through May based on an ambient pH of 8.0 standard units. In an analysis of compliance with chronic and acute seasonal objectives (Exhibits 4.9-3 and 4.9-4), projected median ammonia (as nitrogen) concentrations in the San Joaquin River remain below the more stringent chronic ammonia objective (0.62 mg/l) calculated for the river on a year round basis.

During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge would produce a moderate increase in ammonia levels in the San Joaquin River downstream of the discharge during June through September relative to its seasonal objective of 0.62 mg/l, and would produce a slight increase in ammonia levels in the river during October through May relative to its seasonal objective of 5.62 mg/l. The more distinct increase in ammonia levels in the river during the June through September time period is due to the higher ambient levels of ammonia measured in the San Joaquin River at monitoring location R-1 during this time period, in conjunction with the more stringent chronic ammonia objective in effect from June through September.



Projected Change in San Joaquin River Ammonia (as Nitrogen) Concentration at WQCF R-3 during June through September with increasing WCQF Effluent Flowrate **Exhibit 4.9-3**



Projected Change in San Joaquin River Ammonia (as Nitrogen) Concentration at WQCF R-3 during October through May with increasing WQCF Effluent Flowrate **Exhibit 4.9-4**

These incremental increases in river ammonia concentrations and mass loadings observed when evaluating the June through September (associated with the EPA chronic ammonia criterion) and October through May (associated with the EPA acute ammonia criterion) time periods are shown in Exhibits 4.9-3 and 4.9-4, respectively.

Because the consumptive oxygen demands of ammonia nitrification are most strongly expressed downstream of the City's wastewater outfall, the impact of WQCF effluent ammonia levels on dissolved oxygen (DO) levels in the San Joaquin River are evaluated in the far-field analysis in a discussion of far-field DO impacts (see Impact 4.9-19 below).

The near-field analysis shows that projected, median ammonia concentrations in the San Joaquin River would range from 0.17 to 0.22 mg/l for dry/below normal and critical water years, respectively, which is substantially below the more stringent chronic criterion of 0.62 mg/l for the June through September time period. Further, ammonia concentrations would be substantially lower than the acute criterion of 5.62 mg/l during the October through May time period with concentrations ranging from 0.13 to 0.17 mg/l for dry/below normal and critical water years, respectively. Because the project would result in ammonia concentrations that are below adopted water quality criterion, the project's near-field ammonia impacts would be **less than significant**.

IMPACT 4.9-9 Hydrology and Water Quality—Effects of Proposed Project Discharges on Arsenic (Dissolved) Concentrations in Receiving Waters. *The project would be designed and operated to comply with the NPDES permit effluent limits for dissolved arsenic and projected dissolved arsenic concentrations would be substantially below adopted water quality objectives. Therefore, the project's near-field arsenic concentrations would be* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) for dry/below normal water years were used to calculate an estimated impact of WQCF effluent ammonia in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd. The average total arsenic concentration after the WQCF buildout (27 mgd) is projected to be 8 ug/l. Although the projected effluent concentration is presented as total Arsenic, for the purpose of the near-field analysis, and to be conservative, all arsenic present in WQCF treated effluent is assumed to be in the dissolved form. The RWQCB is required to assign an effluent limit to the total fraction of a metal; limits are not assigned to the dissolved fraction. The project's effluent quality for metals is the projected concentration of the total fraction of a metal. However, tertiary treated effluent has all of its suspended particles removed by the very fine tertiary filtration process, leaving only dissolved constituents in the effluent, and the Basin Plan water quality objective for arsenic specifies that compliance is determined through comparison of the objective with dissolved arsenic concentrations. Because the Basin Plan water quality objective for arsenic specifies that compliance is determined through comparison of the objective with dissolved arsenic concentrations, it is appropriate to state that all arsenic in WQCF tertiary effluent will be considered to be in the dissolved form.

The incremental change in near-field (measured at R-3, see Exhibit 4.9-1) dissolved arsenic concentrations in the San Joaquin River resulting from an increase in WQCF effluent discharged from the current permitted rate (9.87 mgd) to the proposed rate (27 mgd) is projected to range from 0.13 ug/l to 0.25 ug/l during dry/below normal and critical water years, respectively. Total downstream (measured at R-3) dissolved arsenic concentrations would range from 2.12 to 2.32 ug/l during dry/below normal and critical water years, respectively (LWA 2007). The Basin Plan objective for dissolved arsenic in the Sacramento–San Joaquin Delta is 10 ug/L, expressed as the dissolved fraction (CVRWQCB 2006b). Projected, median dissolved arsenic concentrations at full buildout (27 mgd) are well below the Basin Plan objective. Because the project would result in dissolved arsenic concentrations that are below adopted water quality objectives, the project's near-field arsenic impacts would be **less than significant**.

IMPACT 4.9-10 Hydrology and Water Quality—Effects of Proposed Project Discharges on Copper (Dissolved) Concentrations in Receiving Waters. *The project would be designed and operated to comply with the NPDES permit effluent limits for dissolved copper and would result in downstream dissolved copper concentrations that are substantially below adopted water quality objectives. Therefore, the project's near-field copper impacts would be* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) for dry/below normal water years were used to calculate an estimated impact of WQCF effluent dissolved Copper in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd. For the purpose of the near-field analysis, and to be conservative, all arsenic present in WQCF treated effluent is assumed to be in the dissolved form for the same reasons as described above for arsenic.

The CTR freshwater chronic objective for dissolved copper is hardness dependent. It is 14.24 μg/l when using a river hardness value of 172 mgl measured during the low fall flows of October 2002 in the San Joaquin River at monitoring location R-1. To be conservative the more stringent Basin Plan dissolved copper objective of 10 ug/ (CVRWQCB 2006a) was used for assessing the impact of increased WQCF discharge on dissolved copper levels in the San Joaquin River. The incremental change in near-field (measured at R-3, see Exhibit 4.9-1) dissolved copper concentrations in the San Joaquin River resulting from an increase in WQCF effluent discharged from the current permitted rate (9.87 mgd) to the proposed rate (27 mgd) is projected to range from 0.10 μg/l to 0.20 μg/l during dry/below normal and critical water years respectively (LWA 2007). Total downstream (measured at R-3) dissolved copper concentrations would range from 2.07 to 2.24 μg/l during dry/below normal and critical water years, respectively (LWA 2007).

A significant level of copper removal would be accomplished through implementation of filtration at the WQCF. Historical removal efficiencies at similar advanced treatment plants are on the order of 25 percent (Nolte 2007). Assuming 25 percent removal through filtration, mean and maximum effluent concentrations at the point of discharge would be 7 μg/l and 10 μg/l are projected for copper. When mixed with the San Joaquin River median dissolved copper concentrations in the San Joaquin River would be substantially below the Basin Plan objective of 10 μg/l (i.e., 2.07 to 2.24 μg/l measured at R-3). Therefore, the project's near-field copper impacts would be **less than significant**.

IMPACT 4.9-11 Hydrology and Water Quality—Effects of Proposed Project Discharges on Cyanide (Total) Concentrations in Receiving Waters. *The project would be designed and operated to comply with the NPDES permit effluent limits for total cyanide and would result in downstream cyanide concentrations that are substantially below adopted water quality objectives. Therefore, the project's near-field cyanide impacts would be* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) for dry/below normal water years were used to calculate an estimated impact of WQCF effluent total cyanide in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd. The proposed ultraviolet disinfection process is projected to produce treated effluent at full buildout (27 mgd) having an average total cyanide concentration of 1 μg/l at the point of discharge (LWA 2007).

The CTR freshwater chronic objective for total cyanide as it applies to the San Joaquin River is 5.2 μg/l. The incremental change in near-field (measured at R-3, see Exhibit 4.9-1) cyanide concentrations in the San Joaquin River resulting from an increase in WQCF effluent discharged from the current permitted rate (9.87 mgd) to the proposed rate (27 mgd) is projected to range from 0.01 to 0.03 μg/l during dry/below normal and critical water years, respectively, which is below the magnitude of change that could be reliably measured in the field. Total cyanide concentrations would range from 0.30 μg/l to 0.33 μg/l during dry/below normal and critical water years,

respectively and would not be substantially different from cyanide concentrations projected for current permitted discharge rate of 9.87 mgd (i.e., 0.29 to 0.30 µg/l dry/below normal and critical water years, respectively) (LWA 2007). Projected, median total cyanide concentrations in the San Joaquin River are well below the CTR freshwater chronic objective of 5.2 µg/l. Therefore, the project's near-field cyanide impacts would be **less than significant**.

IMPACT 4.9-12 Hydrology and Water Quality—Effects of Proposed Project Discharges on Iron (Dissolved) Concentrations in Receiving Waters. *Dissolved iron mass loading to the San Joaquin River is projected to be slight relative to existing in-stream loads. Projected dissolved iron concentrations in the San Joaquin River would be substantially below the Basin Plan objective of 300 µg/l and mass loadings would be minor compared to measured upstream dissolved iron concentration. The project would be designed and operated to comply with the NPDES permit effluent limits for dissolved iron would result in downstream dissolved iron concentrations that are substantially below adopted water quality objectives. Therefore, the project's near-field iron impacts would be* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) corresponding to a wet water year were used to calculate an estimated impact of WQCF effluent dissolved iron in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 and 27 mgd. Ideally, a dissolved iron data set corresponding to dry/below normal water years would be used for the near-field analysis, but was not available. The proposed project is projected to produce treated effluent with an average total iron concentration of 50 µg/l at the point of discharge. For the purpose of the current analysis, and to be conservative, all iron present in WQCF treated effluent is assumed to be in the dissolved form for the same reasons as described above for arsenic.

The Basin Plan objective for dissolved iron as it applies to the San Joaquin River is 300 µg/l expressed as the dissolved fraction. The incremental change in near-field (measured at R-3, see Exhibit 4.9-1) dissolved iron concentrations in the San Joaquin River resulting from an increase in WQCF effluent discharged from the current permitted rate (9.87 mgd) to the proposed rate (27 mgd) is projected to range from -0.03 to 0.6 µg/l during dry/below normal and critical water years, respectively. Total dissolved iron concentrations would range from 61.1 µg/l to 60.6 µg/l during dry/below normal and critical water years, respectively and would not be substantially different from cyanide concentrations projected for current permitted discharge rate of 9.87 mgd (i.e., 61.4 to 61.2 µg/l dry/below normal and critical water years, respectively) (LWA 2007). Projected, median total cyanide concentrations in the San Joaquin River are well below the Basin Plan objective of 300 µg/l. Therefore, the project's near-field dissolved iron impacts would be **less than significant**.

IMPACT 4.9-13 Hydrology and Water Quality—Effects of Proposed Project Discharges on Manganese (Dissolved) Concentrations in Receiving Waters. *Dissolved manganese mass loading to the San Joaquin River is projected to be slight relative to existing in-stream loads. Additionally, projected dissolved iron concentrations in the San Joaquin River are substantially below adopted Basin Plan objective. The project would be designed and operated to comply with the NPDES permit effluent limits for dissolved manganese would result in downstream dissolved iron concentrations that are substantially below adopted water quality objectives. Therefore, the project's near-field manganese impacts would be* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) for a wet water year were used to calculate an estimated impact of WQCF effluent dissolved manganese in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 and 27 mgd. Ideally, a dissolved manganese data set corresponding to dry/below normal water years would be used for the near-field analysis, but was not available. The proposed project is projected to produce treated effluent with an average total manganese concentration of 10 µg/l l at the point of discharge. For the purpose of the current

analysis, and to be conservative, all manganese present in WQCF treated effluent is assumed to be in the dissolved form for the same reasons as described above for arsenic.

Dissolved manganese mass loading to the San Joaquin River is projected to be slight relative to existing in-stream loads and would only increase by 1.5 lbs/day with buildout of the WQCF. The highest estimated downstream monitoring location R-3 river concentration of 14.2 μg/l (under existing and proposed buildout scenarios) would be less than the current ambient concentration of 14.3 μg/l measured at monitoring location R-1. Because the projected effluent manganese concentration at the point of discharge would be 10 μg/l, which is less than ambient river concentrations, the project would have a diluting effect and downstream San Joaquin River concentrations are anticipated to decrease with implementation of the project. Further, projected manganese concentrations for the San Joaquin River would be substantially below the adopted Basin Plan objective of 50 μg/l. Therefore, the project's near-field manganese impacts would be **less than significant**.

IMPACT 4.9-14 Hydrology and Water Quality—Effects of Proposed Project Discharges on Methylene Blue Active Substances (MBAS) Concentrations in Receiving Waters. *The project would be designed and operated to comply with the NPDES permit effluent limits for MBAS, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. The proposed project is projected to produce treated effluent having an average total manganese concentration of 160 μg/l, which is well below the adopted Basin Plan objective. Therefore, the project's near-field MBAS impacts would be* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) for dry/below normal water years was used to calculate an estimated impact of WQCF effluent Methylene Blue Active Substances (MBAS) in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 and 27 mgd. Because a limited MBAS receiving water data set featuring all nondetected monitoring location R-1 data was available for the near-field analysis, an estimated MBAS concentration at monitoring location R-1 was used. The ambient MBAS concentration employed in the near-field analysis was estimated using the median method detection limit (MDL) associated with the nondetected data (LWA 2006a). The Basin Plan adopted water quality objective for MBAS is 500 μg/l. The median MDL for MBAS from the City's NPDES self-monitoring data is 20 μg/l. The proposed project is projected to produce treated effluent having an average total manganese concentration of 160 μg/l, which is well below the adopted Basin Plan objective. Therefore, the project's near-field MBAS impacts would be **less than significant**.

IMPACT 4.9-15 Hydrology and Water Quality—Effects of Proposed Project Discharges on Nitrate (as Nitrogen) Concentrations in Receiving Waters. *The project would be designed and operated to comply with the NPDES permit effluent limits for nitrate, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. Projected nitrate concentrations would be well below the adopted Basin Plan objective of 10 mg/l. Therefore, the project's near-field nitrate impacts would be* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) for dry/below normal water years were used to calculate an estimated impact of WQCF effluent nitrate (as nitrogen) in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd. The project is projected to produce treated effluent having an average nitrate concentration of 5 mg/l.

The Basin Plan utilizes the adopted Title 22 Primary MCL water quality criterion for nitrate plus nitrite (sum as nitrogen) of 10 mg/l. Projected average total concentrations of nitrate in WQCF effluent at the point of discharge would be 5 mg/l, which is substantially below the adopted Basin Plan objective. Projected median nitrate concentrations in the San Joaquin River downstream of the WQCF outfall (measured at R-3, Exhibit 4.9-1) would range from 2.63 to 2.71 mg/l during dry/below normal and critical water years, respectively. Therefore, the project's near-field nitrate impacts would be **less than significant**.

IMPACT 4.9-16 Hydrology and Water Quality—Effects of Proposed Project Discharges on Nitrite (as Nitrogen) Concentrations in Receiving Waters. *The project would be designed and operated to comply with the NPDES permit effluent limits for nitrite, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. Projected nitrite concentrations at the point of discharge and downstream of the WQCF outfall would be equal to or below adopted Basin Plan objectives. Therefore, the project's near-field nitrite impacts would be* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) for dry/below normal water years were used to calculate an estimated impact of WQCF effluent nitrite (as nitrogen) in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 mgd and 27 mgd. The project is projected to produce treated effluent having an average nitrite concentration of 1 mg/l.

The Basin Plan uses the Title 22 Primary MCL criterion for nitrite (as nitrogen) of 1 mg/l as the adopted water quality standard. Because the data set used in the near-field analysis included 83.3% nondetected data, an estimation of an ambient river concentration was required. The monitoring location R-1 ambient nitrite concentration employed in the near-field analysis was estimated by setting the ambient level at the method detection limit (MDL) of 0.002 mg/l associated with the City's nondetected data. The MDL is from the City's NPDES self-monitoring data.

Projected median nitrite concentrations in the San Joaquin River at buildout of the WQCF (27 mgd) under critical (600 cfs) river flows would be 0.03 mg/l, which is well below the Basin Plan objective (1) mg/l. Further, the WQCF effluent at the point of discharge is projected to have an average total nitrite concentration of 1 mg/l, which is equal to the adopted Basin Plan objective. Therefore, the project's near-field nitrite impacts would be **less than significant**.

IMPACT 4.9-17 Hydrology and Water Quality—Effects of Proposed Project Discharges on Mercury (Total) Concentrations in Receiving Waters. *The incremental change in total mercury concentration in the San Joaquin River due to an increase in proposed Project effluent would be slight and below the magnitude of change that could be reliably measured in the field. Additionally, projected, median total mercury concentrations in the San Joaquin River are well below the CTR Human Health criterion of 0.051 μg/L. The proposed project WWTP upgrades would be designed and operated to comply with the NPDES permit effluent limits for mercury, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. This impact is considered* ***less than significant****.*

Manteca WQCF NPDES self-monitoring data from the San Joaquin River at monitoring location R-1 (just upstream of the WQCF discharge) for dry/below normal water years were used to calculate an estimated impact of WQCF effluent total mercury in the San Joaquin River under critical (600 cfs) and dry/below normal (1,250 cfs) river flows at the existing permitted discharge of 9.87 mgd and at proposed discharges of 17.5 and 27 mgd. The project is projected to produce treated effluent with an average total mercury concentration of 0.01 ug/μg/l l at the point of discharge. Projected median total mercury concentrations in the San Joaquin River with buildout of the WQCF (27 mgd) under critical (600 cfs) river flows would be 0.006 μg/l, which is well below the California Toxics Rule (CTR) Human Health criterion of 0.051 μg/l. Regarding methylmercury, it is anticipated based on an analysis of the data generated from the 2004-2005 Central Valley Clean Water Agency Mercury Study that future methylmercury levels in WQCF tertiary treated effluent should not exceed, on average, the 0.06 ng/l methylmercury implementation goal set forth in the draft Sacramento–San Joaquin Delta Methylmercury TMDL (CVRWQCB, 2006a).

Mercury is a 303(d)-listed constituent for Delta waters, with resource extraction (i.e., mining activity) cited as its key source. Sources of total mercury in the Delta include tributary inflows from upstream watersheds, atmospheric deposition, urban runoff, and municipal and industrial wastewater, with more than 96% of identified

total mercury loading to the Delta from tributary inputs. The Sacramento Basin (Sacramento River and Yolo Bypass) contributes 80% or more of total mercury fluxing through the Delta. Intra-Delta sources are a very small component of overall loading (CVRWQCB 2006b). The project-specific incremental increase in mercury contributions to Delta waters would be less than measurable (on a concentration basis) and, relative to all other sources of mercury to the Delta, would be negligible. Therefore, based on a review of the above information, this impact is considered to be **less than significant**.

IMPACT 4.9-18 Hydrology and Water Quality—Effects of Project Discharges on Pathogens in Receiving Waters. *The project would improve treatment performance for pathogen removal in the treated effluent discharged to the San Joaquin River compared to the existing WQCF operations through the operation of a UV disinfection system. The project would be designed and operated to comply with the NPDES permit limits for total coliform bacteria. Consequently, discharge to the San Joaquin River under the project would contain pathogen levels sufficiently low to be protective of human health. Therefore, this impact is considered* ***less than significant****.*

Levels of pathogens and nonpathogenic organisms that can affect human health are of potential concern with respect to the following beneficial uses: municipal and domestic uses, contact recreation, groundwater recharge, and agricultural supply. Because concentrations of pathogens in ambient waters are generally low, as well as highly varied in characteristic or type and, therefore, difficult to identify, enumerate, and isolate, scientists and public health officials typically monitor nonpathogenic organisms that are associated with fecal contamination, which are more easily sampled and measured. Where wastewater is present, human enteric viruses and other pathogenic organisms may be present, and may constitute a health threat to humans.

The proposed effluent limit for total coliform bacteria in the City's tentative NPDES permit is 2.2 MPN/100 ml, which is based on DHS 1987 disinfection guidelines for wastewater. The 1987 DHS wastewater disinfection guidelines for coliform bacteria were developed with the understanding that the presence of these organisms is an indicator of fecal contamination. The DHS guidelines use coliform bacteria to monitor and assess the overall health risks associated with wastewater discharges. These guidelines were developed by DHS to be protective of municipal, recreation, and agricultural uses of surface waters receiving municipal wastewater discharges. The Basin Plan objective for coliform bacteria states that not less than five samples for any 30-day period shall exceed a geometric mean of 200 fecal coliform/100 ml, nor shall more than 10% of the total number of samples taken during any 30-day period exceed 400 fecal coliform/100 ml for waters designated as having a full-contact recreation beneficial use. EPA's current national ambient recommended criteria for bacteria are stated in terms of E. Coli (126/100 ml) and enterococci (33/100 ml), and are for the protection of full-contact recreation. The lowest DHS requirement for total coliform is 2.2 MPN/100 ml, a Title 22 recycled water requirement for unrestricted reuse, such as urban landscape irrigation, irrigation of food crops and storage in recreational impoundments.

The project includes the installation of a new UV disinfection system. This system would expose treated effluent to UV rays prior to its discharge to kill pathogens that remain in the wastewater stream after treatment. UV disinfection systems generally achieve a significant removal rate for pathogens. Chorine and UV disinfection both provide similar and adequate disinfection of effluent. Each disinfection process is operated so as to provide the required amount of pathogen kill. UV disinfection has the major advantage of not requiring the addition of chemicals to the effluent in order to achieve the proper level of pathogen kill. The chemicals added in the chlorine disinfection process result in the formation of trihalomethanes (dibromochloromethane and bromodichloromenthane, in particular) and cyanide in the effluent. The city's rationale for implementing UV disinfection is to stop producing THMs and therefore ending the need for dibromochloromethane and bromodichloromenthane effluent limits.

Because the project would be designed and operated to comply with the NPDES permit limits for total coliform bacteria, discharge to the San Joaquin River under the project would contain pathogen levels sufficiently low to be protective of human health. Therefore, this impact is considered **less than significant**.

Far-Field Impacts

The minimum and maximum calculated WQCF effluent contributions for six selected locations within the Delta corresponding to critical and dry/below normal water years are listed in Tables 4.9-14 and 4.9-15, respectively. These locations are illustrated on Exhibit 4.9-2. In general, the further away from the WQCF the far-field site is located, the lower the percent contribution of WQCF effluent, and as WQCF discharge increases, so does its percent contribution at far-field locations. There are no established objectives for the percent contribution a wastewater treatment facility's effluent can make within waters of the Delta.

Table 4.9-14
Summary of Minimum and Maximum Effluent Concentrations for Critical Water Year Flowrates of 600 cfs at Vernalis

Location	Minimum Effluent Contribution			Maximum Effluent Contribution		
	9.87 MGD	17.5 MGD	27 MGD	9.87 MGD	17.5 MGD	27 MGD
Delta Pumping Plant Headworks (SWP)	<0.1%	<0.1%	0.1%	1.0%	1.7%	2.7%
Delta Mendota Canal Intake (CVP)	<0.1%	0.1%	0.1%	1.1%	1.9%	3.0%
Pumping Plant #1 (CCWD)	<0.1%	<0.1%	<0.1%	0.2%	0.3%	0.5%
Intake at Old River (CCWD)	<0.1%	<0.1%	<0.1%	0.3%	0.5%	0.8%
San Joaquin River at Light 18	<0.1%	<0.1%	<0.1%	0.9%	1.6%	2.4%
Stockton Ship Channel Turning Basin	0.2%	0.3%	0.5%	2.1%	3.7%	5.7%

Source: LWA 2007

Table 4.9-15
Summary of Minimum and Maximum Effluent Concentrations for Dry/Below Normal Water Year Flowrates of 1,250 cfs at Vernalis

Location	Minimum Effluent Contribution			Maximum Effluent Contribution		
	9.87 MGD	17.5 MGD	27 MGD	9.87 MGD	17.5 MGD	27 MGD
Delta Pumping Plant Headworks (SWP)	<0.1%	<0.1%	0.1%	0.6%	1.0%	1.5%
Delta Mendota Canal Intake (CVP)	0.1%	0.2%	0.3%	0.6%	1.0%	1.5%
Pumping Plant #1 (CCWD)	<0.1%	<0.1%	<0.1%	0.1%	0.3%	0.4%
Intake at Old River (CCWD)	<0.1%	<0.1%	<0.1%	0.2%	0.4%	0.6%
San Joaquin River at Light 18	<0.1%	0.1%	0.1%	0.5%	1.0%	1.5%
Stockton Ship Channel Turning Basin	0.5%	0.8%	1.3%	1.2%	2.1%	3.3%

Source: LWA 2007

IMPACT 4.9-19 Hydrology and Water Quality—Effects of Proposed Project Discharges on Dissolved Oxygen Concentrations in Receiving Waters. *Dissolved oxygen (DO) concentrations in the San Joaquin River and Delta with buildout of the WQCF (27 mgd) would not differ substantially from those that would occur under future or existing baseline conditions. Any minor effects that may occur due to the proposed project would constitute a less-than-significant impact to water quality. This impact is considered* ***less than significant****.*

Two characteristics were analyzed to evaluate potential effects of WQCF discharges on dissolved oxygen (DO) concentrations in the San Joaquin River: (1) the change in DO at the Stockton deep water ship channel (DWSC), and (2) an oxygen sag analysis, the minimum DO concentration downstream of the outfall taking into consideration the ambient conditions above the outfall and the characteristics of the WQCF effluent.

Because the link between WQCF discharge and the water quality in the DWSC is not direct and is influenced by natural (tides) and anthropogenic (barrier operation, dam releases) mechanisms, the model was run for 6.0, 8.11, and 9.87 mgd discharge conditions and the paired outputs were used to form a regression between the modeled change in DWSC DO corresponding to the change in WQCF load of total ultimate oxygen demand. The regression equation was used to evaluate the future change in DWSC DO due to the proposed project. The analysis showed that for both Phase 1 and 2, the dissolved oxygen concentration in the Stockton DWSC would be greater at the 27 mgd buildout than with the current effluent. The results are shown in Table 4.9-16. The far left column represents the DO concentrations in the SDWSC resulting from nondischarge San Joaquin River and Delta conditions (e.g. temperature, BOD load, tides, export rates, etc.) influencing DO, combined with a WQCF discharge rate of 6 mgd. The subsequent columns represent the same nondischarge conditions, but with WQCF discharging under the currently permitted conditions and flowrate of 9.87 mgd, and the buildout flowrates of 17.5 and 27 mgd. For example, for the same nondischarge conditions, a SDWSC DO concentration of 5.0 mg/l at 6 mgd would actually increase to 5.22 mg/l at 9.87 mgd, and decrease to 5.11 mg/l at 17.5. It would be almost the same at 27 mgd as at 5 mgd (5.02 vs. 5.00 mg/l, respectively)

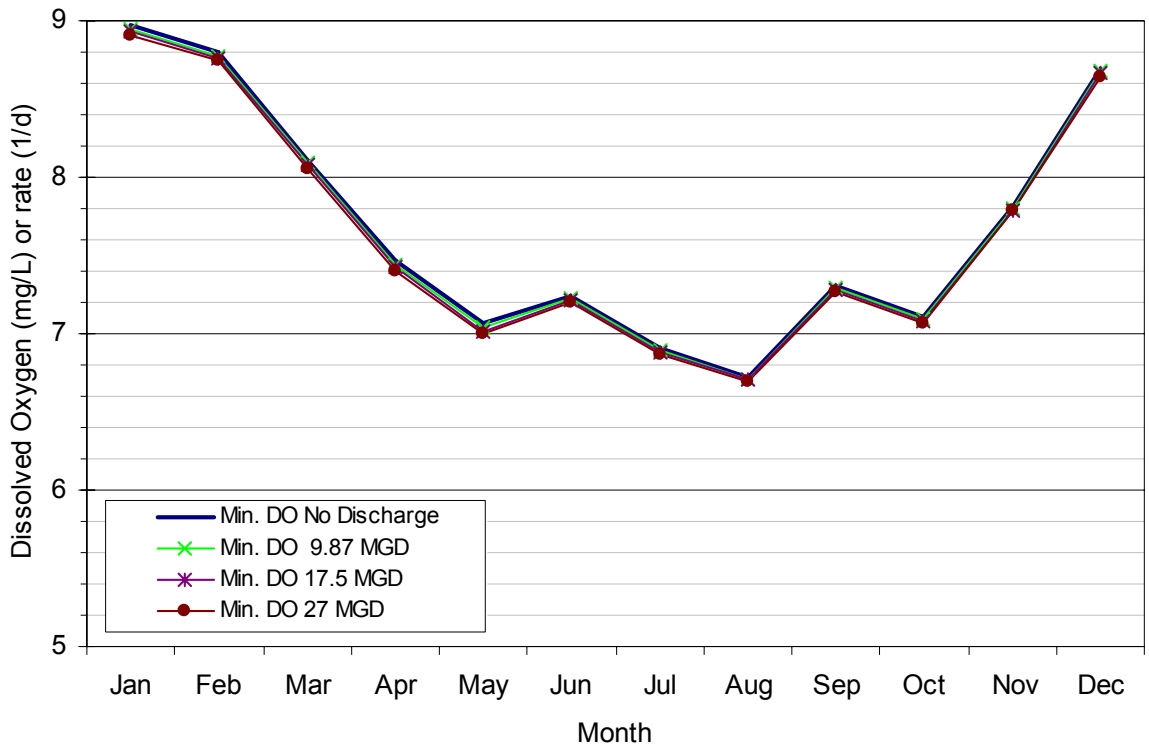
Table 4.9-16
Modeled Stockton Deep Water Shipping Channel Dissolved Oxygen Amounts (in mg/l) and Change from Currently Permitted Levels

6.0 mgd	9.87 mgd	17.5 MGD (Phase1)		27 MGD (Phase 2)	
DO in SDWSC	DO in SDWSC	DO in SDWSC	Difference from 9.87 MGD	DO in SDWSC	Difference from 9.87 MGD
4.00	4.22	4.11	-0.11	4.02	-0.20
5.00	5.22	5.11	-0.11	5.02	-0.20
6.00	6.21	6.11	-0.10	6.02	-0.19
7.00	7.21	7.11	-0.10	7.02	-0.19
8.00	8.20	8.10	-0.10	8.02	-0.18
9.00	9.20	9.10	-0.10	9.02	-0.18

mgd = million gallons per day
mg/l = milligrams per liter (parts per million)
DO = dissolved oxygen
SDWSC = Stockton Deep Water Shipping Channel
Source: LWA 2007

The Streeter-Phelps model was used to estimate the dissolved oxygen sag downstream of the WQCF discharge (See Appendix B in LWA 2007 for a detailed description of the model). The results generated from the model were utilized to evaluate the relative impact of increasing the WQCF discharge rate. The minimum DO downstream of the discharge was calculated for the analysis to evaluate the impact of the project above the currently permitted discharge (9.87 mgd). The near field analyses R-1 concentrations of 5.26 mg/l BOD and 0.13 mg/l as N ammonia were utilized in the DO analyses. The results were not appreciably affected by the seasonality of ammonia and, therefore, the higher summer value was used as a conservative number for the minimum DO analysis. As shown in Exhibit 4.9-5, the incremental change in minimum river DO concentrations is limited to less than 0.1 mg/l between the currently permitted discharge rate of 9.87 mgd and projected build-out of 27 mgd. For both the DWSC DO and minimum DO downstream from the WQCF discharge, the proposed project would not affect DO concentrations by more than 0.2 mg/l. Because the load of biologically oxidizable material carried

by the San Joaquin River at Monitoring Station R-1 is far greater than the load from the WQCF at project build-out, the incremental change in DO due to the project would be minor both in the San Joaquin River downstream of the WQCF and in the SDWSC. Therefore, based on a review of the above information, this impact is considered to be **less than significant**.



Source: LWA 2007

Monthly Minimum Dissolved Oxygen from Streeter-Phelps Analysis of San Joaquin River and WQCF Discharge **Exhibit 4.9-5**

IMPACT 4.9-20 Hydrology and Water Quality—Effects of Proposed Project Discharges on Electrical Conductivity (EC) Concentrations in Receiving Waters. *Modeling results for EC corresponding to critical and dry/below normal water years, respectively, demonstrated that the incremental change in EC concentrations at the selected sites would be no greater than 2 µmho/cm with buildout of the WQCF (27 mgd). Further, EC levels at far-field monitoring locations would be substantially below adopted Basin Plan water quality objectives. Therefore, the project's far-field EC impact would be* ***less than significant****.*

As described above, EC water quality objectives in the Delta are based on the San Francisco Bay/Sacramento–San Joaquin Delta Estuary Basin Plan (SWRCB 1995). Among the far-field sites considered in the analysis, EC objectives exist only for the Clifton Court and Delta Mendota Canal intakes which have a year-round objective of 1,000 µmhos/cm. The median EC levels for all far-field monitoring locations are projected to be between 547 and 599 µmhos/cm for critical water years and 338 to 656 µmhos/cm for dry/below normal water years, which is substantially less than the adopted objective of 1,000 µmhos/cm. Incremental changes in EC at each of the far-field monitoring locations would be no greater than 2 µmho/cm with buildout of the WQCF (27 mgd) Therefore, the project's far-field EC impacts would be **less than significant**.

IMPACT 4.9-21 Hydrology and Water Quality—Effects of Proposed Project Discharges on Dissolved Organic Carbon (DOC) Concentrations in Receiving Waters. *Projected incremental changes in DOC concentrations at far-field monitoring locations would be less than 1 percent during critical water years and less than 3 percent during dry/below normal water years. These changes would not be substantial in relation to existing DOC concentration. Therefore, the project's far-field DOC impacts would be* ***less than significant.***

The DHS has not recommended a Maximum Contaminant Level (MCL) for DOC. The RWQCB also has not adopted a water quality objective for DOC. For both critical and dry/ below normal water year types, the calculated change in DOC at the selected sites is generally less than 0.03 mg/l with buildout of the WQCF, with the exception of the Stockton Ship Channel Turning Basin where the change is estimated to be 0.08 mg/l during a dry/below normal water year. Median DOC concentrations at far-field monitoring locations range from 3.50 mg/l to 3.94 during critical water years and 2.72 to 3.51 during dry/below normal water years. Projected incremental changes in DOC concentrations at far-field monitoring locations would be less than 1 percent during critical water years and less than 3 percent during dry/below normal water years. These changes would not be substantial in relation to existing DOC concentration. Therefore, the project's far-field DOC impacts would be **less than significant**.

IMPACT 4.9-22 Hydrology and Water Quality—Effects of Proposed Project Discharges on Nitrate (as Nitrogen) Concentrations in Receiving Waters. *Modeling results for nitrate as nitrogen corresponding to critical and dry/ below normal water years, respectively, demonstrated that, for both water year types the calculated change in nitrate as nitrogen at the selected sites is estimated to be no greater than 0.05 mg/l with buildout of the WQCF (27 mgd). Median nitrate concentrations at far-field monitoring locations would all be substantially below adopted Basin Plan objectives. Therefore, the project's far-field nitrate impacts would be* ***less than significant.***

For both critical and dry/ below normal water year types, the calculated change in nitrate as nitrogen at the selected sites is generally less than 0.02 mg/l with buildout of the WQCF (27 mgd), with the exception of the Stockton Ship Channel Turning Basin where the change is estimated to be 0.05 mg/l under dry/below normal water years. Median nitrate concentrations at far-field monitoring locations range from 0.52 mg/l to 0.91 mg/l during critical water years and 0.22 mg/l to 1.64 mg/l during dry/below normal water years. Median nitrate concentrations at far-field monitoring locations would all be substantially below adopted Basin Plan objectives. Therefore, the project's far-field nitrate impacts would be **less than significant**.

IMPACT 4.9-23 Hydrology and Water Quality—Construction and Operation of the Proposed Master Plan Facilities and Control of Stormwater Runoff. *The proposed project would involve updating and implementing a stormwater pollution prevention plan to assure compliance with applicable stormwater discharge permits. These and related actions (e.g., implementation of construction BMPs) that would be taken as part of and/or in response to the proposed project would minimize the impact of construction and operational stormwater quality impacts. Therefore, the project would result in a* ***less-than-significant*** *impact stormwater quality impacts.*

Impacts to water quality due to stormwater runoff from a facility can generally originate from: (1) construction activities, such as grading and excavation; and (2) contaminant spills that could occur from day-to-day facilities operations. Storm water runoff from the WQCF site flows into the general drainage system. Proposed facilities that would be connected to the general drainage system include equipment, chemical tanks, sanitary, and solids processing overflow drainage.

The WQCF operates under a General Industrial Storm Water Discharge Permit (General Permit) adopted by the SWRCB. A condition of the General Permit is the requirement to prepare and keep on site a stormwater pollution prevention plan (SWPPP). The major objectives of the SWPPP are to: (1) identify pollutant sources that may

affect the quality of industrial stormwater discharges, and (2) identify and implement control measures and management practices to reduce pollutants in industrial stormwater discharges. The SWPPP would be amended or modified according to the requirements stipulated by NPDES stormwater permits required for future plant facilities, and future plant operations would be required to be in accordance with the plan.

Measures which segregate runoff from chemical, fuel storage, and process-related areas from the storm drainage system would be incorporated into the facilities' design plans. The use of vegetation, dikes, and swales would minimize erosion potential. BMPs would be required to be incorporated into the construction plans and specifications to reduce potential pollutant loading associated with new facilities construction activities.

In addition to the General Permit for industrial stormwater discharges of the WQCF as part of day-to-day operations, the SWRCB has issued a NPDES General Permit for most construction activities within the State. The preparation of a SWPPP for proposed construction activities is required under the General Permit for construction. The SWPPP for construction activities is an operational plan describing definitive measures, such as BMPs, to be used to control potential stormwater pollution. The SWPPP is kept onsite for day-to-day use during project construction and required inspection purposes. The plan is subject to constant revision onsite, depending upon the changing conditions occurring as the project develops. These and related actions that would be taken as part of and/or in response to the proposed project would minimize the impact of construction and operational stormwater quality impacts. Therefore, the project would result in a **less-than-significant** impact stormwater quality impacts.

4.9.3 MITIGATION MEASURES

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

4.9-1 Effects on Potential On-site and Off-site Flooding Risk from Increased Stormwater Runoff

4.9-2 Reduction in Groundwater Recharge

4.9-3 Effects of Potential Off-site Flooding Risk from Increased Treated Effluent Discharge

4.9-4 Effects of Proposed Project Discharge on Biochemical Oxygen Demand (BOD) Concentrations in Receiving Waters

4.9-5 Effects of Proposed Project Discharges on Total Suspended Solids (TSS) Concentrations in Receiving Waters

4.9-6 Effects of Proposed Project Discharges on Total Aluminum Concentrations in Receiving Waters

4.9-7 Effects of Proposed Project Discharges on Electrical Conductivity Concentrations in Receiving Waters

4.9-8 Effects of Proposed Project Discharges on Ammonia (as Nitrogen) Concentrations in Receiving Waters

4.9-9 Effects of Proposed Project Discharges on Arsenic (Dissolved) Concentrations in Receiving Waters

4.9-10 Effects of Proposed Project Discharges on Copper (Dissolved) Concentrations in Receiving Waters

4.9-11 Effects of Proposed Project Discharges on Cyanide (Total) Concentrations in Receiving Waters

4.9-12 Effects of Proposed Project Discharges on Iron (Dissolved) Concentrations in Receiving Waters

4.9-13 Effects of Proposed Project Discharges on Manganese (Dissolved) Concentrations in Receiving Waters

4.9-14 Effects of Proposed Project Discharges on Methylene Blue Active Substances (MBAS) Concentrations in Receiving Waters

4.9-15 Effects of Proposed Project Discharges on Nitrate (as Nitrogen) Concentrations in Receiving Waters

4.9-16 Effects of Proposed Project Discharges on Nitrite (as Nitrogen) Concentrations in Receiving Waters

4.9-17 Effects of Proposed Project Discharges on Mercury (Total) Concentrations in Receiving Waters

4.9-18 Effects of Project Discharges on Pathogens in Receiving Waters

4.9-19 Effects of Proposed Project Discharges on Dissolved Oxygen Concentrations in Receiving Waters

4.9-20 Effects of Proposed Project Discharges on Electrical Conductivity (EC) Concentrations in Receiving Waters

4.9-21 Effects of Proposed Project Discharges on Dissolved Organic Carbon (DOC) Concentrations in Receiving Waters

4.9-22 Effects of Proposed Project Discharges on Nitrate (as Nitrogen) Concentrations in Receiving Waters

4.9-23 Construction and Operation of the Proposed Master Plan Facilities and Control of Stormwater Runoff

4.9.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

All impacts associated with hydrology and water quality would be less than significant. No mitigation measures are required.

4.10 PUBLIC SERVICES AND UTILITIES

This section provides an overview of existing public services and utilities for the city of Manteca and the proposed project area, including water supply, solid waste management, electrical service, natural gas service, fire protection, and police service. Because the proposed project would not involve the construction of any new residential structures and would not directly generate more than 14 residents in the project area, it would not require schools or parks; therefore, these resources are not addressed further in this section. Wastewater service is also not addressed in this section because the proposed project is a wastewater service project and the impacts of providing this service are evaluated throughout this DEIR. Stormwater management and drainage impacts are addressed in Section 4.9, "Hydrology and Water Quality." Impacts are evaluated in relation to increased demand for public services associated with the proposed project and actions needed to provide the services and utilities that could potentially lead to physical environmental effects.

4.10.1 ENVIRONMENTAL SETTING

WATER SUPPLY

Groundwater

The City operates a system of groundwater wells interconnected with a transmission and distribution pipeline. Well depths range from 155 feet to 400 feet, and individual capacities of the operating wells range from 380 gallons per minute (gpm) to 2,300 gpm. The groundwater aquifers underlying the city extend to depths in excess of 600 feet, and the strata slope from the hills east of the city downward to the west. Area groundwater levels are influenced by the proximity of the Sacramento–San Joaquin Delta (Delta) channels to the west. Groundwater recharge comes from irrigation of agricultural lands surrounding the city and infiltration from streams flowing west out of the Sierra Nevada. This recharge occurs in areas with permeable materials that allow filtration of water along streams, alluvial fans, and foothill areas; however, none of these features are present within the city, and there are no notable groundwater recharge areas within the city (City of Manteca 2003a). The groundwater basin safe yield was estimated at 1.0 acre-foot per acre per year; however, the basin is currently in a state of groundwater overdraft. The City began receiving surface water from the South County Water Supply Project (SCWSP) in 2005 to reduce the overdraft (City of Manteca 2006). The SCWSP is a joint effort between the Cities of Manteca, Lathrop, Tracy, and Escalon and the South San Joaquin Irrigation District (SSJID) to implement a conjunctive use water system for these cities.

The *City of Manteca 2005 Urban Water Management Plan* recommends a conjunctive use of surface water from the SCWSP and groundwater pumped by the City's groundwater wells. Surface water supply would be used as the base supply and groundwater facilities would be used to meet peak water demands.

Surface Water

The City is currently participating in the SCWSP. In 1995, the City, along with the Cities of Lathrop, Tracy, and Escalon, entered into an agreement with the SSJID for surface water delivery to these jurisdictions. The SCWSP will deliver up to 11,500 acre-feet per year (AFY) of treated surface water through 2010 from Woodward Reservoir to the turnouts: one on Lathrop Road, east of Union, and the other on West Yosemite Avenue near the wastewater quality control facility (WQCF). A subsequent phase would increase the City's water allocation to 18,500 AFY by 2027 (City of Manteca 2003b). Construction of a new water treatment plant at Woodward Reservoir and transmission lines to the City's turnouts were completed in 2005 (City of Manteca 2006).

Reclaimed Water

Reclaimed water is wastewater that has been collected and highly treated, after human use. Reclaimed water is frequently used to irrigate golf courses, parks, and crops; fill decorative fountains; and fight fires. The 2005 Urban

Water Management Plan includes reclaimed water use in future planning for the city. This would require construction of additional filtration and disinfection facilities at the City's wastewater treatment plant, as well as a distribution system. The use of reclaimed water is planned for dust control and irrigation at the "Big League Dreams" regional sports complex. Additionally, it is anticipated that the City will use reclaimed water for golf course and miscellaneous landscape irrigation by 2010 (Richard, pers. comm., 2006a). Additional information on reclaimed (or recycled) water can be found in Chapter 3, "Project Description."

WQCF Water Usage

The WQCF is not currently connected to the City water system. An on-site groundwater well at the WQCF site is used to meet the washing and showering needs of facility staff. Bottled water is used for drinking. In the future, the WQCF would connect to the City water system through existing distribution pipelines. The WQCF does not keep records on groundwater well usage at this time (Shannon, pers. comm., 2006).

Treated effluent is used to irrigate approximately 190 acres of City-owned cropland surrounding the WQCF site. This nonpotable treated effluent water is also used as facility wash water.

STORM DRAINAGE

The WQCF site is located on relatively flat land with no major drainages traversing the site. Major drainages in the project vicinity include Lone Tree Creek approximately 5 miles north of the WQCF, the Stanislaus River approximately 5 miles south of the WQCF, and the San Joaquin River approximately 2 miles west of the WQCF site. An SSJID canal is located on the WQCF property.

The City's drainage facilities are designed for stormwater to flow into detention and retention basins. Stormwater collected in detention basins, which temporarily hold and gradually release water for short periods of time, would discharge into SSJID drainage facilities. Stormwater collected in retention basins would percolate to groundwater or evaporate (City of Manteca 2003a).

SSJID operates drainage facilities that traverse the city of Manteca and carry a portion of the city's stormwater drainage. Water in the SSJID drainage system flows west into the French Camp Canal, which eventually flows into the French Camp Slough and ultimately drains into the Delta. Existing road and railroad crossings of the French Camp Canal are undersized and require replacement to accommodate future peak flows from the city (City of Manteca 2003a).

Individual development plans within the city limits are required to provide on-site detention designed to reduce peak stormwater flows to the City's system (City of Manteca 2003a). The City's target level of service is to provide 10-year storm drainage protection for all development and to provide 100-year storm drainage protection for all structures.

Stormwater management and drainage impacts are addressed in Section 4.9, "Hydrology and Water Quality."

SOLID WASTE DISPOSAL

Pickup and disposal of solid waste is provided by the City of Manteca Solid Waste Division. The City provides the following solid waste services: residential, biweekly curbside pickup of compost materials; leaf and Christmas tree pickup; oil collection pickup; commercial recycling; and household hazardous waste collection.

Wastes are transported to the Lovelace Transfer Station. Recyclable materials are stored at this facility, while other solid waste and green waste is transported to the Forward Landfill on Austin Road. At present, the Forward Landfill is permitted to accept 8,668 maximum tons per day (tpd) of solid waste. The landfill has a total capacity of 51 million cubic yards (CIWMB 2006) and a remaining capacity of 29.38 million cubic yards (Kennedy, pers. comm., 2006). The landfill has an estimated closure date of 2017 (Kennedy, pers. comm., 2006).

Assembly Bill (AB) 939 requires local agencies to implement source reduction, recycling, and composting. The countywide Integrated Waste Management Plan (IWMP) requires recycling programs, which are expected to result in a 50% diversion away from landfills, thereby extending the life of landfills.

All forms of solid waste generated at the WQCF are transported to the Forward Landfill. Solid waste includes residential trash, compressed screenings, inorganic grit, and dry biosolids (Shannon, pers. comm., 2006).

ELECTRICITY AND NATURAL GAS

Pacific Gas and Electric Company (PG&E) is responsible for provision of electricity and natural gas to the city and the proposed project area. PG&E delivers approximately 81,626 million kilowatt-hours (kWh) of electricity to its 15 million customers throughout the 70,000-square-mile service area in northern and central California (PG&E Corporation 2005). The service area is divided into seven distribution areas, with Manteca located in the Stockton Division of PG&E's Operations, Maintenance, and Construction Area 5.

The WQCF's normal power supply is provided by PG&E via a high-voltage (17-kilovolt [kV]) transformer. Two 1,400-kilowatt (kW) emergency generators provide backup electricity during power outages. Proposed new facilities would increase electrical demand beyond the 9.87 million gallons per day (mgd) average dry-weather flow (ADWF) capacity of the existing system. It is assumed that electrical demand at the WQCF would increase in relatively direct proportion to the increase in wastewater flow.

PG&E is also responsible for the provision of natural gas to the city. Gas is delivered to the city and the proposed project area through portions of PG&E's 46,000 miles of natural gas pipelines.

Cogeneration

Methane gas produced during anaerobic digestion at the WQCF is currently either used as a fuel to heat WQCF digesters or is flared (i.e., burned off) under controlled conditions. As an alternative to flaring, digester gas can be blended with natural gas and routed to an engine generator for electricity production. In the future, electricity produced in this manner could offset electrical deliveries from PG&E. One cogeneration unit (engine generator) is currently installed at the WQCF but has not yet been brought online. Operation of the cogeneration unit is anticipated in 2007. Ultimately, three cogeneration units are planned for installation at the WQCF (Richard, pers. comm., 2006b). The cogeneration system was considered as part of the Manteca WQCF Phase III Expansion Project EIR, and is not part of the proposed project (City of Manteca 2000).

FIRE PROTECTION

The project area is in the service area of the Manteca Fire Department (MFD). The following information on the MFD was obtained from the district's Web site (MFD 2006). MFD's service area covers approximately 60 square miles in southern San Joaquin County; the department maintains three fire stations. The closest fire station to the WQCF site is Fire Station 242, located at 1154 South Union Road, immediately north of State Route (SR) 120 on Union Road, approximately 1.5 miles east of the WQCF site. Two other fire stations, Station 241 at 290 South Powers Avenue and Station 243 at 399 West Louise Avenue, could provide additional backup in an emergency. Stations 241 and 243 are both located east of Union Road.

The MFD is equipped with three engines, three reserve engines, one rescue unit, one communications trailer, eight staff vehicles, and one pickup truck (MFD 2006). The MFD will also be purchasing a ladder truck in the near future (Quaresma, pers. comm., 2006). 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, available to control a given fire and the duration this flow is available. The total fire flow needed to extinguish a structural fire is determined by a variety of factors: 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 dependent on standards set in the California Fire Code.

The MFD provides public fire education, fire prevention, organized and efficient response to fires, first response to hazardous materials incidents, and basic level medical response. Medically related responses account for slightly more than 50% of all requests for service. To maintain a standard level of care, all fire personnel are trained and certified Emergency Medical Technician-1 (EMT) and EMT-D. The MFD has adopted an EMT-defibrillation program. This program allows the fire personnel to deliver an electrical shock to victims of cardiac arrest while also performing cardiopulmonary resuscitation. All medical patients in the MFD service area are transported to one of two local hospitals, depending on proximity and available space.

POLICE SERVICES

The Manteca Police Department is a full service law enforcement agency comprised of more than 70 sworn staff and 30 civilian support staff. The department is organized into two divisions: Operations and Services. Operations is the largest division of the department and includes all uniformed officers and their support teams. Operations Division units include patrol, traffic, school resource officers, community service officers, special weapons and tactics (SWAT), crisis response team, mounted patrol, canine, gangs, and bomb squad. The Services Division includes all the teams and units that support the police function of the department, including dispatch, records, property and evidence, crime analysis, and animal services. In addition, the department has more than 200 volunteers working with its officers and employees. The department operates out of 1001 West Center Street, Manteca, approximately 1.5 miles east of the WQCF site.

REGULATORY SETTING

Federal Plans, Policies, Regulations, and Laws

No federal plans, policies, regulations, or laws are applicable to the proposed project.

State Plans, Policies, Regulations, and Laws

No state plans, policies, regulations, or laws are applicable to the proposed project.

Regional and Local Plans, Policies, Regulations, and Ordinances

The *City of Manteca General Plan 2023* (City general plan) *Public Facilities and Services Element* includes the following policies related to public services and utilities that are relevant to this analysis.

- **Policy PF-P-31:** The City will implement and enforce the provisions of its Source Reduction and Recycling Element.
- **Policy PF-I-17:** The City will require undergrounding of utility lines in new development, and as areas are redeveloped, except where infeasible for operational reasons.
- **Policy PF-P-43:** The City shall endeavor through adequate staffing and patrol arrangements to maintain minimum feasible fire response time for fire and emergency calls.
- **Policy PF-P-39:** The City shall endeavor through adequate staffing and patrol arrangements to maintain minimum feasible police response times for police calls.

4.10.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Evaluation of potential public service and utility impacts was based on a review of documents pertaining to the proposed project area including the City general plan and the *City of Manteca 2005 Urban Water Management Plan*, consultation with appropriate agencies, and field review of the project area and surroundings. Impacts on public services and utilities that would result from the project were identified by comparing existing service capacity and facilities against future demand associated with project implementation.

The project does not include proposals for new residential structures and would not directly generate more than 14 residents in the project area. Therefore, it would not generate a significant number of students or significantly increase demands for school services or facilities. Because the proposed project would not generate more than 14 residents, it would not significantly increase demands on parks or other recreational facilities, and would not result in the substantial physical deterioration of existing recreational facilities. As such, no impacts related to these resources are anticipated. Because the proposed project is a wastewater collection, treatment, disposal, and distribution project and the impacts of providing this service are evaluated throughout this DEIR, impacts on wastewater service and wastewater treatment plant construction are not addressed below. Stormwater management and drainage impacts are addressed in Section 4.9, "Hydrology and Water Quality." These issue areas are not evaluated further in this section.

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines. The proposed project would result in significant public utilities impacts if project implementation would do any of the following:

- create demand for electrical or natural gas service that is substantial in relation to the existing demands;
- require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- cause insufficient water supply to be available to serve the project from existing or permitted entitlements and resources, or require new or expanded entitlements; or
- result in a determination by the wastewater treatment provider that serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.

The proposed project would result in significant public services impacts if project implementation would do any of the following:

- result in substantial adverse physical impacts associated with the provision of or need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times, or other performance objectives for
    - fire protection,
    - police protection, or
    - other public facilities;
- 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 4.10-1 Public Services and Utilities—Impacts on Water Supplies. *The proposed project would increase demand for potable and nonpotable water at the WQCF at rates that could be accommodated by existing and planned potable and nonpotable water supply facilities. Therefore, this impact would be* ***less than significant****.*

SSJID, under contract to the Cities of Manteca, Escalon, Lathrop, and Tracy, has constructed the SCWSP. The project provides treated potable water to the participating cities through construction and operation of a water treatment plant (WTP) and water transmission facilities to deliver treated water. The new WTP is located near SSJID's Woodward Reservoir in Stanislaus County. Water is delivered from the reservoir to the approximately 40-acre WTP facility. An approximately 36.5-mile pipeline conveys treated water from the WTP to turnouts for each participating city.

Future water supply for the city of Manteca is planned to consist of conjunctive use of groundwater from the City's existing and planned municipal wells and surface water deliveries from the SCWSP. The City currently has approximately 12,600 AFY of available water supplies, all via groundwater production. The SCWSP will deliver up to 11,500 AFY of treated water through 2010. A subsequent phase would increase the City's water allocation to 18,500 AFY by 2027, or 42.9% of the total water deliveries associated with the SCWSP in normal precipitation years.

The WQCF is not currently connected to the City's water system. An on-site groundwater well at the site is used to meet the washing and showering needs of facility staff. Bottled water is used for drinking. In the future, the WQCF would connect to the City's water system through existing distribution pipelines. The City does not keep records on groundwater well usage at the WQCF.

Potable water demand at the WQCF is approximately 1,386 gallons per day (American Water Works Association 2006). Estimated future demands for potable water are assumed to increase proportionally to the increase in plant capacity from 9.87 mgd ADWF to 27 mgd ADWF (approximately 174%). Therefore, the proposed project would increase the total daily potable water demand to approximately 3,798 gallons per day (an increase of 2,412 gallons per day). This potable water would be supplied by the existing City water system and future surface water deliveries from the SCWSP. The City would construct on-site water infrastructure improvements that would tie into the existing 12-inch water line located in Yosemite Avenue. Furthermore, the WQCF site is located within the City's urban services boundary. As such, the City has planned for water supplies to serve the WQCF through the City general plan.

Nonpotable water at the plant is currently used for facility wash water and crop irrigation. Nonpotable water would continue to be used for similar uses with implementation of the proposed project. Demand for nonpotable water is assumed to increase proportionally to the increase in plant capacity. Because nonpotable water is generated from spillover from the potable water supply system and secondary effluent, and the potable water supply and secondary effluent would increase in proportion to the increase in capacity at the WQCF, adequate nonpotable water supplies would be available.

Because the City of Manteca would meet future water supply needs through conjunctive use of surface water from the SCWSP and groundwater from the City's existing and planned municipal wells, the City has planned for water supplies to serve the WQCF through the City's general plan, adequate water supply and distribution facilities are available, and no new or expanded facilities would be required to serve the project, the City has adequate capacity to provide water for the proposed project. Water supply impacts would be **less than significant**.

IMPACT 4.10-2 Public Services and Utilities—Increased Generation of Solid Waste. *The proposed project would not substantially increase the amount of solid waste generated at the WQCF related to the total capacity of the Forward Landfill. Waste generated by the WQCF from implementation of the proposed project would be less than 0.1% of the Forward Landfill's permitted capacity. In addition, staff at the Forward Landfill have indicated that the landfill has sufficient capacity to accommodate increased solid waste demands from the WQCF at project buildout. Therefore, the project's solid waste impact would be* ***less than significant****.*

Approximately 10 additional staff would be needed to operate the WQCF at plant buildout in 2020, and five additional staff would be needed at partial plant buildout in 2010. The CIWMB provides an average per-capita solid-waste disposal rate for business types including utilities like wastewater treatment plants (CIWMB 2004). Solid-waste disposal rates for utilities are estimated at 0.3 ton per employee per year. Using the waste disposal rate of 0.3 ton per employee per year for 10 employees, 3 tons of waste (or approximately 83 cubic yards) would be generated annually by these employees in 2020. One and one-half tons of waste would be generated annually by five additional employees in 2010.

Waste screenings, grit, and biosolids are generated by the WQCF and trucked to the Forward Landfill for disposal. Annually, the WQCF currently generates 104 cubic yards of waste screenings, 52 cubic yards of grit, and 638 tons (approximately 548 cubic yards) of biosolids (Shannon, pers. comm., 2006). Estimated screenings, grit, and biosolids generation rates are assumed to increase proportionally to the increase in plant capacity from 9.87 mgd ADWF to 27 mgd ADWF (approximately 174%). Therefore, the proposed project would increase annual screenings, grit, and biosolids generation rates to 285 cubic yards of waste screenings, 142 cubic yards of grit, and approximately 1,502 cubic yards of biosolids.

Solid waste generation rates of 2,012 cubic yards per year would not be reached until full plant buildout in 2020. Much lower generation rates would occur at project initiation in 2008, with gradual increases in the rate until full buildout. The Forward Landfill has approximately 29.38 million cubic yards of available capacity, which is estimated to last through 2017 (Kennedy, pers. comm., 2006). Staff at the landfill indicted that plans for future expansion of the landfill are not yet under way and would not occur until remaining capacity is less than 7 years. Assuming an annual solid waste disposal rate of 2,012 cubic yards, the proposed project would increase the amount of solid waste generated by a total of approximately 20,120 cubic yards through 2017. As such, waste generated by the WQCF from implementation of the proposed project through 2017 would be less than 0.1% of the Forward Landfill's permitted capacity.

Additionally, the proposed project would comply with all federal, state, and local statutes and regulations related to solid waste reduction and recycling and the project would be consistent with City general plan policies related to source reduction and recycling (Policy PF-P-31).

Because the waste generated by the WQCF from implementation of the proposed project would be less than 0.1 % of the Forward Landfill's permitted capacity, and the proposed project would not violate federal, state, or local statutes and regulations related to solid waste, the project would result in **less-than-significant** solid waste impacts.

IMPACT 4.10-3 Public Services and Utilities—Increased Demand for Electricity and Natural Gas. *Implementation of the proposed project would increase demand for energy in the city. However, the energy demands created by the project would not be substantial in relation to the total energy currently supplied by PG&E in its northern and central California service area or total energy demands expected in the future, and proposed energy improvements would be required to comply with existing City, PG&E, and applicable Uniform Building Code requirements. Therefore, this impact would be* ***less than significant****.*

Average electricity demand at the WQCF is 17,386 kWh per day (or 724 kW per day), and average natural gas demand is 27.1 therms per day (Shannon, pers. comm., 2006). Estimated future demands for electricity and natural gas are assumed to increase proportionally to the increase in plant capacity from 9.87 mgd ADWF to

27 mgd ADWF (approximately 174%). Therefore, the proposed project would increase electricity demand to approximately 47,638 kWh per day (or 1,984 kW per day), and natural gas demand to approximately 74.25 therms per day.

Implementation of the proposed project would increase energy demands within the city. However, the energy demands created by the project are not substantial in relation to the total energy supplied by PG&E in its northern and central California service area (estimated in 2005 to be 81,626 million kWh per day of electricity and 844,068 million cubic feet per day of natural gas) or total energy demands expected in the future. The on-site service lines would be sized to meet the demands of the project, and public utility easements would be dedicated for all underground facilities as necessary. Extension of on-site utility lines and construction of facilities to serve the project would occur concurrently with development at the WQCF. All new infrastructure would be installed underground, in conformance with City standards (Policy PF-I-17).

Because the energy demands created by the project would not be substantial in relation to the total energy supplied by PG&E in its northern and central California service area or total energy demands expected in the future, and because proposed energy improvements would be required to comply with existing City, PG&E, and applicable Uniform Building Code requirements, the proposed project would result in **less-than-significant** electricity and natural gas impacts.

IMPACT 4.10-4 Public Services and Utilities—Increased Demand for Fire Protection and Police Services. *Implementation of the proposed project would not require additional fire protection or police services. The City of Manteca police and fire departments would be able to serve the project and meet established performance standards. Therefore, the project's impacts on fire protection and police services would be* ***less than significant****.*

The closest fire station to the WQCF site is Fire Station 242, located at 1154 South Union Road, immediately north of SR 120 on Union Road, approximately 1.5 miles east of the WQCF site. Two other fire stations, Station 241 at 290 South Powers Avenue and Station 243 at 399 West Louise Avenue, could provide backup in an emergency. The Manteca Fire Department would be able to serve the proposed project without constructing new facilities or hiring additional personnel (Quaresma, pers. comm., 2006). Therefore, the project would be consistent with City policies related to adequate staffing to maintain minimum feasible fire and emergency call response times (Policy PF-P-43).

Police services would be provided to the proposed project area by the Manteca Police Department, which is composed of more than 70 sworn staff, 30 civilian support staff, and more than 200 volunteers. The police department is located approximately 1.5 miles east of the WQCF site. The Manteca Police Department would have sufficient staff to serve the proposed project while maintaining acceptable response times (Halford, pers. comm., 2006). Therefore, the project would be consistent with City policies related to adequate staffing to maintain minimum feasible police response times (Policy PF-P-39).

Because implementation of the proposed project would not require additional fire protection or police services and established performance standards could be met, this impact would be **less than significant**.

IMPACT 4.10-5 Public Services and Utilities—Impacts on Existing Utility Corridors. *Implementation of the proposed project could potentially disrupt existing aboveground and underground utility facilities in the project area, resulting in interruption of service. This would be a* ***potentially significant*** *impact.*

Implementation of the proposed project could potentially disrupt existing aboveground and underground utility facilities in the project area, including a PG&E high-voltage electrical transmission line crossing the WQCF property 400 feet south of existing developed areas at the WQCF, and overhead electrical transmission lines along the proposed alignment of the treated-effluent outfall pipeline. Implementation of the proposed project may require that high-voltage electrical transmission towers and other electrical transmission facilities be moved to

accommodate additional WQCF facilities and pipelines. During the project's design phase, the City would consult with the local utility companies to avoid potential disturbances to utility facilities in the project area, where possible. Existing utilities are installed within roadways throughout the project area. Construction and installation of wastewater collection system pipelines, recycled-water distribution pipelines, the parallel treated-effluent outfall pipeline, and wastewater pumping stations could potentially disrupt existing utility facilities in the project area. In accordance with City policies, the City would consult during the design phase with utility companies that operate underground or aboveground utilities in the project area to determine the exact location of these facilities. Typically, the City would avoid existing utilities where possible. If these utilities cannot be avoided, the City would coordinate with the utility companies to determine the best method of minimizing potential disturbances. Nonetheless, implementation of the proposed project could potentially disrupt existing aboveground and underground utility facilities in the project area, and this impact would be **potentially significant**.

4.10.3 MITIGATION MEASURES

No mitigation is necessary for the following less-than-significant impacts:

4.10-1 Impacts on Water Supplies.

4.10-2 Increased Generation of Solid Waste.

4.10-3 Increased Demand for Electricity and Natural Gas.

4.10-4 Increased Demand for Fire Protection and Police Services.

The following mitigation measure is recommended for the potentially significant impact of Impact 4.10-5.

Mitigation Measure 4.10-5: Impacts on Existing Utility Corridors.

PG&E owns and operates gas and electric facilities that are located within and adjacent to the proposed project area. To promote the safe and reliable maintenance and operation of utility facilities, the California Public Utilities Commission (CPUC) has mandated specific clearance requirements between utility facilities and surrounding objects or construction activities. To ensure compliance with these standards, the City of Manteca will coordinate with PG&E early in the development of project plans. Any proposed development plans will provide for unrestricted utility access and prevent easement encroachments that might impair the safe and reliable maintenance and operation of PG&E's facilities.

The requesting party will be responsible for the costs associated with the relocation of existing PG&E facilities to accommodate the development of the proposed project. Because facilities relocations require long lead times and are not always feasible, the City will consult with PG&E as early in the planning stages as possible. Relocations of PG&E's electric transmission and substation facilities (50,000 volts and above) could also require formal approval from CPUC. If required, this approval process could take up to 2 years to complete. The City will consult with PG&E for additional information and assistance in the development of its project schedule to reduce effects on utility service associated with project development.

4.10.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of Mitigation Measure 4.10-5, the project's impacts on existing utilities corridors would be reduced to a less-than-significant level, because the City of Manteca will coordinate with PG&E early in the development of project plans to avoid significant impacts on existing utility infrastructure.

4.11 TRANSPORTATION AND CIRCULATION

This section describes the transportation and circulation impacts associated with implementation of the proposed project, including construction and operation phases. Manteca and other cities and communities throughout San Joaquin County are expected to experience substantial growth. Major projects have been entitled for development throughout the region, and more are proposed. As projects develop, traffic would increase on local and regional roadways and freeways. As regional development proceeds, transportation system improvements would be provided through local and regional funding programs, individual project mitigation, and improvements funded by the City, San Joaquin County, and the California Department of Transportation (Caltrans).

4.11.1 ENVIRONMENTAL SETTING

REGIONAL AND PROJECT AREA ROADWAYS

The regional circulation system in the project area consists of two north-south freeways (State Route [SR] 99 and Interstate 5 [I-5]) located approximately 3.75 miles east and 2.25 miles west of the wastewater quality control facility (WQCF) site, respectively; an east-west freeway (SR 120) located approximately 0.75 mile south of the WQCF site; and several local surface streets (Exhibit 4.11-1). Several local roadways within the project area serve the WQCF. West Yosemite Avenue provides direct access to the WQCF. Detailed descriptions of the key roadways in the vicinity of the project area are provided below.

Interstate 5

I-5, one of the major freeways in the state of California, is located west of the project site. In San Joaquin County, I-5 connects Stockton to Tracy and passes through Lathrop and unincorporated areas of San Joaquin County. The section of I-5 in the vicinity of the WQCF site has three lanes in each direction north of SR 120 and four to five lanes in each direction between SR 120 and I-205 (approximately 1.5 miles west of the city).

State Route 120

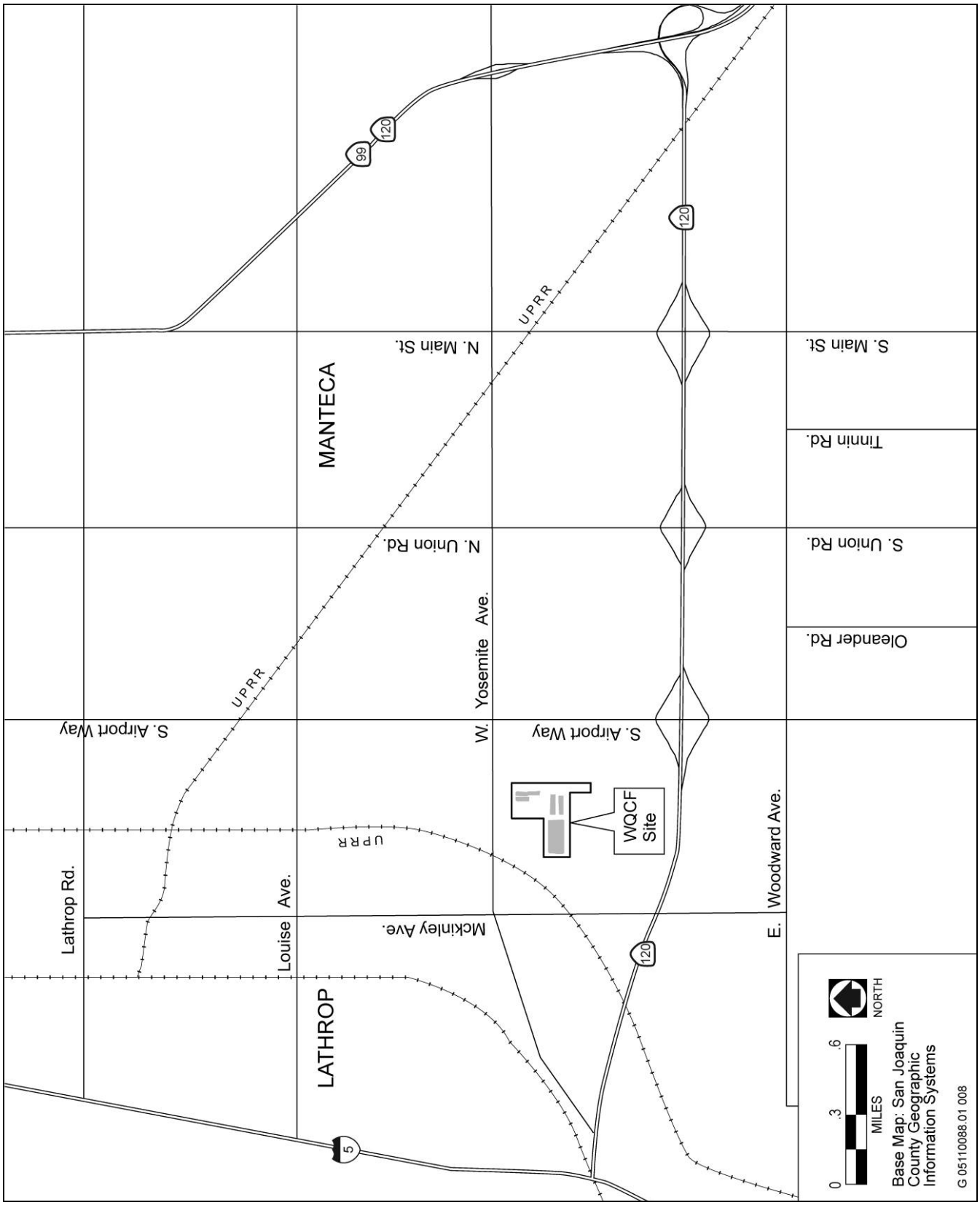
SR 120, which borders the WQCF property to the south, is considered a major regional freeway in San Joaquin County and provides connection from I-5 and I-205 to SR 99. SR 120 is an east-west, four-lane freeway that provides interchanges at Airport Way, Union Road, and Main Street within the city of Manteca.

State Route 99

SR 99, located approximately 3.75 miles east of the WQCF site, serves as one of the major north-south routes in San Joaquin County and provides a connection between Sacramento and Stockton in the north, and the cities of Manteca, Modesto, Merced, Fresno, and Bakersfield in the south. SR 99 has three lanes in each direction south of SR 120 and parallels I-5 throughout much of California.

Lathrop Road

Lathrop Road is an east-west surface street that extends through the city of Manteca into the city of Lathrop and provides regional circulation between I-5 to the west and SR 99 to the east. Lathrop Road provides a primary east-west travel corridor across north Manteca. Approximately 2.25 miles north of the WQCF site, Lathrop Road is generally a two- and three-lane roadway. Near the Union Road intersection, Lathrop Road consists of two eastbound lanes and a single westbound lane. Near the Airport Way intersection, Lathrop Road consists of eastbound and westbound single lanes. Left-turn lanes are provided at both signalized intersections.



Source: Adapted by EDAW in 2007

Project Area Roadways **Exhibit 4.11-1**

Union Road

Union Road is a north-south, two- to four-lane local street located approximately 1.5 miles east of the WQCF site. Union Road provides access to SR 120 via an unsignalized diamond interchange. It is a four-lane roadway north of Wawona Street (approximately 1.5 miles east of the WQCF) and a two-lane roadway between Wawona Street and Avenue D (approximately 6.75 miles southeast of the WQCF). Union Road extends from French Camp Road in the north to Avenue D in the south.

Airport Way

Airport Way is a north-south, two-lane, local street that extends from Stockton Metropolitan Airport in the north to Durham Ferry State Recreational Area in the south. The unsignalized Airport Way interchange provides access to SR 120.

Woodward Avenue

Woodward Avenue is an east-west, two-lane roadway located south of the WQCF site. Woodward Avenue extends from Oakwood Lake in the west to Moffat Boulevard, near SR 99, in the east. This roadway is primarily rural and provides access to nearby farmlands and residences.

Oleander Road

Oleander Road is a north-south, two-lane roadway that is located southeast of the WQCF site. It extends from Woodward Avenue in the north to Ripon Road in the south. The roadway is primarily rural and provides access to nearby farmlands and residences.

Yosemite Avenue

Yosemite Avenue is an east-west, four-lane roadway that primarily serves the City of Manteca. It extends from the SR 120/Yosemite Avenue intersection in the west to SR 99 in the east, where it becomes SR 120, a two-lane highway. This roadway is a primary commercial/retail/office corridor for the city.

LEVELS OF SERVICE

Roadway facility operations are described with the term “level of service” (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. There are six levels, which range from LOS A, the best operating conditions, to LOS F, the worst operating conditions. LOS E represents “at capacity” operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions. LOS can be reported for both roadway segments and intersections. This analysis reports roadway segment LOS.

Roadway segment operations were evaluated using the measurements outlined in the EIR for the *City of Manteca General Plan 2023* (City general plan) (City of Manteca 2003). The relationship between daily traffic volumes and LOS ratings is presented in Table 4.11-1.

Table 4.11-2 presents the existing traffic volumes and LOS of local roadways serving the project area. The LOS designation is based on a comparison of the average daily traffic volume for each roadway segment to the LOS criteria in Table 4.11-1.

Table 4.11-1 Daily Traffic Volume Levels of Service			
Lanes	Level of Service C	Level of Service D	Level of Service E
2	9,100	14,600	15,600
4	21,400	31,100	32,900
6	33,400	46,800	49,300
Source: City of Manteca 2003			

Table 4.11-2 Existing Roadway Levels of Service			
Roadway Segment	Lanes	Volume[1]	Level of Service
Airport Way, North of SR 120	2	11,975	C
Airport Way, Between Louise Avenue and Yosemite Avenue	2	8,900	C
Airport Way, South of Woodward Avenue	2	3,225	C
Yosemite Avenue, Between McKinley Avenue and Airport Way	2	11,200	C
Lathrop Road, Between Airport and Union Road	2	10,200	C
Union Road, Between SR 120 and Woodward Avenue	2	4,300	C
Union Road, South of Woodward Road	2	3,300	C
Woodward Avenue, West of Airport Way	2	2,050	C
Woodward Avenue, East of Airport Way	2	1,675	C
Woodward Avenue, West of Union Road	2	1,700	C
Woodward Avenue, East of Union Road	2	2,950	C
Woodward Avenue, West of Main Street	2	2,975	C
Woodward Avenue, East of Main Street	4	5,150	C
Oleander Avenue, South of Woodward Avenue	2	225	C
Tinnin Road, South of Woodward Avenue	2	275	C
Notes: SR = State Route [1] Average daily traffic. Source: City of Manteca 2003, Fehr & Peers Transportation Consultants 2006			

WQCF OPERATIONS

Yosemite Avenue provides direct access to the WQCF. It runs in an east-west direction and is located north of the WQCF. Traffic generated by the WQCF generally consists of permanent WQCF staff and temporary construction personnel commuting to and from work, deliveries of equipment and supplies to the WQCF, and the hauling of solid waste (including employee trash, biosolids, grit, and screenings) from the WQCF to an off-site disposal facility. Approximately 20 people are currently employed at the WQCF. Supplies such as chemicals, office supplies, and construction materials are delivered to the plant on a regular basis.

EXISTING WQCF TRAFFIC GENERATION

Traffic generated by the WQCF is primarily from employee and delivery vehicle trips, trips related to ongoing construction at the facility, the hauling of grit and screenings to the Forward Landfill, and trash removal to the Forward Landfill. Biosolids generated by the WQCF treatment process are also periodically hauled to the Forward Landfill. Currently, WQCF operations generate approximately 50 one-way trips per day, including 20 employee vehicle round trips (40 one-way trips) and five miscellaneous round trips (10 one-way trips) per day (Richard, pers. comm., 2006a).

The WQCF generates approximately 156 cubic yards of grit and screenings per year, and approximately 548 cubic yards of biosolids per year (Shannon, pers. comm., 2006). Grit, screenings, and biosolids disposal requires approximately 59 annual truck trips, assuming 12 cubic yards per truckload and trash removal from the WQCF once per week.

As shown in Table 4.11-2, traffic volumes on Airport Way north of SR 120 (and to the east of the WQCF) are approximately 11,975 vehicles per day. Traffic volumes north of the WQCF on Yosemite Avenue are approximately 11,200 vehicles per day. WQCF operations contribute approximately 0.4% of existing traffic volumes on Airport Way and approximately 0.4% of traffic volumes on Yosemite Avenue.

REGULATORY SETTING

Federal Plans, Policies, Regulations, and Laws

No federal plans, policies, regulations, or laws are applicable to the proposed project.

State Plans, Policies, Regulations, and Laws

No state plans, policies, regulations, or laws are applicable to the proposed project.

Regional and Local Plans, Policies, Regulations, and Ordinances

San Joaquin County Regional Transportation Plan

San Joaquin County, through the San Joaquin Council of Governments (SJCOG), periodically updates the Regional Transportation Plan, which outlines countywide transportation expenditures based on funding from sources like the federal government, the State of California, and locally collected funds. The current SJCOG Regional Transportation Plan (2004) contains several proposed improvements that would benefit the regional roadway network in the project region. The *Draft 2007 Regional Transportation Plan* (SJCOG 2007) contains several proposed improvements that would benefit the regional roadway network and the project area. These improvements include reconstructing the SR 120 and Airport Way interchange, and widening Airport Way from four to six lanes between SR 120 and Lathrop Road.

Regional Transportation Impact Fee

In the spring of 2006 all local governments in San Joaquin County and SJCOG approved a regional transportation impact fee on new development. These funds, which will be collected through the life of the *Draft 2007 Regional Transportation Plan* (SJCOG 2007), are targeted to key regional highway and roadway improvements and regionally significant transit improvements.

Measure K Strategic Plan

Measure K is a San Joaquin County measure that funds transportation projects through sales tax revenue. The planned expenditures under the measure are provided in the Measure K Strategic Plan. The latest version of this plan was published in 2003. One relevant improvement described in the plan is the widening of Lathrop Road west of I-5 to four lanes in the city of Lathrop, as well as east of I-5 in the city of Manteca. The reauthorization of Measure K passed on the November 2006 ballot, adding over $3.1 billion in transportation resources. Funds will be used roughly one-third for maintenance and safety, one-third for transit and alternative modes of travel, and one-third for roadway operational and capacity improvements. Specifically, the measure includes funds for expanding SR 120 to six lanes between Manteca and Stockton and improvements to all SR 120 interchanges in Manteca.

Proposition 1B

Proposition 1B is a statewide transportation bond program totaling more than $19.9 billion that was approved by California voters in November 2006. Proposition 1B will fund safety improvements, expand public transit, relieve traffic congestion, repair local streets, and reduce air pollution. Under the program, San Joaquin County will receive roadway maintenance, transit, and other capital improvement funds. Some Proposition 1B funds will be automatically distributed to San Joaquin County via a formula, and other funds will be available on a competitive basis.

City of Manteca General Plan

The City general plan includes the following circulation element policies related to transportation and circulation that are relevant to this analysis:

- **Policy C-P-2:** Manteca's target for transportation LOS is to provide citywide average LOS of C or better, and a minimum of LOS D at any individual location. This "C average, D minimum" shall be accomplished by attempting to provide LOC C at all locations, but accepting LOS D under the following circumstances:
    - Where constructing facilities with enough capacity to provide LOS C is found to be unreasonably expensive. This applies to facilities, for example, on which it would cost significantly more per dwelling unit equivalent (DUE) to provide LOS C than to provide LOS D.
    - Where it is difficult or impossible to maintain LOS C because surrounding facilities in other jurisdictions operate at LOS D or worse.
    - Where free-flowing roadways or interchange ramps would discourage use of alternate travel modes.
    - Where maintaining LOS C would be a disincentive to use of existing alternative modes or to the implementation of new transportation modes that would reduce vehicle travel.
- **Policy C-P-26:** The City shall require all new development to provide an adequate number of off-street parking spaces to accommodate the typical parking demands of the type of development on the site.

4.11.2 ENVIRONMENTAL IMPACTS

THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance

are based on the State CEQA Guidelines. The proposed project would result in significant transportation and circulation impacts if it would:

- cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system;
- exceed, either individually or cumulatively, an LOS standard established by the City or Caltrans for designated roads or highways;
- result in inadequate parking capacity;
- substantially increase hazards because of a design feature or incompatible uses; or
- result in inadequate emergency access.

IMPACT ANALYSIS

IMPACT 4.11-1 Transportation and Circulation—Increased Vehicle Trips or Traffic Congestion During Construction. *The project would generate up to 180 one-way construction-related vehicle trips per day associated with construction of the proposed WQCF improvements and up to 114 one-way construction-related vehicle trips associated with construction of proposed pipelines and pumping stations over the course of the planning period. Construction-related WQCF, pipeline, and pumping station trips would represent approximately 1.6%–7% of existing traffic volumes on area roadways. These trips would be temporary and would cease once project construction is complete, would not substantially degrade existing levels of service, and would not increase congestion at nearby intersections. Therefore, the project's construction-related traffic impacts would be* less than significant.

The proposed facilities would be constructed over a period of at least 12 years. Construction activities would increase the number of vehicles traveling to and from the WQCF site and other project areas. Construction could require 80 workers at the WQCF and 50 workers along the wastewater collection system, outfall, and recycled-water distribution pipeline alignments and pumping station areas at any one time, although the exact number would depend on the final design of individual facilities. The exact timing of planned facility improvements is based on projected wastewater flows and loads, regulatory requirements, operational needs, and design criteria. Facility improvements would be phased in 10-year increments over the planning period.

During peak construction activities, 80 construction workers could commute to the WQCF site daily, generating approximately 160 one-way vehicle trips per day. In addition, 50 construction workers would commute to pipeline and pumping station sites on a daily basis, generating approximately 100 one-way vehicle trips per day (Richard, pers. comm., 2006a). Construction activities would require the delivery of construction vehicles, equipment, and materials during the construction period. Construction activities at the WQCF site would generate approximately 10 deliveries per day, resulting in 20 one-way delivery trips, and pipeline and pumping station construction activities would generate seven deliveries per day, resulting in 14 one-way delivery trips (Richard, pers. comm., 2006b).

Overall, the project would generate up to 180 one-way construction-related vehicle trips per day associated with construction of the proposed WQCF improvements and up to 114 one-way construction-related vehicle trips associated with construction of proposed pipelines and pumping stations over the course of the planning period. Construction of WQCF and pipeline improvements could occur concurrently, but would be separated from one another such that a substantial increase in local roadway volumes would not occur. Construction-related WQCF trips would represent approximately 1.6% of existing traffic volumes on area roadways, and construction-related pipeline and pumping station trips would represent approximately 7% of existing traffic volumes on area roadways. These trips would not substantially degrade existing levels of service and would not increase

congestion at nearby intersections. Therefore, the proposed project would be consistent with City general plan traffic Policy C-P-2.

Because construction-related vehicle trips associated with the project would not substantially degrade existing levels of service and would not increase congestion at nearby intersections, the project's construction traffic impacts would be **less than significant**.

IMPACT 4.11-2 Transportation and Circulation—Potential Increase in Long-Term Operational Traffic. *The project would generate 20 additional one-way employee passenger vehicle trips per day and less than one truck haul trip per day (approximately two truck haul trips per week). These trips represent less than 1.0% of existing traffic volumes on local roadways and would not decrease the LOS of these roadways. Therefore, long-term operational traffic impacts would be* ***less than significant****.*

Approximately 10 additional staff members would be needed to operate the WQCF at project buildout in 2020. These employees would generate approximately 20 one-way daily trips commuting to and from the WQCF on a daily basis.

The increase in treatment capacity of the WQCF would also increase the amount of treatment byproducts (grit, screenings, and biosolids) produced at the WQCF. Waste screenings, grit, and biosolids generated by the WQCF are trucked to the Forward Landfill for disposal. Annually, the WQCF generates 104 cubic yards of waste screenings, 52 cubic yards of grit, and approximately 548 cubic yards of biosolids (Shannon, pers. comm., 2006). At WQCF buildout, estimated screenings, grit, and biosolids generation rates are assumed to increase proportionally to the increase in plant capacity from 9.87 million gallons per day (mgd) average dry-weather flow (ADWF) to 27 mgd ADWF (approximately 174%). Therefore, the proposed project would increase the generation rates of annual screenings, grit, and biosolids to 285 cubic yards of waste screenings, 142 cubic yards of grit, and approximately 1,502 cubic yards of biosolids. Assuming 12 cubic yards of solid waste per truckload, an additional 1,225 cubic yards of additional solid waste would require 102 one-way truck trips per year to the Forward Landfill (approximately two one-way trips per week).

The California Integrated Waste Management Board (CIWMB) provides an average per-capita solid-waste disposal rate for business types including utilities like wastewater treatment plants (CIWMB 2004). Solid-waste disposal rates for utilities are estimated at 0.3 ton per employee per year. Using the waste disposal rate of 0.3 ton per employee per year for 10 employees, 3 tons of waste (or approximately 83 cubic yards) would be generated annually by these employees in 2020. Because it is assumed that trash removal from the WQCF occurs once per week, the relatively small increase in waste generated by these 10 additional employees would not increase the trash removal frequency at the WQCF, and no additional truck trips for employee trash disposal would be required.

Overall, the project would generate 20 one-way employee passenger vehicle trips per day and less than one truck haul trip per day. These trips are less than 1.0% of existing traffic volumes on local area roadways and would not decrease the LOS of these roadways. Therefore, the proposed project would be consistent with City general plan traffic Policy C-P-2.

Because total trips are less than 1.0% of existing traffic volumes on local area roadways and would not decrease the LOS of these roadways, long-term operational traffic impacts would be **less than significant**.

IMPACT 4.11-3 Transportation and Circulation—Potential for Inadequate Parking Capacity. *Implementation of the proposed project would result in the creation of a small demand for additional parking spaces during the regular working shift at the WQCF. However, adequate space is available at the WQCF site for additional parking spaces, and additional parking spaces would be included in final project design. Adequate space also exists in the project area to adequately accommodate vehicles and equipment associated with construction of pumping stations, the outfall pipeline, and pipelines for the wastewater collection system and recycled-water distribution system. Therefore, the proposed project would not result in inadequate parking capacity. This impact would be* ***less than significant****.*

Currently, staffing at the WQCF consists of approximately 20 people. At WQCF buildout, approximately 30 staff members would be needed to operate the WQCF. Therefore, demand for on-site parking spaces would increase. The WQCF site occupies approximately 22 acres of a 210-acre City-owned property. Implementation of the proposed project would result in the expansion of the WQCF footprint onto City-owned farmland surrounding the WQCF. Sufficient space exists both within and outside the existing WQCF footprint for the construction of additional parking spaces, and additional parking spaces to accommodate increased parking demand would be included in final WQCF site design. Therefore, the proposed project would be consistent with City general plan parking Policy C-P-26. In addition, no off-site or on-street parking would be necessary to accommodate WQCF site parking needs.

During peak construction activities, 80 construction workers could commute to the WQCF site daily, generating approximately 160 one-way vehicle trips per day. In addition, 50 construction workers would commute to pipeline and pumping station sites on a daily basis, generating approximately 100 one-way vehicle trips per day (Richard, pers. comm., 2006a). The proposed project would temporarily increase demand for parking during the construction period to stage construction equipment and construction personnel vehicles. The WQCF site has several open areas (e.g., north of the ultraviolet light disinfection facilities and east of the primary sedimentation basins) to adequately accommodate construction-related vehicles within the footprint of the site. Sufficient space also exists in the project area to accommodate vehicles and equipment associated with construction of pumping stations, the outfall pipeline, and pipelines for the wastewater collection system and recycled-water distribution system. Construction staging areas along proposed pipeline routes and roadways would be designed to accommodate all the parking needs of construction equipment and construction personnel vehicles and minimize hazards to roadway users (see Impact 4.11-4).

Because sufficient space exists both within and outside the existing WQCF footprint for the construction of additional parking spaces, because additional parking spaces to accommodate increased parking demand would be included in the final WQCF site design, and because construction staging areas at the WQCF site and along proposed pipeline routes and roadways would be designed to accommodate all the parking needs of construction equipment and construction personnel vehicles and minimize hazards to roadway users, this impact would be **less than significant**.

IMPACT 4.11-4 Transportation and Circulation—Increase in Hazards because of a Design Feature. *No permanent design features are proposed that would increase hazards for pedestrians, bicyclists, or drivers. Standard construction practices (i.e., cones, signage, traffic controllers) would be employed during project construction to minimize any potential hazards. However, construction-related vehicle trips associated with construction of the proposed WQCF improvements, outfall pipeline, pumping stations, and pipelines for the wastewater collection system and recycled-water distribution system may block some roadways and result in the queuing of vehicles on area roadways. This could increase the potential for vehicle accidents and could temporarily increase response times for emergency service vehicles. Therefore, this impact would be* ***potentially significant****.*

The proposed WQCF facilities would be constructed at the existing City-owned WQCF site. Project construction would require construction equipment and heavy vehicles, such as scrapers, cranes, and dump trucks, to be stored

in designated areas on the WQCF property during nonwork hours. Pumping stations would most likely be constructed within new residential subdivisions, and pipelines would be constructed primarily within existing roadway right-of-way. Once constructed, pumping stations and pipelines would require minimal maintenance.

During peak construction activities, 80 construction workers could commute to the WQCF site daily, generating approximately 160 one-way vehicle trips per day. In addition, 50 construction workers would commute to pipeline and pumping station sites on a daily basis, generating approximately 100 one-way vehicle trips per day (Richard, pers. comm., 2006a). To ensure public safety, standard construction practices would be employed as needed and would include temporary traffic controls such as signage, traffic control personnel, and cones. Standard construction practices would also include the selection of adequate staging areas for construction equipment, employee parking, and storage during construction activities. However, the increased number of vehicles accessing the WQCF site during construction could result in the queuing of vehicles on Yosemite Avenue. In addition, the increased number of vehicles associated with construction of the outfall pipeline, pumping stations, and pipelines for the wastewater collection system and recycled-water distribution system could temporarily block some roadways and result in the queuing of vehicles on Airport Way, Woodward Avenue, and other project area roadways. This could lead to an increase in the potential for vehicle accidents along these roadways and could temporarily increase response times for fire protection, police, and ambulance service vehicles along affected roadways.

Because the increased number of vehicles associated with construction of the WQCF, outfall pipeline, pumping stations, and pipelines for the wastewater collection system and recycled-water distribution system could result in an increase in the potential for vehicle accidents and could temporarily increase response times for emergency service vehicles along these roadways, this impact would be **potentially significant**.

4.11.3 MITIGATION MEASURES

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

4.11-1: Increased Vehicle Trips or Traffic Congestion During Construction.
4.11-2: Potential Increase in Long-Term Operational Traffic.
4.11-3: Potential for Inadequate Parking Capacity.

The following mitigation measure is recommended for the potentially significant impact of Impact 4.11-4.

Mitigation Measure 4.11-4: Increase in Hazards because of a Design Feature.

Before commencement of any construction activities, the City of Manteca Public Works Department will prepare and approve a construction management plan. The plan will identify the timing of construction and the timing of elements that would result in the full or partial blockage of local roadways. The plan will indicate where emergency vehicle access to project facilities would be provided, and will also outline the procedures for coordination with emergency service providers before project construction and road closures. The plan will also specify the measures that would be implemented to minimize traffic-related impacts, including construction parking during construction. These measures could include, but are not limited to, use of signage notifying travelers that they are entering a construction zone; and use of cones, flaggers, and guide vehicles to direct traffic through the construction zone. In addition, the plan will include, at a minimum, the following conditions:

1. Before beginning any construction activities, the City will determine the roadways that will receive project-related construction traffic for the transport of materials and equipment to the WQCF and those roadways in which new pipeline would be installed.

2. The City will document existing pavement conditions through photographs of roadways identified in item 1 above. The photographs will identify general views of pavement conditions as well as document specific locations of where there are current deficiencies in pavement conditions. These photos will be retained on file at the WQCF.

3. This City will monitor the condition of roadways identified in item 1 above every 6 months to determine whether any pavement degradation (e.g., potholes, pavement separation) has occurred from preconstruction conditions.

4. Where roadways show evidence of degradation below acceptable standards as determined by the City Department of Public Works, the City will repair degraded sections to acceptable standards.

5. Lane closures will be identified including specific times of closure. All lane closures will be limited to the hours between 9 a.m. and 4 p.m.

A copy of the plan will be submitted to local emergency response agencies and these agencies will be notified at least 14 days before the commencement of construction that would partially or fully obstruct local roadways.

The City Public Works Department will ensure that project contractors adhere to the provisions of the plan and maintain a copy of the plan at project construction sites.

4.11.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of the above mitigation measure, the project's impacts on local roadways would be reduced to a less-than-significant level because the City of Manteca Public Works Department will prepare and approve a construction management plan before the commencement of project construction activities. Implementation of this mitigation measure would reduce temporary roadway hazard and emergency access impacts to less-than-significant levels.

4.12 CULTURAL RESOURCES

This section provides an evaluation of the potential impacts on cultural resources that could result from project implementation. Cultural resources may include archaeological traces such as early Native American occupation sites and artifacts, historic-era buildings and structures, and places used for traditional Native American observances or places with special cultural significance. These materials can be found at many locations on the landscape, and along with prehistoric and historic human remains and associated grave-goods, are protected under various state and local statutes.

The information presented here is based on previous work completed by EDAW and other investigators in the project vicinity, a review of historic maps and photographs, an archaeological field inventory, and a review of tax assessor's documents. 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 DEIR are provided in general rather than specific terms. The cultural resources report, which identifies specific locations of archaeological sites in or near the project area, has been placed on file at the Central California Information Center (CCIC) of the CHRIS, and may be reviewed by authorized individuals.

4.12.1 ENVIRONMENTAL SETTING

REGIONAL PREHISTORIC CONTEXT

Fredrickson (1973, 1974) proposed a sequence of cultural patterns for the central districts of the North Coast Ranges, placing them in a framework of cultural periods that he believed were applicable to California as a whole. He proposed and used the concept of the cultural pattern as an adaptive mode that is shared in general outline by a number of cultures that are analytically separable. These different cultures could be characterized by similar technological skills and devices and similar economic modes, which include participation in trade networks and practices surrounding wealth and similar mortuary and ceremonial practices. Fredrickson argued that the dating and definition of particular patterns should be kept separate from temporal periods, given the coexistence of more than one cultural pattern operating at any particular time. Thus, his framework of prehistoric periods is based on general technological and cultural horizons in operation throughout California over appreciable lengths of time. The general elements of this framework are outlined below.

The **Paleo-Indian Period** (12,000–8000 Before Present [B.P.]) saw the first demonstrated entry and spread of humans into California. Known sites are situated along lakeshores and a developed milling tool technology may have existed at this time. The social units were not heavily dependent on exchange of resources. Exchange activities occurred on an ad hoc, individual basis. Characteristic artifacts include fluted projectile points and flaked stone crescents. Traditionally, Paleo-Indians are viewed as exclusive big-game hunters. However, more recent research suggests that they pursued much more varied subsistence and economic systems than previously thought.

The beginning of the **Lower Archaic Period** (8000–5000 B.P.) coincides with the middle Holocene climatic change to generally drier conditions and the disappearance of the pluvial lakes that likely influenced earlier land-use patterns. Subsistence appears to have been focused on the consumption of plant foods as opposed to those obtained by hunting or trapping. Settlement appears to have been semi-sedentary, with little emphasis on wealth. Most tools were manufactured of local materials, and exchange remained on an ad hoc basis. Distinctive artifact types included large dart points, milling slabs, and hand stones.

The **Middle Archaic Period** (5000–3000 B.P.) begins at the end of mid-Holocene climatic conditions, when the climate became similar to present-day conditions. Cultural change likely was, in part, a response to changing environmental conditions. Economies were more diversified, and possibly included the introduction of acorn-processing technology. Hunting remained an important source of food, as evidenced by faunal remains recovered from sites from this period. Sedentism appears to have been more developed and a general population growth and

expansion occurred. Little evidence is present for development of regularized exchange relations. Artifacts diagnostic of this period include the bowl mortar and pestle, which first appear in the archaeological record during this time, and large projectile points.

The increased complexity of social and political factors marks the **Upper Archaic Period** (3000–1500 B.P.). The development of status distinctions based on wealth is well documented and group-oriented religions emerge. Some indications suggest that these religions may represent the origins of the Kuksu religious system at the end of the period. Exchange systems grew more complex with evidence of regular, sustained exchanges between groups. Shell beads gained in significance as possible indicators of personal status and as important trade items. During this period, large projectile points are still found in lithic assemblages, and the bowl mortar and pestle replace the milling stone and hand stone throughout most of the state.

Several technological and social changes distinguish the **Emergent Period** (500–200 B.P.). The bow and arrow are introduced during this period and ultimately replace the dart and atlatl. Territorial boundaries between groups become well established and closely resemble those documented in the ethnographic literature. Distinctions in individual social status become increasingly linked to acquired material wealth. Exchange of goods between groups becomes more regularized with more material, including raw materials, entering into the exchange networks. In the latter portion of this period, exchange relations become highly regularized and sophisticated. The clam disk bead becomes a monetary unit for exchange, and increasing quantities of goods were moved greater distances. Craft specialization arises and individuals or groups of craftspersons govern various aspects of production and exchange of trade goods in particular. During the latter part of this period, consistent contact with Euro-American populations becomes regular and sustained.

ETHNOGRAPHIC CONTEXT

Ethnographically, the Northern Valley Yokuts occupied the project vicinity—that is, the land on either side of the San Joaquin River from the Sacramento–San Joaquin 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 Nevada 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.

Euro-American 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. In general, early contacts between the Native Americans and Euro-Americans were not positive. Many Yokuts were lured or captured by missionaries and scattered among the various missions, although many escaped and returned to the valley. Yokut 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 Yokut population, killing thousands and severely disturbing traditional cultural patterns. The influx of Europeans during the Gold Rush era further reduced the population through additional diseases and violent relations with the miners. Although there was no gold in the Yokuts territory, miners passing through on their way to the diggings caused a certain amount of upheaval.

HISTORIC CONTEXT

The earliest known European settlers in the San Joaquin County area were trappers with the Hudson's Bay Company, many of whom were of French descent. Several of these early settlers inhabited the area still known today as French Camp. While early European trappers and explorers may have paved the way for future non-Indian settlement of the project area and its vicinity, the establishment of the Spanish land grant *ranchos* had a lasting impact on the cultural, social, economic, and physical landscape.

The project area is situated just south of the Campo de los Franceses land grant. This grant was made to Guillermo Gulnac in 1843, and consisted of more than 48,000 acres near French Camp (Beck and Haase 1974). Gulnac entered into a partnership with Captain C. M. Weber, a German immigrant. Weber moved to Stockton in 1847, after receiving a half interest in the rancho from Gulnac. Weber later purchased the other half interest in the rancho and encouraged settlement in the region by offering new emigrants plots of land (Cook 1975).

C. T. Blanchard and L. Whitman were two of these early settlers. Whitman had a residence in the northwest of Section 7 of Township 2 South, Range 7 East on the Manteca 7.5-minute U.S. Geological Survey (USGS) quadrangles, settling in the area in 1853. Blanchard established a farm of 520 acres with a house in the southeast corner of Section 7 of Township 2 South, Range 7 East on the Manteca 7.5-minute USGS quadrangles in 1855, after arriving in the state from New Hampshire (Thompson and West 1879).

Another of the early settlers in the area, Joshua Cowell, became known as the "Father of Manteca," arriving in 1862. Cowell is credited with having established dairying in the region. Once the Central Pacific Railroad built a line through the area, it became known as Cowell Station. In 1897, Cowell Station was renamed Manteca (Spanish for "lard"). The origin of the city's present name is debatable; one popular explanation lies in the fact that many of California's early dairymen were Portuguese, and their word manteiga (butter), could easily have been corrupted to the present spelling (Hillman and Covello 1985). Development in Manteca followed soon after.

The first organized Manteca-area government consisted of a board of trade, which was a cross between a city council and a chamber of commerce. Under its direction, a volunteer fire department was organized in 1912. The early town government was disbanded when the failure of a local septic tank system resulted in a quarantine imposed by the California Department of Health in 1918. To fund a bond issue for the installation of a sewer system, the town was incorporated. The new city council approved several projects for the area, among them a new jail, street signs, purchase of a fire bell, and street curbs for Yosemite Avenue between Main Street and the Southern Pacific Railroad tracks (Hillman and Covello 1985).

Agriculture and irrigation played a major role in the growth of Manteca. Alfalfa fields, orchards, and large-scale dairy operations were all instrumental in building the local economy. By 1920, dairy farming was the largest enterprise in south San Joaquin County. Over time, the larger farms were divided into smaller plots, usually 40 acres in size. The increased number of farms resulted in a rapidly expanding population. Further development and expansion resulted from the creation of the South San Joaquin Irrigation District in 1909.

Beginning in the late 1940s, Manteca became a popular bedroom community because of its proximity to Stockton, Tracy, and Modesto. Its growth and reputation as a burgeoning location for families led to Manteca becoming known as "The Family City."

CULTURAL RESOURCES STUDY METHODOLOGY AND FINDINGS

Cultural resources investigations for the proposed project consisted of a staged approach that included prefield research, field surveys, resource documentation, and Native American consultation. All aspects of the cultural resources study were conducted in accordance with the federal *Secretary of the Interior's Guidelines for Identification of Cultural Resources* (Title 48 of the Code of Federal Regulations, Sections 44720–44723) and the California Office of Historic Preservation's *Instructions for Recording Historical Resources*.

Before field surveys were conducted, an information request was submitted by EDAW to the CCIC. The records search included reviews of sites listed in the National Register of Historic Places (NRHP), 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 an archaeologist on August 29 and 30, 2006. The areas surveyed consisted primarily of existing paved roads, with some areas of

orchard land planted with almonds and agricultural fields planted in corn, and a small segment of pasture land. Ground visibility throughout the surveyed portions of agricultural areas ranged from 20% to 40%. Archaeologists performed pedestrian transects along the linear pipeline routes, as well as 15-meter buffer zones along each side of the proposed routes.

Native American Consultation

Although not strictly required under CEQA, given the potentially sensitive archaeological nature of the project area, appropriate Native American groups and representatives were contacted regarding the proposed project. Initiation of this contact included a letter to the Native American Heritage Commission (NAHC) to request a search of the NAHC Sacred Lands Files and a list of individuals and groups who might have an interest in or knowledge of culturally sensitive areas in the project area. A response from the NAHC indicated that a record search of the Sacred Lands Files did not indicate the presence of Native American cultural resources or areas of cultural sensitivity in the immediate project area. Input from the NAHC-designated Native American contact for San Joaquin County was also solicited. To date, no response has been received.

Previous Archaeological Investigations

The CCIC files indicated that 22 cultural resources investigations had been previously conducted within the project area (Table 4.12-1) and an additional 10 had been conducted within 1/8 mile of the project area (Table 4.12-2).

Table 4.12-1
Previous Cultural Resources Investigations within the Project Area

Title	Author (Date)	CCIC File No.
Cultural Resource Inventory, Central Lathrop Specific Plan, San Joaquin County, California	EDAW (2005)	SJ-5803
Cultural Resources Inventory and Assessment for the Union Ranch Specific Plan EIR, San Joaquin County, California	EDAW (2004)	SJ-5582
Archaeological Resources Assessment—Manteca Properties, San Joaquin County, California	Busby (2004)	SJ-5840
Cultural Resources Investigations for the South San Joaquin Irrigation District in San Joaquin County, California	Baloian et al. (2004)	SJ-5309
Cultural Resources Assessment for the Lathrop Water Recycling Plant No. 1, Phase 1 Expansion Project	EDAW (2003)	SJ-5003
Airport Way to Yosemite Avenue Specific Plan—Archaeological and Historical Background Reports	Windmiller and Napoli (2003a)	SJ-4896
Southwest Manteca Area Specific Plan—Archaeological and Historical Background Reports	Windmiller and Napoli (2003b)	SJ-4901
City of Manteca General Plan Update—Archaeological and Historical Background Reports	Windmiller and Napoli (2002)	SJ-4786
Historic Property Survey Report for Widening and Signal Installation at Austin Road and Route 120, San Joaquin County, California	Keefe (2000)	SJ-4219
Cultural Resources Survey for the Level (3) Communications Long Haul Fiber Optics Project. Segment WS04: Sacramento to Bakersfield	Nelson (2000)	SJ-3995
Cultural Resources Assessment Report, Oakwood Lake Expansion EIR, San Joaquin County, California	Self et al. (1999)	SJ-3611
Negative Archaeological Survey Report for the Road Rehabilitation and Shoulder Backing on Route 120 between Post Miles 6.2 and 8.2 in San Joaquin County, California	Wooten (1999)	SJ-3653
Cultural Resources Investigations of the Proposed Delicato Intertie Project, South San Joaquin Irrigation District Distribution Line Projects, San Joaquin	Napton (1998)	SJ-3141

Table 4.12-1 Previous Cultural Resources Investigations within the Project Area		
Title	Author (Date)	CCIC File No.
County, California		
Cultural Resources Inventory Report for the Proposed Mojave Northward Expansion Project	Hatoff et al. (1995)	SJ-2759
Cultural Resource Investigations of the Proposed Tidewater Bikeway Project, City of Manteca, San Joaquin County, California	Napton (1994)	SJ-2262
Historic Property Survey Report for the Proposed Tidewater Bikeway Project in the City of Manteca, California	Caltrans (1994)	SJ-3362
Preliminary Cultural Resources Investigation for the South Manteca Area Plan, 7,800 Acres in San Joaquin County, California	Napton (1993)	SJ-1900
Negative Archaeological Survey Report, Modesto Track Consolidation Corridor, San Joaquin County and Stanislaus County, California	Harmon et al. (1991)	SJ-1836
Historic Architecture Survey Report, Track Consolidation and Realignment, Modesto, California	Hill (1992)	SJ-1435
Cultural Resources Investigations of the Rouse Property, 80 Acres in Manteca, San Joaquin County, California	Napton (1992)	SJ-1450
Cultural Resource Reconnaissance of the Lathrop Road (Airport Way to Highway 99) Expansion , San Joaquin County, California	Napton (1982)	SJ-768
Cultural Resources Evaluation for the Manteca Wastewater Project, San Joaquin County, California	Chavez (1981)	SJ-729
Source: Data obtained from Central California Information Center, California State University, Stanislaus, Turlock		

Table 4.12-2 Previous Cultural Resources Investigations in the Project Vicinity (within 1/8 Mile)		
Title	Author (Date)	CCIC File No.
Addendum Architectural Evaluation for the DDFC-Sharpe Site, San Joaquin County, California	Cheever and Berryman (2006)	SJ-6064
New Tower (NT) Submission Packet, FCC Form 620	Billat (2005)	SJ-5953
Cultural Resource Assessment of the Wastewater Quality Control Facility, City of Manteca, San Joaquin County, California	Peak et al. (2000a)	SJ-4091
Cultural Resource Overview for the Lathrop Road UPRR Grade Separation Project, City of Lathrop, California	Peak et al. (2000b)	SJ-4161
Cultural Resource Assessment of the Wastewater Quality Control Facility, City of Manteca, San Joaquin County, California	Peak et al. (1999)	SJ-4090
Cultural Resource Investigation of the Proposed Weston Ranch Levee Improvement Project, San Joaquin County, California	Napton (1988)	SJ-786
An Archaeological Overview and Management Plan for the Sharpe Army Depot, Lathrop, California	Cleland (1987a)	SJ-731
An Archaeological Overview and Management Plan for the Sharpe Army Depot, Lathrop, California	Cleland (1987b)	SJ-732
Historic Properties Report, Sharpe Army Depot, Lathrop, San Joaquin County, California	Building Technologies (1984)	SJ-2245
A Cultural Resource Assessment of Sharpe Army Depot, Lathrop, San Joaquin County, California	Orlins (1979)	SJ-815
Source: Data obtained from Central California Information Center, California State University, Stanislaus, Turlock		

The analysis of cultural resources within the project area was also based on a review of recent cultural resources studies prepared for the *Oleander, Sundance, and Sundance 2 Development Projects DEIR* (City of Manteca 2006) and the *Promenade Shops at Orchard Valley DEIR* (City of Manteca 2005).

Cultural Resources in the Project Area and Vicinity

Previous cultural resources investigations within the project area and in the project vicinity (within 1/8 mile) have identified a number of prehistoric and historic-era sites and features. While none of these are situated directly within the project area, they do suggest a moderate level of sensitivity regarding the potential for the discovery of cultural resources during project implementation. Most of the studies noted in Table 4.12-1 and Table 4.12-2 consisted of records and literature searches only, or produced negative reports for areas within the proposed project. Studies that resulted in the documentation of cultural resources in the project vicinity are discussed below.

One prehistoric property (CCIC resource no. P-39-282) has been identified within 1/8 mile of the project area. This site is described as a large mound overlooking the San Joaquin River, the site of a major Yokuts village that was excavated in October 1971 by J. J. Johnson of Sacramento State University. Excavations at this site revealed Middle Horizon (Middle Archaic) materials and as many as nine burials with dates ranging from 3500 B.P. to the 1830s. This site was reportedly destroyed and used as fill during construction of State Route 120. Self et al. (1999) confirmed this reported destruction in the Oakwood Lake EIR (Table 4.12-1).

Baloian et al. (2004) (Table 4.12-1) conducted an inventory along Ferry Road and Woodward Avenue for the South San Joaquin Irrigation District, resulting in the documentation of five segments of the Tidewater Southern Railroad (CCIC resource no. CA-SJO-256H), two drainage canals (P-39-102 and P-39-103), and the Permanente Metal Corporation Magnesium Plant (CA-SJO-241H). Fryman (1996) conducted an archaeological and architectural inventory and evaluation for the U.S. Army Corps of Engineers and recorded the remains of a 1942-43 facility railroad complex (P-39-133), of which only an engine house and retired engine remain. None of these features were considered eligible for listing in the NRHP (or the California Register of Historical Resources [CRHR]), and all were cited as lacking integrity of setting, design, materials, workmanship, feeling, and association; none of these identified resources are within the project area.

Baloian et al. (2004) (Table 4.12-1) also recorded 15 single-family properties and an ancillary building (P-39-4400 through P-39-4417). Two of the homes were considered potentially eligible for inclusion in the CRHR. Both, P-39-4404 and P-39-4405, were considered eligible under Criterion c of the CRHR, and P-39-4405 was also considered eligible under Criterion a; each of these properties embody characteristics of their respective time periods, and P-39-4405 is cited as a unique example of 1910s settlement in the Manteca area. Four of these properties—P-39-4401, P-39-4410, P-39-4411, and P-39-4412—were not considered eligible for inclusion in the CRHR, because of their limited architectural and historical significance. Baloian was unable to fully evaluate the remaining properties for potential archaeological and architectural values because of restricted access. None of these properties are situated directly within the project area.

EDAW (2003, 2005) conducted cultural resources assessments for the Lathrop Water Recycling Plant Expansion and the Central Lathrop Specific Plan. Eight single-family properties (P-39-4494, 4495, 4496, 4497, 4498, 4501, 4502 and 4503), a dairy complex (P-39-4500), and a public utility building (P-39-4499) were identified. Construction dates for these structures range from the late 1920s to the late 1950s. While some of these properties retain architectural characteristics common to their respective period, none of them were considered distinct examples or possess a significant association to any important historic person or event. Therefore, they were not considered eligible for listing on the CRHR. In addition, none of these properties are situated directly within the project area.

Keefe (2000) conducted a Historic Property Survey Report for widening and signal installation at Austin Road and State Route 120, and recorded four single-family properties and an educational building (the Calla High

School). All of these properties were considered to have limited architectural or historical value, and were not eligible for inclusion in the NRHP or considered a historical resource for the purposes of CEQA. However, all of the houses and the school (P-39-4188, P-39-4189, P-39-4190, P-39-4191, and P-39-4192) are listed in the Historic Property Data File for San Joaquin County; each marked to be reviewed for historic restoration. None of these properties are situated directly within the project area.

Survey Findings

Many of the above-mentioned prehistoric and historic-era cultural resources identified in previous studies are present along roadways that would be used in the construction of the wastewater collection system pipelines proposed for the current project. However, none of them are within the project area because sewer line construction, staging, and access would take place within existing paved roads.

Because of limited ground visibility (<5%) within fields currently planted in corn, a portion (totaling approximately 3.35 miles of the pipeline route for the proposed wastewater collection system) could not be surveyed because of the heavy crop cover. These 3.35 miles included 2.05 miles in the southwestern portion of the project area near the intersection of Peach Avenue and Airport Way, and approximately 1.3 miles in the center of the western portion of the project area between Yosemite and Louise Avenues, and west of Airport Way. In addition, a portion of the pipeline alignment for the recycled-water distribution system (totaling approximately 1.5 miles) was also not surveyed. These 1.5 miles included 0.96 mile in the central portion of the project area between Swanson Road and West Center Street north of Yosemite Avenue, and 0.54 mile in the southwestern portion of the project area south of Woodward Avenue.

REGULATORY SETTING

Federal Plans, Policies, Regulations, and Laws

No federal plans, policies, regulations, or laws are applicable to the proposed project.

State Plans, Policies, Regulations, and Laws

The most frequently applied legislation to protect cultural resources in California consists of the provisions of CEQA that provide for the documentation and protection of significant prehistoric and historic resources. Before the approval of discretionary projects and the commencement of agency undertakings, the potential impacts of the project on archaeological and historical resources must be considered (Public Resources Code [PRC] Sections 21083.2 and 21084.1 and the State CEQA Guidelines [Title 14 of the California Code of Regulations, Section 15064.5]).

CEQA uses a broad definition of what constitutes a cultural resource, which is outlined in Title 14, Section 4852 of the California Code of Regulations. Cultural resources can include traces of prehistoric habitation and activities, historic-era sites and materials, and places used for traditional Native American observances or places with special cultural significance. In general, any trace of human activity more than 50 years in age is required to be treated as a potential cultural resource. However, as projects can extend over a period of years from planning to implementation stages, the minimum age generally accepted for resources to be considered historic for the purposes of CEQA is 45 years.

The significance of an archaeological or historic resource as per the State CEQA Guidelines is an important consideration in terms of their management. Listing, or eligibility for listing, on the CRHR is the primary consideration in whether or not a resource is subjected to further research and documentation. CEQA states that if a project would result in significant impacts on important historical resources, then alternative plans or mitigation measures must be considered. However, only significant historical resources need to be addressed. The State CEQA Guidelines define a significant historical resource as “a resource listed or eligible for listing on the California Register of Historical Resources” (PRC Section 5024.1). As a matter of policy, public agencies should

avoid damaging effects to historic and archaeological resources, particularly those that are CRHR eligible. When impacts cannot be avoided, their affects can be mitigated through:

- avoidance during construction phases,
- incorporation of sites into open space,
- capping resources with chemically stable fill,
- deeding a site into a permanent conservation easement, and
- data recovery (testing and excavation).

CEQA also provides for a measure of protection for Native American human remains (State CEQA Guidelines Section 15064.5[d]) and for the accidental discovery of cultural resources (State CEQA Guidelines Section 15064.5[e]). These are particularly important provisions because they take into account the possibility that significant resources not noted in previous research may be present within a project area and need to be treated in a way that conforms to CEQA standards.

Regional and Local Plans, Policies, Regulations, and Ordinances

The Resource Conservation Element of the *City of Manteca General Plan 2023* outlines goals and policies associated with cultural resources. The following policies may be relevant to this analysis:

- **Policy RC-P-37:** The City shall not knowingly approve any public or private project that may adversely affect an archaeological site without consulting the California Archaeological Inventory at Stanislaus State University, conducting a site evaluation as may be indicated, and attempting to mitigate any adverse impacts according to the recommendation of a qualified archaeologist. City implementation of this policy shall be guided by the California Environmental Quality Act (CEQA) and the National Historic Preservation Act (NHPA).

- **Policy RC-P-38:** The City shall require that the proponent of any development proposal in an area with potential archaeological resources, shall consult with the California Archaeological Inventory, Stanislaus State University to determine the potential for discovery of cultural resources, conduct a site evaluation as may be indicated, and mitigate any adverse impacts according to the recommendation of a qualified archaeologist. The survey and mitigation shall be developer funded.

The City general plan further requires records searches unless the City determines that the proposed project area has already been sufficiently surveyed, requires archaeological surveys where probable cause exists for discovery of archaeological resources, requires consultation, evaluation, and preparation of a monitoring plan if resources are discovered, encourages the placement of monuments or plaques to recognize historic sites and structures, and requires consultation with the county coroner if human remains are discovered.

4.12.2 Environmental Impacts

Analysis Methodology

The following analysis is based on a combination of background research, archaeological pedestrian surveys, and an assessment of historic structures as described above under “Cultural Resources Study Methodology and Findings.”

Thresholds of Significance

For purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed project would result in a significant impact. These thresholds of significance are based on the State CEQA Guidelines. The proposed project would result in significant cultural resources impacts if it would:

- cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5 of the State CEQA Guidelines;
- cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5 of the State CEQA Guidelines; 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) It contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information.

(2) It has a special and particular quality, such as being the oldest of its type or the best available example of its type.

(3) It is directly associated with a person or prehistoric or historic event that is scientifically recognized as important.

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) It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

(b) It is associated with the lives of persons important in our past.

(c) It 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.

(d) It 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, or association.

IMPACT ANALYSIS

IMPACT 4.12-1 Cultural Resources—Damage to or Destruction of Documented Cultural Resources in Surveyed Areas. *The entire project area, with the exception of a 3.35-mile portion of the pipeline route for the proposed wastewater collection system and a 1.5-mile portion of the pipeline alignment for the proposed recycled-water distribution system, has been surveyed for cultural resources. Archival and field research has demonstrated that there are no known archaeological or historical resources within the surveyed project area. Because there are no known recorded archaeological sites, features, or artifacts or historical resources within the surveyed portion of the project area, the project's impact on known archaeological and historical resources would be* ***less than significant.***

A records search conducted by the CCIC indicated that several previous cultural resources investigations have been completed within and in the vicinity of the project area. However, none of those studies resulted in the identification of historical or prehistoric resources in the project area. One prehistoric property (CCIC resource no. P-39-282) had been identified within 1/8 mile of the project area (the large mound overlooking the San Joaquin River, the site of a major Yokuts village), but the site had been confirmed (by Self et al. 1999) as having been destroyed.

The CCIC records search information was supplemented with a field survey performed by an EDAW cultural resources specialist on August 29 and 30, 2006, consistent with the policies of the City general plan (Policies RC-P-37 and RC-P-38). No archaeological or historical resources were identified during the survey. Because there are no known recorded archeological sites, features, or artifacts or historical resources within the surveyed portions of project area, the project's impacts on known archeological and historical resources in the surveyed portions of the project area would be **less than significant**.

IMPACT 4.12-2 Cultural Resources—Damage to or Destruction of Undiscovered Cultural Resources. *Portions of the project area (including a 3.35-mile segment of the pipeline route for the proposed wastewater collection system and a 1.5-mile portion of the pipeline alignment for the recycled-water distribution system) could not be surveyed because access to these areas was limited. CCIC records searches did not indicate presence of known cultural resources in these areas; however, because these areas could not be surveyed, the potential exists to uncover previously undiscovered resources during project construction. Furthermore, construction-related subsurface disturbances could potentially destroy or damage previously undiscovered prehistoric or historic cultural resources at the wastewater quality control facility (WQCF), pumping station sites, and side-bank outfall site, and along the pipeline alignments. Because these resources have the potential to represent "unique archaeological resources" or "historic resources" as defined by CEQA, this impact would be* ***potentially significant****.*

The project sites are located in a region where significant prehistoric and historic-era cultural resources have been documented. No "unique" or "historic" cultural resources (as per CEQA definitions) have been documented at the WQCF or along the alignments proposed for the wastewater collection system and recycled-water pipelines; however, findings of the records search and of previous investigations within the vicinity of the project site have revealed that there is potential for unrecorded cultural resources to be unearthed or otherwise discovered at the project area during ground-disturbing and construction activities. Furthermore, a 3.35-mile portion of the pipeline alignment for the proposed wastewater collection system, a 1.5-mile portion of the pipeline alignment for the recycled-water distribution system, pumping station sites, and the side-bank outfall site have not been surveyed because of site access and other limitations. There is a possibility that previously unrecorded prehistoric and/or historic resources could be situated directly within the unsurveyed 3.35-mile portion of the collection system alignment (2.05 miles in the southwestern portion of the project area near the intersection of Peach Avenue and Airport Way, and approximately 1.3 miles in the center of the western portion of the project between Yosemite and Louise Avenues, and west of Airport Way), the unsurveyed 1.5-mile portion of the pipeline alignment for the recycled-water distribution system (including 0.96 mile in the central portion of the project area between Swanson Road and West Center Street north of Yosemite Avenue, and 0.54 mile in the southwestern portion of the project area south of Woodward Avenue), pumping station sites, and the side-bank outfall site. Such resources could be determined to be unique or historic; therefore, this impact would be **potentially significant**.

IMPACT 4.12-3 Cultural Resources—Discovery of Human Remains during Construction. *Although no evidence suggests that buried human remains would be encountered during project construction, the potential exists for buried human remains to be encountered and for construction activities to result in damage to or destruction of such remains. This impact would be* ***potentially significant****.*

Although no evidence for prehistoric or early historic interments was found in the proposed project site in surface contexts, this does not preclude the existence of buried human remains. Furthermore, human remains have

previously been found in the project vicinity. California law recognizes the need to protect historic era and Native American human burials, skeletal remains, and items associated with Native American interments from vandalism and inadvertent destruction. The procedures for the treatment of Native American human remains are contained in Sections 7050.5 and 7052 of the California Health and Safety Code and in PRC Section 5097.

It is possible that previously unknown buried human remains could be unearthed and damaged or destroyed during excavation activities associated with the proposed project, such as grading, preparation, and use of staging areas, excavation, and stockpiling. Damage to or destruction of human remains during project construction or other project-related activities would be considered significant. Because there is potential for such damage to occur, this impact would be **potentially significant**.

4.12.3 MITIGATION MEASURES

No mitigation measures are necessary for the following less-than-significant impact:

4.12-1. Damage to or Destruction of Documented Cultural Resources.

The following mitigation measures are provided for the potentially significant impacts of Impacts 4.12-2 and 4.12-3:

Mitigation Measure 4.12-2: Damage to or Destruction of Undiscovered Cultural Resources.

Before the beginning of any project construction activity that could affect the previously unsurveyed portions of the project site, qualified archaeologists shall survey all portions of the site that were not examined during intensive surveys for the current effort, including unsurveyed portions of the pipeline alignment for the recycled-water distribution system (0.96 mile in the central portion of the project area between Swanson Road and West Center Street north of Yosemite Avenue, and 0.54 mile in the southwestern portion of the project area south of Woodward Avenue), pumping station sites, the side-bank outfall site, and approximately 3.35 miles of the pipeline alignment for the proposed wastewater collection system (2.05 miles in the southwestern portion of the project site near the intersection of Peach Avenue and Airport Way, and approximately 1.3 miles in the center of the western portion of the project area between Yosemite and Louise Avenues, and west of Airport Way). The survey shall be conducted during a time when the affected sites can be plowed and disked, so the natural ground surface can be examined for traces of prehistoric and/or historic-era cultural resources. Surveys of these areas are not necessary if it is determined that the areas would not be affected by project construction-related activity, including equipment staging or material stockpiling.

Before the onset of project-related ground-disturbing activities (e.g., land clearing), all construction personnel shall be alerted to the possibility of uncovering buried cultural resources and shall be educated by a qualified archaeologist as to identification of archaeological artifacts. If an inadvertent discovery of cultural materials (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, structure/building remains) is made during project-related construction activities, ground disturbances in the area of the find shall be halted and a qualified professional archaeologist shall be notified regarding the discovery. The archaeologist shall determine whether the resource is potentially significant as per the CRHR and shall develop appropriate mitigation.

Mitigation Measure 4.12-3: Discovery of Human Remains during Construction.

California law recognizes the need to protect interred human remains, particularly Native American burials and associated items of patrimony, from vandalism and inadvertent destruction. The procedures for the treatment of discovered human remains are contained in Sections 7050.5 and 7052 of the California Health and Safety Code and PRC Section 5097.

In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, all such activities within a 100-foot radius of the find shall be halted immediately and the City shall be notified. The City shall immediately notify the county coroner and a qualified professional archaeologist. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact the Native American Heritage Commission by phone within 24 hours of making that determination (Health and Safety Code Section 7050[c]). The City's responsibilities for acting after notification that Native American human remains were discovered are explained in detail in PRC Section 5097.9. The City of Manteca or its appointed representative and the professional archaeologist shall contact the Most Likely Descendant (MLD), as determined by the NAHC, regarding the remains. The MLD, in cooperation with the property owner and the lead agencies, shall determine the ultimate disposition of the remains.

4.12.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of the above mitigation, the project's impacts on previously undiscovered cultural resources on the project site and human remains would be reduced to less-than-significant levels because appropriate measures would be implemented to preserve or record any previously undiscovered resources at the project area.

4.13 FISHERIES AND AQUATIC RESOURCES

This section describes the fisheries and aquatic resources in the vicinity of the project and in the greater Sacramento-San Joaquin Delta (Delta) and provides an assessment of the potential water quality-related effects of implementation of the proposed project on these resources for parameters not fully addressed in Section 4.9, "Hydrology and Water Quality." Please refer to Section 4.9 for assessments of potential contaminant-related effects of the project on fisheries and aquatic resources. This evaluation uses existing information from previously completed documents that address fisheries and aquatic resources in the project vicinity, including the following:

- *Thermal Plan Exception Analysis Final Report* (LWA 2006);
- *Near and Far Field Dilution Analysis of the Manteca Wastewater Discharge* (RMA 2006); and
- *Antidegradation Analysis for proposed Wastewater Quality Control Facility Discharge Modification* (LWA 2007).

The results and information from these reports and others are summarized in this section. Copies of these reports are available for review at the City of Manteca Pubic Works Department during normal business hours (i.e., 8 a.m. to 5 p.m.). In addition, the Near and Far Field Dilution Analysis of the Manteca Wastewater Discharge (RMA 2006) and Antidegradation Analysis for proposed Wastewater Quality Control Facility Discharge Modification (LWA 2007) reports are included as Appendices F and C of this Draft EIR respectively. Sufficient detail is provided in this section to analyze issues related to fisheries and aquatic resources at a project level of detail for both the first phase (Phase IV) (capacity increase from 9.87 to 17.5 million gallons per day (mgd) average dry weather flow [ADWF]) and second phase (Phase V) (capacity increase from 17.5 to 27 mgd ADWF) of the proposed project.

4.13.1 ENVIRONMENTAL SETTING

This section contains a summary of the aquatic habitats, fish populations, and benthic macroinvertebrates in the San Joaquin River and Delta in the vicinity of the proposed project.

AQUATIC HABITATS

The principal surface water bodies in the project vicinity include the San Joaquin River and the Delta. The legal boundary of the Delta extends upstream, in the San Joaquin River, to Vernalis. The City of Manteca Wastewater Quality Control Facility (WQCF) discharges treated effluent into the San Joaquin River immediately upstream of the Western Pacific Railroad bridge. The water bodies potentially affected by effluent discharges from the WQCF are those within the legal boundary of the Delta, including the San Joaquin River in the vicinity of the point of discharge and the downstream portions of the Delta.

The San Joaquin River in the vicinity of the WQCF is characterized by a wide (approximately 300 feet) channel with little canopy or overhead vegetation and minimal bank cover. Aquatic habitat in the San Joaquin River is characterized primarily by slow moving glides and pools, is depositional in nature, and has limited water clarity and habitat diversity. Many of the fish species utilizing the San Joaquin River in the vicinity of Manteca use this lower segment of the river to some degree, even if only as a migratory pathway to and from upstream spawning and rearing areas. The lower river also is used by certain fish species (e.g., delta smelt) that make little to no use of areas in the upper segment of the river.

FISH POPULATIONS

The Delta and San Francisco Bay comprise the largest estuary on the west coast. More than 200 species of marine and freshwater fish rely on its unique habitat characteristics for one or more of their life stages (CALFED 2000).

The lower San Joaquin River and Delta serve as a migration corridor and/or provide other types of habitat (e.g., rearing, spawning) for two runs of Chinook salmon (i.e., fall-run and late fall-run) (*Oncorhynchus tshawytscha*), steelhead (*Oncorhynchus mykiss*), delta smelt (*Hypomesus transpacificus*), Sacramento splittail (*Pogonichthys macrolepidotus*), white sturgeon (*Acipenser transmontanus*), green sturgeon (*Acipenser medirostris*), striped bass (*Morone saxatilis*), and numerous other resident native and introduced species (Table 4.13-1).

Table 4.13-1
Fish Species Reported in the Vicinity of the Manteca WQCF

Common Name	Scientific Name
Native Species	
hitch	*Lavinia exilicauda*
blackfish	*Orthodon microlepidotus*
San Joaquin roach	*Lavinia symmetricus* sp.
hardhead	*Mylopharodon conocephalus*
Sacramento splittail	*Pogonichthys macrolepidotus*
pikeminnow	*Ptychocheilus grandis*
Sacramento sucker	*Catostomus occidentalis*
delta smelt	*Hypomesus transpacificus*
longfin smelt	*Spirinchus thaleichthys*
steelhead/rainbow trout	*Oncorhynchus mykiss*
Chinook salmon	*Oncorhynchus tshawytscha*
threespine stickleback	*Gasterosteus aculeatus*
prickly sculpin	*Cottus asper*
tule perch	*Hysterocarpus traski*
white sturgeon	*Acipenser transmontanus*
green sturgeon	*Acipenser medirostris*
Introduced Species	
American shad	*Alosa sapidissima*
threadfin shad	*Dorosoma petenense*
goldfish	*Carassius auratus*
red shiner	*Cyprinella lutrensis*
carp	*Cyprinus carpio*
golden shiner	*Notemigonus chrysoleucas*
rosyface shiner	*Notropis rubellus*
fathead minnow	*Pimephales promelas*
white catfish	*Ameiurus catus*
black bullhead	*Ameiurus melas*
channel catfish	*Ictalurus punctatus*
wakasagi	*Hypomesus nipponensis*
western mosquitofish	*Gambusia affinis*
inland silverside	*Menidia beryllina*
striped bass	*Morone saxatilis*
bluegill	*Lepomis macrochirus*

Table 4.13-1 Fish Species Reported in the Vicinity of the Manteca WQCF	
Common Name	Scientific Name
redear sunfish	*Lepomis microlophus*
smallmouth bass	*Micropterus dolomieu*
largemouth bass	*Micropterus salmoides*
white crappie	*Pomoxis annularis*
black crappie	*Pomoxis nigromaculatus*
bigscale logperch	*Percina macrolepida*
yellowfin goby	*Acanthogobius flavimanus*
Shimofuri goby	*Tridentiger bifasciatus*
chameleon goby	*Tridentiger trigonocephalus*
Source: DFG unpublished data (compiled by EDAW in 2007)	

Special-Status Fish Species

Special-status fish species are legally protected or are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. Special-status fish species addressed in this section include:

- species listed as threatened or endangered under the state or federal Endangered Species Acts (ESAs);
- species identified by U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), or California Department of Fish and Game (DFG) as species of special concern; and
- species fully protected in California under the California Fish and Game Code.

A total of ten special-status fish species occur or have the potential to occur in the San Joaquin River in the vicinity of the project site and are described below (Table 4.13-2). Of the ten species, Central Valley steelhead Evolutionarily Significant Unit (ESU), Central Valley spring-run Chinook salmon ESU, Sacramento River winter-run ESU, green sturgeon, and delta smelt are listed as a federally threatened or endangered species. The USFWS de-listed Sacramento splittail from its federally threatened status on September 22, 2003. NMFS determined that listing is not warranted for Central Valley fall-/late fall-run Chinook salmon; however, it is still designated as a Species of Concern because of concerns over specific risk factors. The four remaining species (i.e., longfin smelt [*Spirinchus thaleichthys*], San Joaquin roach [*Lavinia symmetricus* sp.], and hardhead [*Mylopharodon conocephalus*]) are considered Species of Special Concern by DFG and/or federal Species of Concern by USFWS.

Table 4.13-2 Special-status Fish Species Potentially Occurring in the Lower San Joaquin River				
Species	Status [1]		Habitat	Potential to Occur in the lower San Joaquin River
	USFWS/ NMFS	DFG		
Central Valley steelhead *Oncorhyncus mykiss*	T	--	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally in inundated floodplains, rivers, tributaries, and Delta.	Occurs in the Sacramento and San Joaquin rivers, tributaries, and Delta. Occurs seasonally in the San Joaquin River in the project vicinity.

Table 4.13-2
Special-status Fish Species Potentially Occurring in the Lower San Joaquin River

Species	Status [1]		Habitat	Potential to Occur in the lower San Joaquin River
	USFWS/ NMFS	DFG		
Central Valley fall-/late fall–run Chinook salmon *Oncorhyncus tshawytscha*	SC	SSC	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally in inundated floodplains, rivers, tributaries, and Delta.	Occurs in the Sacramento and San Joaquin rivers, tributaries, and Delta. Occurs seasonally in the San Joaquin River in the project vicinity.
Sacramento River winter-run Chinook salmon *Oncorhyncus tshawytscha*	E	E	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally in inundated floodplains, rivers, tributaries, and Delta.	Occurs in the Sacramento River, tributaries, and Delta. Unlikely to occur in the San Joaquin River in the project vicinity; however, occasional adult and/or juvenile strays may be present.
Central Valley spring-run Chinook salmon *Oncorhyncus tshawytscha*	T	T	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally in inundated floodplains, rivers, tributaries, and Delta.	Occurs in the Sacramento River, tributaries, and Delta. Unlikely to occur in the San Joaquin River in the project vicinity; however, occasional adult and/or juvenile strays may be present.
Green sturgeon *Acipenser medirostris*	T	--	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally inundated floodplains, rivers, tributaries, and Delta.	Occurs in the Sacramento and San Joaquin rivers, tributaries, and Delta. Has potential to occur in the San Joaquin River in the project vicinity.
Delta smelt *Hypomesus transpacificus*	T	T	Spawns in tidally influenced freshwater wetlands and seasonally submerged uplands; rears seasonally inundated floodplains, tidal marsh, and Delta.	Occurs in tidally influenced segments of the Sacramento and San Joaquin rivers, tributaries, and Delta. Has potential to occur in the San Joaquin River in the project vicinity.
Longfin smelt *Spirinchus thaleichthys*	--	SSC	Spawns in tidally influenced freshwater wetlands and seasonally submerged uplands; rears seasonally inundated floodplains, tidal marsh, and Delta.	Occurs in tidally influenced segments of the Sacramento and San Joaquin rivers, tributaries, and Delta downstream of the project area. Unlikely to occur in the San Joaquin River in the project vicinity.
Sacramento splittail *Pogonichthys macrolepidotus*	DT	SSC	Spawning and juvenile rearing from winter to early summer in shallow weedy areas inundated during seasonal flooding in the lower reaches and flood bypasses of the Sacramento River including the Yolo Bypass.	Occurs in the Sacramento and San Joaquin rivers, tributaries, and Delta. Has potential to occur in the San Joaquin River in the project vicinity.
Hardhead *Mylopharodon conocephalus*	--	SSC	Spawning occurs in pools and side pools of rivers and creeks; juveniles rear in pools of rivers and creeks, and shallow to deeper water of lakes and reservoirs.	Occurs in the Sacramento and San Joaquin rivers, tributaries, and Delta. Has potential to occur in the San Joaquin River in the project vicinity.
San Joaquin roach *Lavinia symmetricus* sp.	--	CSC	Spawning occurs in pools and side pools of small rivers and creeks; juveniles rear in pools of small rivers and creeks.	Occurs in tributaries to the Sacramento and San Joaquin rivers. Not likely to occur in the San Joaquin River in the project vicinity.

[1] Legal Status Definitions

Federal Listing Categories (USFWS & NMFS)
- E Endangered (legally protected)
- T Threatened (legally protected)
- DT Recently delisted from threatened status
- SC Species of Concern

State Listing Categories (DFG)
- E Endangered (legally protected)
- T Threatened (legally protected)
- FP Fully Protected (legally protected, no take allowed)
- CSC California Species of Concern (no formal protection)

Source: Data compiled by EDAW in 2007

Fish Species and Life Stages of Primary Management Concern

Evaluating potential water quality-related impacts to fish resources requires an understanding of fish species' life histories and life stage-specific environmental requirements. Therefore, this information is provided below for fish species of primary management concern that occur within the lower San Joaquin River and Delta. Species of primary management concern include special-status species likely to occur in the potentially affected portions of the San Joaquin River and Delta (e.g., Chinook salmon, steelhead, green sturgeon, delta smelt, Sacramento splittail, hardhead) and those species that are recreationally and/or commercially important (e.g., Chinook salmon, steelhead, striped bass).

Because these species collectively represent a diversity of life histories and environmental requirements, and because they are among the most sensitive to environmental perturbation, the findings from assessments made for these species can be effectively used to make inferences to other fish species using the lower San Joaquin River and Delta. Species of primary management concern with the greatest potential to be affected by increased effluent discharges under the proposed project are discussed below. Because effluent discharges are often higher in temperature that background ambient water temperatures, particular attention is focused on species/life stage thermal tolerances. The seasonal timing of significant life stages for these species in the project vicinity is presented in Table 4.13-3.

Table 4.13-3
Life History and Distributions of Evaluation Fish Life Stages in the 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							■	■	■	■	■	■
Rearing/Emigration	■	■	■	■	■	■						
Steelhead												
Adult Migration	■							■	■	■	■	■
Rearing/Emigration	■	■	■	■	■	■	■	■	■	■	■	■
Green sturgeon												
Adult Migration			■	■	■	■	■					
Rearing/Emigration	■	■	■	■	■	■	■	■	■	■	■	■
Delta smelt												
Adult Foraging and Spawning	■	■	■	■	■	■	■					■
Larvae and Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Sacramento splittail												
Adult Foraging and Spawning	■	■	■	■	■	■	■	■	■	■	■	■
Larvae and Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
Hardhead												
Adult Foraging and Spawning					■	■	■					
Larvae and Juvenile Rearing						■	■	■	■	■		
Striped bass												
Adult Foraging and Spawning			■	■	■	■	■	■				
Larvae and Juvenile Rearing						■	■	■	■	■		

■ period of potential occurrence

Source: Moyle 2002; NMFS 2005

Chinook salmon

The fall-/late fall-run of Chinook salmon is currently the largest run of Chinook salmon in the San Joaquin River system. Because fall-/late fall-run Chinook salmon represent the greatest proportion of all four runs in the Central Valley, they continue to support commercial and recreational fisheries of significant economic importance. On September 16, 1999 (64 FR 50393), NMFS determined that listing was not warranted for the Central Valley fall-/late fall-run Chinook salmon ESU. However, the ESU was designated as a candidate for listing due to concerns over specific risk factors. On April 14, 2004 (69 FR 19975) the ESU was reclassified as a species of concern. The ESU includes all naturally spawned populations of fall-run Chinook salmon in the Sacramento and San Joaquin River Basins and their tributaries, east of Carquinez Strait.

Chinook salmon adult migration – In general, adult fall-/late fall-run Chinook salmon migrate into the Sacramento River and its tributaries from July through December, with immigration peaking from mid-October through November (Exhibit 4.13-2). Fall-/late fall-run Chinook salmon spawn in tributaries of the San Joaquin River, including the Stanislaus River, Tuolumne River, and Merced River, several miles upstream of the project site. Optimum water temperatures for adult Chinook salmon migration have been reported to range from approximately 49 to 58 degrees Fahrenheit (°F), with adult migration continuing to occur at temperatures up to approximately 68°F (Bell 1973).

Optimal temperatures generally range from 50°F to 59°F for adult Chinook salmon migration and pre-spawning activity. Consistent temperatures of 60°F to 64°F are considered acceptable for migration by NMFS and U.S. Environmental Protection Agency (EPA), and EPA's criteria for migration is 68°F if there are thermal refuges in the system allowing fish to migrate and hold in cooler areas for some part of the migration period. This suggests a relatively slow increase in adverse thermal effects from 60°F to 68°F, where several types of low chronic stress have been documented (Berman 1990; Marine 1992; Poole et al. 2001), including potential for reduced swimming speed, increased disease, and reduced fecundity. There is reasonable agreement that consistent temperatures in the 64°F to 68°F range are somewhat stressful and create stress even with short-term exposure times of days to weeks. Above 68°F, disease rates have been documented to be quite high, including 100% mortality from disease outbreaks (Berman 1990). Because disease is a significant concern, and higher temperatures are clearly related to increased disease incidence and lethality, it is reasonable to assume that the adverse effects curve begins to steepen rapidly at higher temperatures and longer exposure times.

Based on available information, the following temperature guidelines have been identified for adult Chinook salmon:

- Optimal range: 50°F to 60°F
- Range of increasing adverse effects: 61°F to 68°F
- Lethal effects: >68°F
- Behavioral avoidance: reported at 68°F

Chinook salmon juvenile rearing and migration – Juvenile fall-run Chinook salmon emigrate from San Joaquin River tributaries (e.g., Stanislaus, Merced, and Tuolumne rivers) and other river tributaries to the delta during the late winter and spring (February – mid-June) (San Joaquin River Group 2001, 2002, 2003, 2004, 2005; CDFG unpublished data).

Within a range of approximately 50°F to 60°F, warming temperatures appear to increase growth rates of rearing Chinook salmon and temperatures in this range are considered optimal or acceptable. Low-level stresses such as smolting problems may occur within and outside of this range, but high growth rates may be sustained in the 59°F to 66°F range, somewhat offsetting potential disease problems.

Bartholow and Henriksen (2004) evaluated fall-run Chinook salmon mortality over a range of mean weekly water temperatures (constant daily mean temperature exposure, assuming variation throughout the day). Their analysis is consistent with an optimum high threshold of 60°F, where they find daily mortality rates are very low. They

show daily mortality rates rising slowly as temperatures approach 68°F and then rising rapidly from 68°F to 77°F, at which time mortality is considerable.

They note that this mortality is not necessarily a result of direct thermal effects, but may be related to disease, predation, and other indirect effects. Their continuous relationship, therefore, provides a basis for establishing a continuous criterion that reflects indirect effects as well as direct effects. They compare their projections to relationships for rearing and smoltification, which include acclimation effects.

Given the potential for downstream thermal effects on emigrating fry and smolts, a regime of rising temperatures in the spring, up to 60°F, may be considered beneficial, and temperatures from 61°F to 68°F should be considered acceptable, with low levels of stress offset by growth rates that may not decline significantly until about 68°F.

Based on available information, the following temperature guidelines have been identified for juvenile Chinook salmon:

- Optimal range: 50°F to 60°F
- Range of increasing adverse effects: 61°F to 68°F (low); >68°F (rapidly increasing)
- Lethal effects: > 77°F
- Behavioral avoidance: change (delta-T) of 16°F above ambient

Steelhead

On March 19, 1998, NMFS listed the Central Valley steelhead as threatened (63 FR 13347). Central Valley steelhead are all considered to be winter-run steelhead (McEwan and Jackson 1996). Similar to salmon, these fish mature in the ocean before entering freshwater on their spawning migrations.

Steelhead adult migration – The timing of river entry is often correlated with an increase in river flow, such as occurs during freshets and precipitation events with the associated lowering of ambient water temperatures. Moyle (2002) notes that steelhead have been observed in migration, holding, and spawning over a wide range of temperatures (33°F to 77°F), but he considers an acceptable range is 39°F to 73°F. Estimates of optimum temperature regimes are correspondingly wide ranging, and estimates of optimal conditions are: 39°F to 51°F (IEP 1999); 44°F to 51°F (USFWS 1997); 50°F to 59°F (Moyle 2002). EPA (2003) applies its general salmonid criteria to steelhead, with an acceptable seven day average of the daily maximum temperature of 64°F (or 68°F with thermal refuges). USFWS (1997) suggests there is chronic low stress at 51°F to 59°F, and higher stress above this range. Given the potential for high diel (24-hour daily) temperature variation, an optimal mean daily temperature range for steelhead migration may be 44°F to 53°F, with low stress effects between 54°F and 68°F. Temperatures in excess of 68°F should be assumed to be stressful, with a lethal threshold of 69°F to 73°F, depending on assumptions regarding disease (LWA 2006).

Based on available information, the following temperature guidelines have been identified for adult steelhead:

- Optimal range: 44°F to 53°F
- Range of increasing adverse effects: 54°F to 68 F
- Lethal effects: > 69 °F
- Behavioral avoidance: reported at 65°F

Steelhead juvenile rearing and emigration – Moyle (2002) notes that juvenile steelhead have been observed rearing in temperatures from 33°F to 77°F, but that a survivable range is probably 37°F to 71°F. Steelhead are thought to have marginally higher thermal tolerances than Chinook salmon. This would reflect steelhead life history, which includes the potential for progeny of anadromous steelhead to rear in freshwater for an extended period of time pending parr maturation and a return to the sea.

Based on literature data, optimal rearing conditions are obtained at temperatures of 44°F through 69°F, depending on the life history function being evaluated (e.g., rearing, smoltification, emigration) or the nature of the study (field or laboratory). Four studies postulate optimal temperatures in the 44°F to 60°F range, but USFWS (1997) notes that there are low to high chronic stress effects at temperatures above 50°F and Zaugg et al. (1972) suggests that maturation (i.e., smolting) is affected in the 50°F to 59°F range. The upper lethal limit for steelhead is approximately 75°F (Bjornn and Reiser 1991). Temperatures over 70°F can result in respiratory distress for steelhead due to reduced dissolved oxygen levels (NMFS 2003).

Based on available information, the following temperature guidelines have been identified for juvenile steelhead:

- Optimal range: 44°F to 60°F
- Range of increasing adverse effects: 61°F to 68°F
- Lethal effects: > 69°F
- Behavioral avoidance: reported at 68°F

Green sturgeon

On April 6, 2005, NMFS proposed a threatened status listing for the southern distinct population segment (DPS) of North American green sturgeon (70 FR 17386). In North America, green sturgeon is found from Ensenada, Mexico, to Southeast Alaska. Green sturgeon is not abundant in any estuaries along the Pacific coast, although they are caught incidentally in the estuaries by the white sturgeon fishery. Like all sturgeon species it is anadromous, but it is also the most marine-oriented of the sturgeon species (NMFS 2005).

Green sturgeon is thought to spawn every three to five years (Tracy 1990). Their spawning period is March to July, with a peak in mid-April to mid-June (Moyle et al. 1992). Green sturgeon spawning occurs in deep pools or holes in large, turbulent river mainstems (Moyle et al. 1992). Specific spawning habitat preferences are unclear, but are likely large cobbles, but can range from clean sand to bedrock. Eggs are likely broadcast over the large cobble substrate where they settle into the space between the cobbles. Temperatures above 68°F are lethal to green sturgeon embryos and temperatures above 66°F will lead to reduced growth (Cech et al. 2000). Juveniles appear to spend one to three years in freshwater before they enter the ocean (Nakamoto et al. 1995).

Green sturgeon spawning has only been documented in the Klamath, Sacramento (Moyle et al. 1992, CDFG 2002) and Rogue (Erickson et al. 2001, Rien et al. 2001) rivers during recent times. Green sturgeon spawning in the San Joaquin River is not well documented.

Based on available information, the following temperature guidelines have been identified for green sturgeon:

- Range of increasing adverse effects: > 66°F to 74°F
- Lethal effects: > 68°F (embryos)

Delta smelt

Delta smelt were listed as threatened under the ESA on March 5, 1993 (59 FR 440). On December 19, 1994 (59 FR 65256), USWFS designated critical habitat. Delta smelt were also listed as threatened under CESA in 1993. Delta smelt are found only from the Suisun Bay upstream through the Sacramento-San Joaquin Delta.

Delta smelt are endemic to the Delta and occur primarily in open surface waters of Suisun Bay, in the Sacramento River downstream of Isleton, and in the San Joaquin River downstream of Mossdale (near the WQCF discharge outfall) (USFWS 1994). They used to be one of the most common pelagic (living in open water away from the bottom) fish in the upper Sacramento-San Joaquin estuary (USFWS 2004). 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 (Sweetnam 1997, 1998). 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). Except when spawning in fresh water, delta smelt are most frequently documented in, or slightly upstream of, the entrapment zone, where riverine freshwater flow in the estuary mixes with seawater and the salinity is between 0.5 ppt and 5.2 ppt (SWRCB and USACE 1995). Since the early 1980s, delta smelt have been most abundant in the northwestern Delta in the Sacramento River (USFWS 1994, Bennett 2005).

Delta smelt disperse widely into fresh water in late fall and winter as the spawning period approaches, and may move as far upstream as Mossdale on the San Joaquin 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 southern and central Delta. They spawn in shallow, fresh or slightly brackish water upstream of the mixing zone. Most spawning happens in tidally influenced backwater sloughs and channel edgewaters (Moyle 2002; USFWS 2004).

Larvae hatch between 10–14 days, are planktonic (float with the water currents), and are washed downstream until they reach areas near the entrapment zone where salt and fresh water mix. Delta smelt are fast growing and short-lived with the majority of growth within the first 7 to 9 months of life. Most smelt die after spawning in the early spring although a few survive to a second year. Delta smelt feed entirely on small crustaceans called zooplankton (Moyle 2002; USWFS 2004).

Swanson and Cech (1995) conducted a series of laboratory investigations to identify the critical thermal maximum temperature threshold for delta smelt. Results of these laboratory investigations demonstrated that the upper thermal threshold for delta smelt is approximately 13-16°F (delta T) above ambient with a maximum temperature of 77°F.

Delta smelt abundance fluctuates greatly from year to year, however, recent information has demonstrated a dramatic decline of the delta smelt population (Bennett 2005). Their short lives and relatively low fecundity make populations susceptible to reduction following periods when conditions are unfavorable, such as during droughts. 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. 1995; USFWS 2004).

Based on available information, the following temperature guidelines have been identified for delta smelt:

- Optimal range: 44°F to 60°F
- Range of increasing adverse effects: 61°F to 68°F
- Lethal effects: > 77°F; delta T of 13°F to 16°F

Sacramento Splittail

On September 22, 2003 the USFWS removed Sacramento splittail from the list of threatened species. The USFWS determined that threats to Sacramento splittail are being addressed through habitat restoration actions such as the CALFED Bay-Delta Program and the Central Valley Project Improvement Act (CVPIA); as a result, splittail are not likely to become endangered in the foreseeable future.

Sacramento splittail are endemic to California. Except for very wet years, they are mostly confined to the Delta, Suisun Bay, Suisun Marsh, and Napa Marsh (USFWS 1999). In recent years, splittail distribution appears to have been concentrated in the lower Sacramento River and south Delta (SWRCB and USACE 1995). Overall, the species distribution has been reduced to less than one-third of its original range.

Splittail are typically found in waters with temperatures between 41°F and 75°F, but individuals acclimated to high temperatures can survive rapid changes and temperatures of 84°F to 91°F for short periods. They can also survive low dissolved oxygen levels (<1 milligram oxygen/liter [mg/l]). These tolerances make splittail well-suited to slow-moving sections of rivers and sloughs (Moyle 2002).

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. Spawning in the tidal freshwater habitats of the Sacramento-San Joaquin River Delta has been observed as early as January and as late as July (Sommer et. al 2002). Spawning occurs primarily in the lower reaches of rivers, flood bypasses, and dead-end sloughs. Little information is available as to how far upstream splittail occur in the San Joaquin River (Wang 1986), but adults and juveniles have been reported upstream of Modesto (USFWS 1996). Juvenile splittail are commonly found in Delta sloughs late in winter and spring. Splittail are believed to spawn at water temperatures from 48°F to 68°F (Wang 1986).

Juvenile emigration into the Delta begins in late winter (e.g., February) and continues throughout the summer. In general, juvenile splittail are most abundant in water less than 6 feet deep, but show considerable capacity to swim against strong river and tidal currents (Moyle 2002). Although splittail use deeper, open water as they grow, much of the population continues to use shallow (<10 feet) edge habitat as adults (USBR and DWR 2003).

Based on available information, the following temperature guidelines have been identified for Sacramento splittail:

- Optimal/suitable range: 41°F to 75°F
- Range of increasing adverse effects: 84°F to 91°F
- Lethal effects: > 91°F; delta T of 7°F to 13°F

Hardhead

Hardhead, a relatively large cyprinid species, is listed as a California Species of Special Concern; no federal designation has been made. Although this species is widespread and abundant throughout the Sacramento River and San Joaquin River systems, recent declines in numbers have raised concern. Hardhead are a moderately slow growing species that typically require two years to reach sexually maturity. Hardhead are typically found in streams having summer temperatures in excess of 68°F and reported suitable temperatures determined by laboratory experiments appear to be 75°F to 82°F (Moyle et al. 1995). However, in a natural thermal plume, hardhead generally selected temperatures of 63°F to 70°F when cooler temperatures were available (Moyle et al. 1995). Hardhead are typically found in low- to mid-elevation streams and reservoirs. In streams, adult hardhead tend to utilize the deepest portions of the water column, rarely moving into the upper water column, while juveniles demonstrated a preference for shallow water close to the stream banks (Moyle et al. 1995).

Based on available information, the following temperature guidelines have been identified for hardhead:

- Optimal/suitable range: 63°F to 70°F
- Range of increasing adverse effects: > 82°F

Striped bass

Striped bass, a recreationally important introduced species, occurs in the Sacramento and San Joaquin rivers, major tributaries, and the Delta. Striped bass support a popular sport fishery in these water bodies. Adult spawning migrations extend from April through July with peak spawning activity occurring during late May and early June (Wang 1986). Adults spawn at or near the water surface in groups typically comprised of 5 to 30 fish. In the Sacramento River system, spawning is not initiated until water temperatures reach approximately 57°F, ceases at water temperatures exceeding 70°F, and the reported most favorable temperature range is 59°F to 68°F (Moyle 2002). Initially, larval striped bass require currents to transport them to areas of slack water until the ability to swim is developed (1–2 days post-hatching). The emigration period lasts throughout the summer months and into early fall (e.g., May–October) (LWA 2006).

Striped bass are characteristic of a resident warm-water fish species with a relatively high thermal tolerance. The reported most favorable water temperatures for rearing juvenile striped bass range from approximately 61°F to

73°F (Hassler 1988). Adult and juvenile striped bass can tolerate short-term exposures to temperatures as high as 93°F; however, long-term exposures to temperatures exceeding 77°F result in stress and 86°F is often lethal (Moyle 2002). At temperatures less than approximately 80°F, adult fish can tolerate abrupt temperatures changes, such as those encountered when shifting from seawater to freshwater.

Based on available information, the following temperature guidelines have been identified for striped bass:

- Optimal/suitable range: 59°F to 75°F
- Range of increasing adverse effects: 77°F to 91°F
- Lethal effects: > 86°F

MACROINVERTEBRATE POPULATIONS

Aquatic insects and other macroinvertebrates perform many ecological roles in aquatic habitats. The abundance and composition of macroinvertebrate 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.

Fry in streams feed extensively on drift insects, but zooplankton are more heavily eaten in the lower San Joaquin River and Delta. Adult and juvenile chironomids (Diptera) insects and crustacean zooplankters, especially Cladocera and Copepoda, are principal food items of Chinook salmon and steelhead fry and juveniles in the larger river systems (e.g., lower Sacramento and San Joaquin rivers) (Kjelson et al. 1982). Smolts feed on gammarid amphipods and larval fish in brackish waters; larger and older smolts select larger crustaceans (Corophium and Neomysis) and fish as food (Cannon 1982). The shift from shallow epibenthic prey to larger, often pelagic species reflects the movement of juveniles from shallow littoral habitats into deeper river and tidal channels as they increase in size (Allen et al. 1986). Other typical macroinvertebrates inhabiting the Delta and lower reaches of the San Joaquin River include amphipods, mysid shrimp, and bay shrimp. The thermal tolerance of chironomids, cladocerans, copepods, amphipods, mysid shrimp, and bay shrimp ranges from 82°F to 87°F depending on the species (Bradley 1976; Hair 1971; Heubach 1969).

REGULATORY SETTING

Fisheries and aquatic 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. Key regulatory issues applicable to the proposed project are discussed below.

FEDERAL

Federal Endangered Species Act

Pursuant to the federal ESA, the USFWS and the 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. Fish species occurring in the project vicinity are covered under the federal ESA.

Sustainable Fisheries Act

In response to growing concern about the status of U.S. fisheries, the Sustainable Fisheries Act of 1996 (Public Law [PL] 104-297) was passed by Congress to amend the Magnuson-Stevens Fishery Conservation and

Management Act (PL 94-265), the primary law governing marine fisheries management in the federal waters of the United States. Under the Sustainable Fisheries Act, consultation is required by NMFS on any activity that might adversely affect essential fish habitat (EFH). EFH includes those habitats that fish rely on throughout their life cycles. It encompasses habitats necessary to allow sufficient production of commercially valuable aquatic species to support a long-term sustainable fishery and contribute to a healthy ecosystem. The San Joaquin River has been designated as EFH for Pacific salmon.

STATE

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA) and §2081 of the California Fish and Game Code, a permit from DFG 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. Fish species occurring in the project vicinity are covered under CESA.

REGIONAL AND LOCAL

Water Quality Control Plans

Water Quality Control Plan (Basin Plan) for the Sacramento/San Joaquin River Basins

The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) (RWQCB 1998) provides water quality standards for waters of the Sacramento River and San Joaquin River Basins. Beneficial uses identified within the Basin Plan that are directly associated with aquatic resources include:

- Warm Freshwater Habitat - Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- Cold Freshwater Habitat - Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- Estuarine Habitat - Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
- Rare, Threatened, or Endangered Species - Uses of water that support aquatic habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under State or federal law as rare, threatened or endangered.

National and California Toxics Rules and the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California

Criteria for priority pollutants for the State of California are promulgated in the National Toxics Rule (NTR) and California Toxics Rule (CTR). The Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California (Phase 1 of the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan) adopted by the SWRCB on March 2, 2000 (SWRCB 2000), applies to discharges of toxic pollutants into inland surface waters, enclosed bays, and estuaries. The policy establishes implementation provisions for NTR and CTR criteria, and for priority pollutant objectives established in Basin Plans. The policy also establishes certain monitoring requirements and chronic toxicity control provisions, and includes special provisions for certain types of discharges.

Water Quality Control Plan for Control of Temperatures in Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan)

The SWRCB (1988) Water Quality Control Plan for Control of Temperatures in Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan) contains temperature objectives applicable to the proposed project. These objectives (Section 5.A) state that discharge shall not:

a. exceed the receiving water temperature by more than 20°F;

b. create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature which exceeds 25% of the cross sectional area of the River at any point; and,

c. cause a temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.

Pursuant to General Water Quality Provision 4 of the Thermal Plan, the City of Manteca is pursuing a limited exception to specific Thermal Plan water quality objectives for the current permitted discharge rate of 9.87 MGD (LWA 2006).

Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary

The Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta WQCP) (SWRCB 1995) establishes water quality control measures that will contribute to the protection of beneficial uses in the Bay-Delta. Among others, this plan establishes objectives for salinity, Delta outflow, export limits, and the Delta cross channel gates.

These objectives are provided for the protection of following beneficial uses: estuarine habitat, coldwater habitat, warmwater habitat, migration of aquatic organisms, spawning, reproduction, and/or early development of aquatic organisms, wildlife habitat, and rare, threatened, or endangered species. These objectives also provide protection for the beneficial uses of shellfish harvesting, commercial and sport fishing, and navigation.

NPDES Permit for the Manteca WQCF

On March 19, 2004, the RWQCB adopted Order No. R5-2004-0028 (NPDES No. CA0081558), which contains waste discharge requirements for the Manteca WQCF. In the Order, the RWQCB found that the discharge from the WQCF was unable to consistently comply with final effluent limitations for several constituents including receiving water limitations for temperature. Therefore, at the time of adoption of the Order, the RWQCB also issued Cease and Desist Order No. R5-2004-0029 (CDO), pursuant to California Water Code Section 13301. The CDO includes requirements and time schedules to bring the discharge into full compliance with the final effluent and receiving water limitations. On July 25, 2005 the City provided updated schedules for meeting the compliance time schedules required in the Order and CDO. One of the updated schedules was for compliance with the time schedule to meet the final effluent limitations for temperature contained in the CDO. A Thermal Plan Exception Report was developed and submitted February of 2007 and full compliance is expected by February 2009.

The following are excerpts of the relevant receiving water limitations contained in the Order for the protection of aquatic resources:

Limitation # 1 – Dissolved Oxygen. The discharge shall not cause dissolved oxygen concentrations in the San Joaquin River to fall below 5.0 mg/l.

Limitation # 6 – Turbidity. The discharge shall not cause an increase of the monthly average turbidity to exceed the following:

a. More than 1 Nepholometric Turbidity Unit (NTU) if background is between 0 and 5 NTUs.
b. More than 20% where natural turbidity is between 5 and 50 NTUs.
c. More than 10 NTUs where natural turbidity is between 50 and 100 NTUs.
d. More than 10% where natural turbidity is greater than 100 NTUs.

Limitation # 7 – pH. The discharge shall not cause the normal pH to fall below 6.5, exceed 8.5, or the 30-day average ambient change by more than 0.5 units.

Limitation # 8 – Temperature. The discharge shall not cause the creation of a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25% of the cross-sectional area of the river at any point.

Limitation # 9 – Temperature. The discharge shall not cause the receiving water temperature to increase more than 4°F above the ambient temperature of the receiving water at any time or place outside the zone of initial dilution.

Limitation # 12 – Aquatic communities. The discharge shall not cause aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.

Limitation # 13 – Toxic pollutants. The discharge shall not cause toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.

San Joaquin River Agreement

As discussed above, the WQCP for the Bay-Delta includes water quality and flow objectives for the San Joaquin River Basin. The flow objectives were a source of dispute because of the alleged lack of scientific information regarding the relationship of flow to salmon survival and because the San Joaquin River stakeholders were not represented in the negotiations that established the objectives (1994 Bay-Delta Accord). An association of water users on the San Joaquin River system filed suit against the SWRCB, challenging the flow objectives contained in the WQCP.

In an effort to settle this issue out of court, the San Joaquin River interests collaborated with other water users, environmental, and governmental interests to identify feasible voluntary actions to protect the San Joaquin River's fish resources and implement the SWRCB's objectives. Initial meetings started in 1996 culminated in an agreement with the Delta water export interests, known as the Letter of Intent to Resolve San Joaquin River Issues.

Fishery biologists from State and federal agencies and other stakeholders outlined a program of study to gather the best available scientific information on the impact of flows and State Water Project/Central Valley Project (SWP/CVP) export rates on the salmon smolts in the lower San Joaquin River. The result is a scientific adaptive fishery management plan commonly known as the Vernalis Adaptive Management Plan (VAMP) (see description below).

The San Joaquin River stakeholders recognized the value of implementing VAMP and taking other actions to help implement the 1995 WQCP. This recognition led to the development of the San Joaquin River Agreement. A Statement of Support for the San Joaquin River Agreement was signed by most of the parties to the negotiations, committing them to the program once all environmental and regulatory procedures required by the National Environmental Policy Act (NEPA), CEQA, and SWRCB were complete. By February 1999, these requirements and a federal Record of Decision had been completed with the culmination of an EIS/EIR for *Meeting Flow Objectives for the San Joaquin River Agreement, 1999-2010*. The SWRCB adopted D-1641 on December 29, 1999, subsequently revised on March 15, 2000, providing for implementation of the Agreement.

Vernalis Adaptive Management Plan

VAMP, officially initiated in 2000 as part of the SWRCB Decision 1641 (as revised), is a large-scale, long-term (12-year), experimental/management program designed to protect juvenile Chinook salmon migrating from the San Joaquin River through the Sacramento-San Joaquin Delta. VAMP is also a scientifically recognized experiment to determine how salmon survival rates change in response to alterations in San Joaquin River flows and SWP/CVP exports with the installation of the Head of Old River Barrier (HORB). VAMP employs an adaptive management strategy to use current knowledge of hydrology and environmental conditions to protect Chinook salmon smolts, while gathering information to allow more efficient protection in the future.

4.13.2 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Approach Overview

The proposed project could change water quality in the San Joaquin River, in the vicinity of the discharge (i.e., near-field), and at downstream Delta locations (fully mixed far-field). The project would have negligible, if any, effects on water quality in water bodies (other than the San Joaquin River) upstream of Manteca. Moreover, the project would not cause, either directly or indirectly, hydrologic changes of a magnitude and frequency that could adversely affect aquatic resources, either upstream or downstream of the point of effluent discharge (see Section 4.9, "Hydrology and Water Quality" of this EIR for further discussions regarding hydrologic effects of the proposed project).

The statewide SWP/CVP system could undergo hydrologic and operational changes in the future that would have seasonal effects on San Joaquin River flows. These changes would be caused by increased diversion demands (resulting from population growth within the region) and increased water releases (resulting from water quality management and/or environmental restoration initiatives), and associated changes in SWP/CVP operations. The potential impacts of future hydrologic and SWP/CVP operational changes on fisheries and aquatic resources, caused by future changes in surface water hydrology within the Manteca WQCF project vicinity, have already undergone CEQA review (see Final EIR for *Meeting Flow Objectives for the San Joaquin River Agreement 1999-2010* [1999] and Supplemental EIS/EIR for *Acquisition of Additional Water for Meeting the San Joaquin River Agreement Flow Objectives, 2001-2010* [2001]) and, therefore, are not re-assessed in this EIR. These documents are hereby incorporated by reference into this EIR.

Based on the above and the project description (see Chapter 3), the potential for the project to adversely affect fisheries and aquatic resources within the study area is via effects on water quality. Consequently, a thorough analysis of the project's effects on the water quality of the San Joaquin River in the vicinity of the discharge and at downstream Delta locations is presented in Section 4.9, "Hydrology and Water Quality." The methodology used for these water quality assessments is presented in Section 4.9 with additional detail provided in Appendix C (LWA 2007).

Effects of project-related water quality on fish and other aquatic resources downstream of the Manteca WQCF discharge were evaluated based on appropriate water quality criteria for the protection of freshwater aquatic life and other relevant technical information as reported in scientific literature. Separate discussions for the assessment of conventional parameters and priority pollutants, and temperature are provided below.

Conventional Parameters and Priority Pollutants

A step-wise evaluation process was employed to assess the potential effects of conventional parameters (e.g., pH, BOD, turbidity, nutrients, etc.) and priority pollutants under proposed project conditions (see Section 4.9). The first step involved evaluating compliance with applicable water quality criteria (CTR/NTR), water quality

objectives (State Water Quality Control Plans), and NPDES limitations. If consistent compliance with the applicable water quality criteria/objectives and NPDES permit limitations was demonstrated for the proposed project condition, and the applicable regulatory criteria/objective and permit limitations were considered protective of aquatic life resources, then it was determined that the parameter concentration/level in the receiving water would not adversely affect fisheries and aquatic resources. This evaluation was conducted for both near-field and far-field locations, downstream of the discharge outfall as well as for constituents assessed that were not modeled.

If consistent compliance under the proposed project condition is anticipated, but current scientific information pertaining to the parameter indicated that the current criteria/objective(s) and/or NPDES limitation(s) is/are not adequately protective of aquatic life, or if no criteria, objective, or NPDES limitation currently exists for the parameter (e.g., nutrients), then a scientific assessment, using the current and available scientific literature, was performed. This assessment addressed the potential for the parameter to affect aquatic resources downstream of the discharge, at the concentrations/levels documented for the proposed project condition.

If initial evaluations indicate that consistent compliance with applicable criteria, objective(s), and/or NPDES limitation(s) could not be achieved under the proposed project condition, a scientific evaluation, using the available scientific literature, also was performed. This evaluation was conducted to determine whether the anticipated magnitude and frequency of criteria/objective or permit limitation exceedance would be expected to result in adverse impacts to fish or other aquatic resources downstream of the discharge outfall. For example, at the onset of preparing this chapter, it was known that:

1. the current Manteca WQCF discharge cannot consistently comply with the Thermal Plan temperature objectives applicable to this facility, and thus exceptions to the Thermal Plan are being sought (to be incorporated into the current NPDES permit's temperature limitations); and

2. the Thermal Plan objectives are not necessarily based on the current science regarding thermal effects of the Manteca WQCF discharge on anadromous salmonids and other aquatic biota using the lower San Joaquin River.

Consequently, a thorough technical assessment, using the available scientific literature, was performed to determine the potential for project-specific thermal impacts to aquatic resources.

Temperature

Aquatic life uses are the only beneficial uses of the lower San Joaquin River and Delta that could be affected by the thermal effects of the proposed project. The applicable Thermal Plan objectives and current NPDES permit limitations are not well supported by current scientific information pertaining to thermal effects on aquatic life. Therefore, compliance with these thermal limits does not necessarily provide an adequate means by which to assess actual thermal impacts to aquatic life in the San Joaquin River and Delta. Rather, a scientific assessment of thermal effects on fish and macroinvertebrates was performed.

As discussed above (see section 4.13.1, "Environmental Setting"), a variety of fish and macroinvertebrates inhabit the lower San Joaquin River. These include Chinook salmon, steelhead, striped bass, and a number of other native and nonnative resident and migratory species. The potential biological effects of exposure of fish and other aquatic organisms to elevated water temperatures are a function of a variety of factors including the duration of exposure, the magnitude of temperature exposure, acclimation temperature, life stage, and species. The response and tolerance of aquatic organisms to elevated water temperatures varies substantially among species. Responses to temperature exposure may include, but are not limited to, acute mortality, sub-lethal physiological changes, behavioral avoidance, behavioral attraction, and changes in feeding and growth rates. Assessing the potential effects of the Manteca WQCF discharge on aquatic organisms inhabiting the lower San Joaquin River in the vicinity of the existing discharge includes consideration of the seasonal timing for when organisms would be present in the area and potentially exposed to the discharge, ambient (acclimation) water temperatures, and the

species-specific response to temperature exposure. Information available from the scientific literature to provide general guidelines on the biological response for many of the species of organisms inhabiting the San Joaquin River, which have been used, in part, as the basis for this assessment (see Section 4.13.1, "Environmental Setting," above). Information derived from analyses of the thermal characteristics of the discharge, in addition to information on the tidal currents and hydrodynamic patterns occurring within the lower San Joaquin River were also considered as part of this evaluation (see Appendix C, LWA 2007).

Species of fish and macroinvertebrates, which inhabit the river and Delta year-round (i.e., resident species), are characterized by a high tolerance to seasonal water temperature conditions (e.g., these are generally referred to as warm-water species). Cold-water fish species, including Central valley fall-/ late fall-run Chinook salmon and Central Valley steelhead are sensitive to exposure to elevated water temperatures during their juvenile and adult migration through the Delta and lower San Joaquin River. Given their sensitivity to seasonally elevated water temperatures, this assessment primarily focuses on fall-/ late fall-run Chinook salmon and steelhead, although other species are also considered in the analysis.

Because the habitat conditions within the portion of the lower San Joaquin River affected by the proposed City of Manteca WQCF discharge are not suitable for spawning and egg incubation by salmon or steelhead, the effects of water temperature on incubating eggs has not been included. Salmon and steelhead use the lower San Joaquin River as a migratory corridor, for both upstream migration by adults and downstream migration by juveniles, as well as a limited juvenile rearing and foraging.

Based on the nature of thermal loading to the receiving water that occurs via the Manteca WQCF discharge outfall on the riverbank, three potential effects to fish and macroinvertebrates were assessed:

1. blockage or significant delay of upstream spawning migrations of adult anadromous fish, particularly anadromous salmonids, caused by the thermal plume that exists immediately downstream of the discharge outfall;

2. population-level effects resulting from potential mortality in fish or macroinvertebrates caused by acute (short-term) exposure to elevated water temperatures when moving past the discharge outfall; and

3. population or community-levels effects on fish and macroinvertebrates potentially resulting from the incremental increase in lower river/Delta water temperatures upon the Manteca WQCF effluent discharged becoming fully mixed with San Joaquin River water downstream of the outfall.

The following assessment methodology was employed to address the thermal issues associated with the proposed project.

Potential for Thermal Plume below the Discharge Outfall to Block or Delay the Upstream Spawning Migrations of Anadromous Fishes

A three-dimensional, hydrodynamic RMA-10 model of the river in the vicinity of the WQCF discharge was used as the basis for the evaluation. Graphics and summary statistics data tables of the thermal plume below the discharge outfall were prepared from model simulations, under a variety of river and effluent flow and temperature combinations (see Appendix F). The graphics and summary data tables depict the thermal contours and attributes within the plume, for the initial (approximately) 2,000 feet downstream of the discharge outfall, based on the simulated difference between river background temperature and effluent temperature and the flow rates for both the river and effluent. The contour graphics are color-coded so that the differential between effluent and river temperatures can be seen, in spatial context, downstream of the discharge outfall. Graphics showing a river plan view (from the discharge outfall to downstream 2,000 feet) and river cross-sectional views at 25 feet, 125 feet, 250 feet, 450 feet, 1,000 feet, and 2,000 feet downstream of the outfall were used for assessment purposes. These graphics were used, along with summary statistics data tables, for determining probabilities of temperature effects resulting from the proposed project, and characterizations of absolute temperatures that could

occur within the plume, to determine whether the thermal characteristics of the plume pose a potential to block or significantly delay upstream spawning migrations of anadromous fishes. The scientific basis for making the blockage delay determination considered:

1. the presence of a sufficient portion of the river, in the area of the plume and downstream, that remains thermally unaffected or negligibly affected, thereby providing a “zone of passage;”

2. location in the water column and river cross-section that fish species evaluated typically move;

3. behavioral responses of immigrating adult anadromous fish when they encounter thermal plumes;

4. the time of year that the species assessed immigrate past the discharge outfall;

5. the threshold temperature range for blockage of salmonid passage (i.e., avoidance temperatures); and

6. the thermal tolerances of adult anadromous fishes that pass the discharge outfall on their migrations through the lower San Joaquin River to upstream spawning grounds.

Potential for the Thermal Plume to Adversely Affect Fish or Macroinvertebrates Passing the Discharge Outfall

The same model output graphics and summary statistics discussed above (see Appendix F) were used to assess whether mortality (acute direct or delayed, indirect mortality) would be expected to occur in fish and macroinvertebrates that actively move or drift downstream through the zone of initial effluent mixing, downstream of the discharge outfall. These graphics and summary statistics tables were used for river background and effluent absolute temperatures and absolute temperatures that could occur within the plume, to determine whether the thermal characteristics of the plume could cause a thermal shock to biota of sufficient magnitude and frequency to cause acute direct mortality or delayed, indirect mortality, thereby resulting in adverse population- or community-level effects. The scientific basis for making this determination considered:

1. the seasonal and condition-specific cross-sectional thermal characteristics of the river, downstream of the discharge outfall;

2. location in the water column that various aquatic species typically move, when passing the discharge outfall;

3. the time of year that various aquatic species move downstream past the discharge outfall;

4. behavioral responses of the biota evaluated when encountering thermal plumes;

5. thermal tolerances of a representative number of biota known to move past the discharge outfall during one or more periods of their life cycle; and

6. swimming speeds of actively swimming fishes (i.e., the length of time aquatic species would be subjected to the thermal plume).

Population- or Community-level Effects to Fish or Macroinvertebrates from the Incremental Increase in Downstream Water Temperatures

The fraction or percentage of WQCF effluent present at various downstream locations within the Delta was modeled in order to provide an indication of the far-field impacts of the proposed project on Delta water quality. Six locations within the Delta (see Exhibit 4.9-2) were chosen as far-field sites for the evaluation of water quality impacts due to increased WQCF discharge. Sites were selected to provide pre- and post-project water quality estimates at several drinking water export locations and the Stockton Deep Water Ship Channel (DWSC). The

calculated effluent fractions facilitate the use of a mass balance model to estimate changes in the selected water quality parameters due to an increase in WQCF discharge. Historic Delta water quality data and historic Manteca effluent data were then used to estimate incremental changes in the Delta under the maximum full build-out WQCF discharge scenario of 27 mgd.

Potential incremental increases in the fully mixed river temperature, downstream of the discharge outfall, were extrapolated from the dilution analysis model runs for two one-year periods: October 1991 through September 1992, a critically dry year, and January 2002 through December 2002, a normal dry year (see Section 4.9 and Appendix F for details on modeling approach). The fully mixed downstream dilution of the discharge for the proposed project condition was compared to that simulated for the existing condition to determine potential project-specific temperature increases where the effluent initially becomes fully-mixed with the river (i.e., downstream of thermal plume). Comparison of the simulated dilution/temperature under the proposed project to that modeled for the existing condition facilitated determination of the downstream effect.

Summary statistics were used to determine whether the project-specific incremental increase in fully mixed downstream river/Delta water dilution/temperatures would be expected to cause population- or community-level effects on aquatic biota inhabiting the San Joaquin River and Delta system, or result in adverse effects to individual organisms that are listed under the federal and/or State ESA. The scientific basis for making this determination considered:

1. the magnitude and frequency of the incremental change in temperature;

2. the seasonal temperature regime of the San Joaquin River/ Delta downstream of the discharge outfall under the existing condition and proposed project conditions;

3. the available scientific literature regarding thermal tolerances of key fish species of primary management concern;

4. the nature of the use of the lower San Joaquin River by fish species of primary management concern; and

5. factors dictating lower San Joaquin River temperatures during the summer and fall months of the year.

THRESHOLDS OF SIGNIFICANCE

The significance criteria described below were developed for use in assessing potential impacts to fisheries and aquatic resources resulting from Manteca WQCF effluent discharges and constituent loading under the proposed project or its alternatives. Application of these significance criteria to findings determined from modeled output was used to make impact significance determinations. Effects of the proposed project on fish or other aquatic resources were considered significant if the project would:

- cause changes to San Joaquin River and/or Delta water quality, outside the zone of initial mixing, of sufficient magnitude and frequency to adversely affect an aquatic species' long-term population levels in these water bodies;

- degrade the quality of San Joaquin River and/or Delta aquatic habitats used by special-status aquatic species, including habitat(s) designated as critical habitat, to an extent that could cause a reduction in species abundance or long-term population levels (special-status species are defined as those that are currently listed as endangered or threatened under the federal ESA or State CESA and species formally proposed for federal and/or State listing as threatened or endangered);

- cause sufficient degradation in near-field water quality that would substantially delay, block, or otherwise substantially interfere with the success of upstream adult immigration or downstream juvenile emigration of

anadromous fishes past the Manteca WQCF discharge outfall, thereby resulting in adverse population-level effects; and

- cause sufficient degradation in water quality immediately downstream of the Manteca WQCF discharge outfall that would result in a substantial potential for lethality to organisms passing through the zone of initial mixing.

Findings from these impact assessments were compared to these significance criteria to make impact determinations.

IMPACT ANALYSIS

Temperature

Preparation of the 2000 Draft EIR for the *Manteca WQCF Phase III/IV Expansion Project* (EDAW 2000) revealed that the WQCF effluent would not comply with all objectives of the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan; SWRCB 1972) under some conditions. Because the WQCF outfall is an existing discharge in the tidally influenced reach of the San Joaquin River, Section 5.A of the Thermal Plan applies to the discharge and stipulates the following:

1. Elevated temperature waste discharges shall comply with the following:

    a. The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.

    b. Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25% of the cross-sectional area of a main river channel at any point.

    c. No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.

In general, the current permitted WQCF effluent is warmer than the San Joaquin River, and if evaluated on a monthly average, objective a. of the Thermal Plan is met for the WQCF discharge. Because the effluent is warmer than the receiving water, objectives b. and c. of the Thermal Plan are not necessarily met within the WQCF plume. By operating under a timed discharge during periods of low river flow to discharge only on the outgoing tide, the thermal plume will meet objective b. of the Thermal Plan. However, the temperature difference between the discharge and the river may exceed objective c. of the Thermal Plan. Pursuant to General Water Quality Provision 4 of the Thermal Plan, the City of Manteca is pursuing a limited exception to specific Thermal Plan water quality objectives for the permitted discharge rate of 9.87 MGD (LWA 2006). The current thermal analysis is expanded to evaluate the thermal effects of 27 mgd WQCF discharges on the San Joaquin River (full build-out).

As stated in the Impact Assessment Methodology section (above), the current Thermal Plan and NPDES permit limitations are not well supported by the current science regarding thermal effects on aquatic life. Therefore, compliance with these temperature limitations is not predictive of (or well correlated to) thermal impacts to aquatic life downstream of the Manteca WQCF discharge. Consequently, a detailed, scientifically based, quantitative assessment of near-field and fully mixed temperature modeling results for the purposes of assessing potential thermal impacts of the project to aquatic life is provided below.

IMPACT 4.13-1 Fisheries and Aquatic Resources — Potential for Thermal Plume below the Discharge Outfall to Block or Substantially Delay the Upstream Spawning Migrations of Fishes. *A thermal plume currently exists in the San Joaquin River immediately downstream of the Manteca WQCF discharge outfall, but is not believed to block or substantially delay the upstream spawning migrations of fishes due to a relatively large zone of passage that is present during all months of the year, under all conditions. At full build-out (27 mgd capacity), the proposed project would result in increased plume size and changes to certain aspects of the plume's internal characteristics (e.g., temperature contours) and/or the frequency with which specific characteristics would occur, relative to the existing (permitted) condition. However, a viable zone of passage for all migrating fish species would be maintained under worst-case conditions with implementation of the proposed project. Based on these findings, the proposed project would have a* ***less-than-significant*** *impact on the upstream spawning migrations of adult fishes.*

Upstream migrating temperature sensitive anadromous fish (e.g., Chinook salmon, steelhead) can potentially be blocked or delayed if they encounter sufficiently high fully-mixed river temperatures while migrating to upstream spawning areas (Evans and Johnson 1980; Bell 1986; Boles 1988). If a thermal plume exists, immigrating adult fish could be temporarily blocked or delayed; however, their behavior response would be to avoid the plume and seek a "zone of passage" where river temperatures are more favorable and thus facilitate passage.

Thermal Plume Characteristics

Under the existing permitted discharge capacity of 9.87 mgd, modeling results show a zone of passage, where the ambient water temperatures are unaffected by the effluent discharge, occurs on the west margin of the San Joaquin River at the Manteca WQCF discharge along the entire length of the plume under all months, flow, and permitted effluent discharge conditions (LWA 2006; see also Appendix F, Figures 20 and 21). The maximum cross-sectional area affected by this plume is approximately 22% at 1,000 ft downstream of the discharge outfall with a maximum increased temperature of approximately 8°F over ambient background river water temperatures.

At full build-out (capacity increase to 27 mgd) and under conservative worst-case conditions,[1] the proposed project would result in an increased thermal plume size and changes in certain aspects of the plume's internal characteristics (e.g., temperature contours) and/or the frequency with which specific characteristics would occur, relative to the existing (permitted - 9.87 mgd) condition. The width (and cross-sectional area) of the plume was simulated to remain relatively narrow (and small) at the point of discharge, 15% of the cross-section or approximately 45 feet wide, with a maximum increased temperature of approximately 8°F over ambient background river water temperatures. Downstream of the outfall, the plume spreads out laterally and vertically to cover a greater proportion of the river's cross-section. Conversely, the water temperature within the plume decreases as the plume and ambient waters mix (i.e., become diluted) with increasing distance downstream of the outfall. For example, at approximately 1,500 feet downstream of the discharge outfall, the location of maximum plume cross-sectional area effect, the plume covers 51% (approximately 150 ft) of the channel with a maximum increased temperature of 5°F (see Appendix F, Figures 20 and 21). Consequently, the unaffected passage zone at this cross-section of the river comprises approximately one-half of the river's approximate 300-foot width (or 150 feet) at the widest location of the plume. Due to buoyancy of warmer water temperatures, the plume is slightly wider at the water surface compared to the bottom of the channel.

Movement Tendencies of Upstream Spawning Migrations of Fishes

Coldwater fish species such as Chinook salmon and steelhead prefer temperatures below those that often exist in the San Joaquin River at the WQCF outfall during the summer months (Cherry et al. 1977) and, therefore, likely

[1] Appendix F provides graphic characterizations and summary statistics of San Joaquin River temperatures within the initial 2,000 ft downstream of the outfall (i.e., within the entire length of the plume). The graphic characterization and summary statistics data tables depicts a conservative "worst-case" scenario, based on minimum background flows (i.e., dry year) in the river during the winter period and a maximum effluent discharge rate of 27 mgd.

seek the coldest water temperatures available along their migration route. Numerous studies have shown that fish, when presented with a range of temperatures, will seek a temperature that is preferred, and will not submit themselves to temperatures sufficiently high to cause adverse physiological effects when given options (Cherry et al. 1975; Gray et al. 1977; Biro 1998).

As fish migrate upstream and begin to encounter and move into the thermal plume, temperature differences from river background become greater and they may gradually encounter unfavorably high water temperatures. These fish would either move laterally within the river channel until they encounter either more tolerable temperatures or the unaffected zone of passage along the other shoreline, or they would move higher or lower in the water column seeking more favorable temperatures. Because a zone of passage (unaffected by the effluent plume) remains along the west river margin under all conditions modeled and it is sufficiently wide (i.e., 150 feet) (Appendix F), the fish would be allowed to move laterally and continue upstream with minimal delay. Additionally, because the thermal waters of the plume are more buoyant and therefore, spread wider at the surface of the water column, they could move into deeper water and continue along more of a mid-channel migration route that would expose them to temperatures less different, or even no different, from river background. In either case, should fish swim or “drift” back toward the affected area of the plume before passing the discharge outfall, the same behavioral response would be repeated until the fish moved past the outfall.

If fish were to move into the plume, exposure time would be expected to be limited based on their ability to swim rapidly. Cruising speeds (i.e., the speed at which a fish can swim for an extended period of time) for adult chinook salmon and steelhead typically fall within 2 to 4 body lengths/second or approximately 1.5 to 3 feet/second (fps) (based on size) (Bell 1986). Adult salmonids are capable of maintaining sustained swimming velocities of up to 4.6 fps and burst speeds in excess of 20 fps, depending on water velocity and temperature (Powers and Orsborn 1990). Therefore, if fish were to move into the thermal plume, their ability to rapidly move out of the elevated water temperatures would result in short exposure time (e.g., on the order of minutes).

An example of this movement tendency was documented by Becker (1973). Based on tracking studies of Chinook salmon and steelhead migration past the discharge of heated effluent in the Columbia River, it was concluded that (a) no complete thermal barrier to salmonid migration existed, (b) upstream spawning was not affected, (c) fish were capable of detecting temperature change and changing migration paths, and (d) there was no detectable difference in migration rates when water temperatures downstream of the discharge were elevated by 3.5°F to 5.5°F above ambient summer water temperatures of 68°F measured upstream of the discharge.

Analysis Summary

At approximately 1,500 feet downstream of the discharge outfall, approximately half (i.e., 51%) of the river cross-sectional area (along the east bank river margin) would be affected by the effluent plume (Appendix F). As such, an approximate 150-foot zone of passage exists for the fish species in the west margin of the water column. As the fish move closer to the discharge, the portion of the water column (i.e., cross-sectional area) affected by the effluent plume decreases slightly. Within 450 feet of the discharge outfall, 47% of the water column is affected by the plume. At 250 feet downstream of the discharge, where internal plume temperatures can show substantial differences from river background, particularly under the “worst-case” scenario (Appendix F), 59% of the river cross-section along the west margin of the river is unaffected by the plume. Based on the plume dynamics simulated within the river channel under the “worst-case” conditions, adult fish undertaking upstream spawning migrations past the WQCF discharge outfall would be presented with an adequate zone of passage during winter months.

Based on results of this assessment, the discharge plume associated with build-out of the proposed project (increased capacity up to 27 mgd) has the potential to result in behavioral avoidance of elevated water temperatures within the plume of thermal water downstream from the point of discharge. Avoidance of the plume is considered to be a short-duration impediment to migration. The plume would not result in a complete barrier to migration. Based on the area of the river cross-section affected by elevated water temperatures, the unaffected

passage zone, and the ability of adult salmon to rapidly avoid and migrate upstream, no substantial adverse impacts to the health or condition of adult salmon or steelhead are anticipated to result from potential short-duration exposure of fish to the higher temperature plume within the channel area. Therefore this impact is considered to be **less than significant**.

Although the temperature modeling shows a technical violation of California Thermal Plan discharge temperature criterion, it is concluded from these analyses that exposure of adult Chinook salmon and steelhead (upstream migrating) to the proposed discharge (27 mgd) for a short period of time is not expected to result in a substantial increase in adult mortality or reduction in reproductive success.

IMPACT 4.13-2 Fisheries and Aquatic Resources — Thermal Effects on Fish and Benthic Macroinvertebrates Exposed to the Plume While Moving Downstream Past the Discharge Outfall. *At full build-out, the proposed project would result in a thermal plume of increased temperatures, relative to the ambient temperatures, across portions of the water column, under all conditions, that is larger than the thermal plume that currently exists (and permitted) downstream of the discharge outfall. The project-specific changes to the size and characteristics of this plume would be considerable, as would project-specific effects on the frequency with which specific plume characteristics occur. A zone of passage would remain along the west bank river margin of the water column where river temperatures are unaffected by discharges. When achievable, actively swimming young-of-the-year fishes emigrating from upstream rearing areas would select migration routes past the discharge outfall that avoid elevated temperatures and excessive temperature differentials. The macroinvertebrate communities inhabiting the sediments and drifting through the plume are generally tolerant of the absolute temperature regime and differences created by the proposed project, particularly for the relatively short period of time they would be drifting through the plume. However, passively drifting fish are typically transported past the discharge in the near-shore habitats and along the upper portion of the water column, both of which are noticeably affected by the effluent plume. Based on the findings for passively drifting fish being noticeably affected by the thermal plume, the proposed project would have a* ***potentially significant*** *impact on the populations and communities of fish moving downstream in the lower San Joaquin River and Delta.*

This assessment of emigrating (i.e., downstream migrating) young-of-the-year fishes addresses the potential effects that the thermal plume may have on: 1) actively-swimming juvenile fish with an ability to avoid the plume; 2) post-emergent fry passively drifting in the current with little to no swimming ability; and 3) benthic macroinvertebrates drifting past the discharge outfall. Fish species with actively swimming emigrants include Chinook salmon, steelhead, white sturgeon, green sturgeon (Wang 1986). Fish species with passively drifting young-of-the-year include post-emergent Chinook salmon fry, Sacramento splittail, striped bass, and hardhead (Wang 1986). Little in the way of fish egg drift is expected in the WQCF outfall area because spawning and hatching typically occur in areas upstream of this location. In this assessment, emphasis was placed on anadromous salmonids (i.e., Chinook salmon and steelhead) because they are among the most temperature sensitive of the fish and are of high management concern.

Actively Swimming Young-of-the-Year Fishes

As discussed under Impact 4.13-1 above, an approximate 150-foot zone of passage (largely or completely unaffected by the thermal plume) exists along the west river margin in the area where the widest thermal plume occurs (approximately 1,500 feet downstream of the discharge outfall (Appendix F, Figures 20 and 21). As a result of the discharge plume buoyancy, maximum elevated water temperatures occur primarily near the water surface.

Emigrating salmonids tend to migrate along the river margins in shallow, slower-moving waters rather than in the higher velocity water near the center of the channel (Bell 1986; Healey 1991; Moyle 2002). In this portion of the water column they use the structure of fallen trees, undercut banks, roots wads, and other near-shore structure to reduce predation pressures and provide shade and food resources. When migrating downstream, the juvenile and

smolt life stages of anadromous salmonids are believed to use the upper one-third of the water column and the river margins, with the larger smolts more likely to use the center of the channel (Dauble et al. 1989).

The lower San Joaquin River near the Manteca WQCF discharge outfall is channelized; has extensive riprap along the banks; is characterized by a lack of near-shore woody debris or other structures, shading, and backwater areas; has relatively swift, tidally influenced currents; and has relatively high water temperatures during the late spring, summer, and fall months. As such, the river in this location does not provide the kind of habitat elements that would encourage salmonid rearing; rather, it serves as a migration corridor to better rearing habitats at downstream Delta locations (Yoshiyama et al. 1996). Consequently, movement of actively swimming anadromous salmonid emigrants past the WQCF outfall area is believed to occur rather rapidly, with juvenile salmonids rearing in the more complex slough habitats of the central and west Delta prior to ocean entry.

Regarding thermal tolerances and preferences of Chinook salmon, Brett (1952) reported that juvenile Chinook salmon acclimated to a temperature of 59°F and had an upper lethal temperature of >77°F (for a one-week exposure). Bjornn and Reiser (1991) state that the upper lethal limit for steelhead is approximately 75°F and that salmonids usually try to avoid stressful temperature conditions when possible by moving to other areas. Gray et al. (1977) reported that juvenile Chinook salmon avoided heated thermal plumes when plume temperatures were 16°F to 19°F above ambient water temperature. These authors report that behavioral adaptations may prevent juvenile Chinook salmon in nature from experiencing lethal conditions from thermal discharges. Kerr (1953) subjected yearling fall-run Chinook salmon acclimated to 55-56°F to instantaneous rises of up to 27°F for 3.5 to 5 minutes and found no mortality with a 25°F rise and reported a maximum temperature tolerance of 83°F. Boles (1988) reviewed numerous studies conducted on thermal tolerance of salmonids and reported that the upper lethal temperature for long-term exposure among fingerling Chinook salmon in the Sacramento River to be 78.5°F, although higher temperatures can be tolerated for brief periods.

Regarding thermal tolerances and preferences of steelhead, Myrick and Cech (2000) reported the incipient lethal temperatures for resident rainbow trout is approximately 78.8°F and upper critical thermal maxima approaches 87.8°F at high acclimation temperatures. Moyle (2002) states rainbow trout will survive temperatures approaching 82°F if they have been acclimated to the upper temperature and the water is saturated with oxygen. Leitritz and Lewis (1980) report yearlings and adults under hatchery conditions can withstand temperatures up to 78°F for short periods of time. The Santa Ynez River Technical Advisory Committee (2000) reported that young-of-the-year steelhead exposed to temperatures above 77°F in southern California's Santa Ynez River system were observed to be generally healthy and actively feeding. Studies of juvenile steelhead of the Central Valley have shown that steelhead may exhibit significant mortality under long-term exposure to temperatures exceeding 77°F, but they can tolerate temperatures up to 85°F for short periods of time (Myrick and Cech 2000).

Based on the information provided above, anadromous salmonid emigrants actively swimming along the east margin of the river at or immediately downstream of the discharge outfall would be exposed to temperatures that could cause adverse effects and/or exceed thermal tolerances. In the event that these fish were to encounter the unfavorably high water temperatures while passing through the thermal plume, they would be expected to swim away from such areas as they continue their downstream movements. However, because the plume is relatively wide (maximum of approximately 150 feet) and is situated along the margin of the river, fish may not be able to immediately swim to cooler waters in the zone of passage. At the upstream head of the plume, exposure to the elevated temperatures would be sudden with little time to acclimate to the change. Conversely, exposure under such scenarios would be brief (e.g., <30 minutes) due to river flow velocities in the portion of the channel affected by the plume and juvenile fish swimming speeds (see above). Emigrants that pass the location of the discharge outfall along the west margin of the river could swim through the zone of passage unaffected by the thermal plume.

Passively Drifting Young-of-the-Year Fishes

Young-of-the-year fishes that passively drift in the water column and young fishes that are weak swimmers include post-emergent Chinook salmon fry, striped bass, Sacramento splittail, hardhead, and delta smelt (Wang 1986). Following hatching, these fish are transported downstream by river currents to rearing habitats in the Delta. Chinook salmon that emigrate as post-emergent fry typically remain in near-shore habitats (Healey 1991; Moyle 2002). Larvae of striped bass, delta smelt, Sacramento splittail, and hardhead are typically transported in the near-surface portions of open waters and along near-shore habitats. Consequently, the early life stages of these fishes could drift into and through the thermal plume without the ability to escape and would be exposed to the higher temperatures for a relatively long period of time (potentially >30 minutes depending on river water velocities and location within the plume). This sudden exposure (minimal acclimation) to the higher temperature plume for a relatively long period of time (drifting through the entire length of the approximate 2,000-foot plume) could result in adverse thermal effects to the health and/or condition of these young-of-the-year fishes. Mortality may not necessarily result from direct thermal effects, but may be related to disease, predation, and other indirect effects resulting from exposure.

Drifting Macroinvertebrates

As discussed in the setting, the common macroinvertebrate taxa present in the lower San Joaquin River and Delta are species that are tolerant of relatively high temperatures (ranges from 82°F to 87°F). Although the thermal plume along the east margin of the river may change the macorinvertebrate community composition and/or species-specific relative abundances compared to the existing permitted condition, it would not be expected to result in substantial population-level adverse effects. The increased area where community composition and relative abundances may be altered by the enlarged plume is expected to be negligible relative to all available macroinvertebrate habitat of the lower San Joaquin River and Delta (i.e., many thousands of acres).

Summary of Impacts

Fish that swim into the thermal plume would encounter a thermal gradient and would likely select a preferred migration path based on temperatures encountered as they continue to move downstream. However, because the plume is relatively wide (maximum of approximately 150 feet) and is situated along the margin of the river, fish may not be able to immediately swim to cooler waters in the zone of passage (along the west margin). At the upstream head of the plume, exposure to the elevated temperatures would be sudden with little time to acclimate to the change. Additionally, passively drifting young-of-the-year fishes could drift into and through the thermal plume without the ability to escape and would be exposed to the higher temperatures for longer periods of time (potentially >30 minutes depending on river water velocities). The sudden exposure to the high temperature plume for relatively long periods of time could result in adverse thermal effects to the health and/or condition of these young-of-the-year fishes. Ultimately, population-level effects could result from potential mortality in fish caused by acute (short-term) exposure to elevated water temperatures when moving past the discharge outfall. Therefore, this impact is **potentially significant**.

IMPACT 4.13-3 Fisheries and Aquatic Resources — Population- or Community-level Effects to Fish or Macroinvertebrates from the Incremental Increase in Downstream Water Temperatures (Fully Mixed Condition). *The proposed project would result in small incremental increases in the fully mixed San Joaquin River/Delta water temperatures downstream of the discharge outfall. Under all conditions above critical water year flow rates, the proposed project at full build-out condition would result in a fully mixed regime downstream of the discharge that is near equivalent to that under the existing permitted condition (<1% effluent contribution). These effluent contributions would result in negligible incremental increases in downstream water temperatures. Based on these findings, the proposed project would have a* ***less-than-significant*** *impact to fully mixed lower San Joaquin River/Delta water temperatures.*

In addition to changing the existing thermal plume that occurs immediately downstream of the discharge outfall, discharges under the proposed condition full-build-out condition constitute a point-source heat load to the system. This assessment evaluates the incremental increase in the fully mixed San Joaquin River/Delta water temperatures that could occur under the proposed project full build-out condition, relative to the existing permitted condition. Model simulations for nominal San Joaquin River flow rates of 600 cfs and 1,250 cfs were performed to evaluate the proposed project's incremental effects on downstream Delta locations under critical and dry/below normal water years, respectively.

The minimum and maximum calculated WQCF effluent contributions for selected locations within the Delta are listed in Appendix C (Tables 35 and 36) corresponding to critical and dry/below normal water years, respectively. In general, the farther away from the WQCF discharge the far-field site is located, the lower the percent contribution of WQCF effluent, and as WQCF discharge increases, so does its percent contribution at far-field locations. The calculated WQCF percent contribution exceedance plots are presented for selected Delta locations in Appendix C (Figures 27 through 32). For example, from Figure 27, less than 0.5% of the water at the SWP Clifton Court intake will be of WQCF origin for 70% of a critical water year; and for 85% of a dry/below normal water year at a WQCF full build-out discharge rate of 27 mgd. Lower WQCF discharge results in lower percent contributions of WQCF effluent at far-field locations.

Because the proposed project (at full build-out) would result in a fully mixed regime downstream of the discharge that is near equivalent to that under the existing permitted condition (<1% effluent contribution) under all conditions above critical water year flows rates, these effluent contributions would result in negligible incremental increases in downstream water temperatures. Therefore, this impact is **less than significant**.

Other Water Quality Parameters and Priority Pollutants

The assessments of all other water quality related effects of the proposed project on aquatic life (i.e., fisheries and aquatic resources) within the affected project area are contained within the various numbered, constituent-specific impact assessments of Section 4.9 (Hydrology and Water Quality).

Temporary Construction-related Effects on Water Quality

The assessment of temporary construction-related effects on San Joaquin River water quality and its fisheries and aquatic resources is contained in Section 4.9 (Hydrology and Water Quality).

4.13.3 MITIGATION MEASURES

No mitigation is necessary for the following less-than-significant impacts:

4.13-1: Potential for Thermal Plume below the Discharge Outfall to Block or Substantially Delay the Upstream Spawning Migrations of Fishes

4.13-3: Population- or Community-Level Effects to Fish or Macroinvertebrates from the Incremental Increase in Downstream Water Temperatures (Fully Mixed Condition)

The following mitigation measure is provided for the potentially significant impact:

Mitigation Measure 4.13-2: Thermal Effects on Fish and Benthic Macroinvertebrates Exposed to the Plume While Moving Downstream Past the Discharge Outfall. The City of Manteca will design, install, and operate a treated effluent cooling tower or an equivalent technology that cools treated effluent prior to discharge into the San Joaquin River. The cooling tower or equivalent technology will be designed to reduce the temperature of the treated effluent by up to 15°F such that the effluent discharge and associated size and intensity of the thermal plume will not result in adverse thermal affects to the health and/or condition of sensitive fish species and will

comply with all California Thermal Plan Objectives, which have been established to be protective of beneficial uses. The reduction in temperature of the treated effluent will prevent the creation of a lethal zone or plume, defined as water temperatures that are at or above the lethal effects levels (i.e., >68°F) during time periods when the most sensitive fish species would be in the vicinity of the WQCF outfall (i.e., from January to May) and ambient background temperatures are at or below these lethal effects levels. Because the ambient water temperature of the San Joaquin River can exceed the >68°F lethal effects threshold during the later portion of the time period when sensitive species are present (e.g., April and May), the temperature of the treated effluent produced by the cooling tower or equivalent technology may be greater than ambient background river temperatures under these conditions and during these periods. This could result in conditions where the plume exceeds the lethal effects threshold; however, with implementation of the cooling tower or equivalent technology, the size and intensity of the plume will be minimized resulting in only short-term exposure (through reduced plume size) to marginally increased water temperatures. Because sensitive fish species have been documented (Moyle 2002, Bartholow and Henricksen 2004, Bjorn and Reiser 1991) to survive exposure to higher temperatures (beyond lethal effects thresholds) for short periods of time, substantial adverse impacts to fish would not occur.

Furthermore, the cooling tower or equivalent technology will be designed to cool treated effluent to meet all California Thermal Plan objectives that were established, in part, to be protective of beneficial uses including cold water fish habitat. The cooling tower or equivalent technology cooling capacity of 15°F would achieve an effluent temperature within 3°F to 4°F of the ambient river temperature.

Before the design of the cooling tower or equivalent technology is finalized, the City of Manteca will obtain the approval of the RWQCB indicating that the cooling tower or equivalent technology design is adequate to address concerns regarding discharge of higher temperature treated effluent into the San Joaquin River.

The cooling tower or equivalent technology will be constructed, installed, and operated in accordance with the approved final design prior to operating the WQCF at the expanded capacity (i.e., greater than 9.87 mgd ADWF). Implementation of a cooling tower or equivalent technology would reduce impacts to fisheries resources that may otherwise result from the increased discharge of higher temperature treated effluent into the San Joaquin River to a **less-than-significant** level.

The specific design, siting, and operational characteristics of the cooling tower or equivalent technology are unknown at this time. Construction and operation of the cooling tower or equivalent technology could potentially result in many of the same significant environmental impacts as the project (e.g., agricultural resources, construction-related air quality, noise, geology and soils, cultural resources), some of which may remain significant and unavoidable with implementation of all feasible mitigation. In particular, construction of the cooling tower or equivalent technology has the potential to result in significant and unavoidable impacts on farmland.

4.13.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of the mitigation measure identified above, the project's fisheries and aquatic resources impacts would be reduced to a less-than-significant level because the design, installation, and operation of a cooling tower or equivalent technology would ensure that treated effluent discharged into the San Joaquin River would be reduced by up to 15°F, and the effluent discharge and associated size and intensity of the thermal plume will not result in adverse thermal affects to the health and/or condition of sensitive fish species. Construction and operation of the cooling tower or equivalent technology could result in significant and unavoidable impacts on farmland even with implementation of all feasible mitigation. No other feasible mitigation could be implemented by the project to reduce these impacts. Therefore, farmland impacts would remain significant and unavoidable.

5 CUMULATIVE IMPACTS

5.1 INTRODUCTION

This section provides an analysis of overall cumulative impacts of the project taken together with other past, present, and probable future projects producing related impacts, as required by Section 15130 of the State CEQA Guidelines. The goals of this analysis are to first determine whether the overall long-term impacts of all such projects would be cumulatively significant and second to determine whether the project itself would cause a "cumulatively considerable" (and thus significant) incremental contribution to any such cumulatively significant impacts. (See State CEQA Guidelines Sections 15130[a]-[b], Section 15355[b], Section 15064[h], Section 15065[c]; Communities for a Better Environment v. California Resources Agency [2002] 103 Cal.App.4th 98, 120.) This analysis creates a broad context in which to assess the proposed project's incremental contribution to anticipated cumulative impacts, as viewed on a geographic scale beyond the project site itself, and to determine whether the project's incremental contribution to any significant cumulative impacts is itself significant (i.e., "cumulatively considerable" as defined by CEQA).

Cumulative impacts are defined in State CEQA Guidelines Section 15355 as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." A cumulative impact occurs from "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (State CEQA Guidelines Section 15355[b]).

Consistent with State CEQA Guidelines Section 15130(a), the discussion of cumulative impacts in this DEIR focuses on significant and potentially significant cumulative impacts. State CEQA Guidelines Section 15130(b), in part, provides the following:

> The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

5.2 PROJECTS CONTRIBUTING TO POTENTIAL CUMULATIVE IMPACTS

The State CEQA Guidelines identify two methods for establishing the cumulative environment in which the project is to be considered: the use of a list of past, present, and probable future projects or the use of adopted projections from a general plan, other regional planning document, or a certified EIR for such a planning document. For this DEIR, both the list and the plan approach have been combined to generate the most reliable future projections possible. A list approach is used to define the local project environment and includes projects within the City of Manteca. In addition, a list approach is used to define regional water quality projects that could affect San Joaquin River water quality. Because the project directly influences and is influenced by regional development activities, the plan approach is also used to allow a cumulative analysis on a regional scale. The plan approach encompasses large-scale water programs that could affect the water quality of the San Joaquin River and the Sacramento-San Joaquin Delta. Projects and plans included in these two approaches are described below.

5.2.1 CUMULATIVE CONTEXT

Agriculture has been the driving force over the decades in the conversion of natural lands in Manteca and the surrounding region. This conversion of natural land removed biological habitat and has resulted in such

environmental effects as air quality degradation attributable to dust from cultivation and emissions from farm equipment, as well as water quality degradation from runoff of irrigation water containing traces of pesticides.

According to U.S. Census records, the population in Manteca grew from around 40,800 in 1990 to more than 49,200 in 2000 (U.S. Census Bureau 1990, 2000a). This increase in population has come as a result of moderate urbanization over the decade, particularly the development of single-family residences and commercial and office buildings. Urbanization has also resulted in increased traffic, particularly on increasingly crowded local roadways, increased air pollution from vehicles and construction, and loss of farmland. Even with this growth, however, Manteca accounted for only 9% of the total San Joaquin County population in the year 2000 (approximately 563,600 persons).

San Joaquin County has grown substantially in recent years, particularly in the cities of Tracy and Stockton. Between 1990 and 2000, Tracy grew by more than 23,000 residents and Stockton grew by 33,000 residents. Together, these two cities represent 69% of the County's population gain between 1990 and 2000. In comparison, Manteca's growth equaled 10% of the total County population gain. Growth in Tracy and Stockton has resulted in environmental changes similar to those occurring in Manteca, although at more pronounced levels than in Manteca. The County is addressing numerous regional issues pertaining to severe air quality degradation, traffic congestion, biological habitat loss, loss of farmland, and other urban-related environmental changes.

The water quality of the lower San Joaquin River drainage and the Sacramento-San Joaquin Delta has been heavily affected by human activities. Land use in the Sacramento-San Joaquin Delta is dominated by agriculture (about 538,000 acres), while urban and commercial property account for approximately 64,000 acres of developed land. The use of pesticides and fertilizers has altered water quality, with pesticides sometimes reaching levels acutely toxic to sensitive invertebrates. Agriculture and urban/stormwater runoff are the predominant sources of contaminants in the San Joaquin Basin. Agricultural return flows sometimes contain high concentrations of dissolved solids (i.e. salinity) and trace elements that can degrade water quality. Watersheds that feed the river and Delta contribute pollutants and stressors that produce or exacerbate water quality problems. In addition, construction of the Stockton Deep Water Channel and channeling of the San Joaquin River system have created an area of reduced dissolved oxygen near Stockton.

5.2.2 LIST OF RELATED LOCAL PROJECTS

The list of past, present, and probable future local projects used for this cumulative analysis includes those projects that have occurred or are planned to occur within the City. For the purposes of this discussion, the projects that may have a cumulative effect on the resources in the project area will often be referred to as the "related projects." Related projects are identified in Table 5-1 and Exhibit 5-1; the numbering corresponds to the numbers used in the exhibit and table.

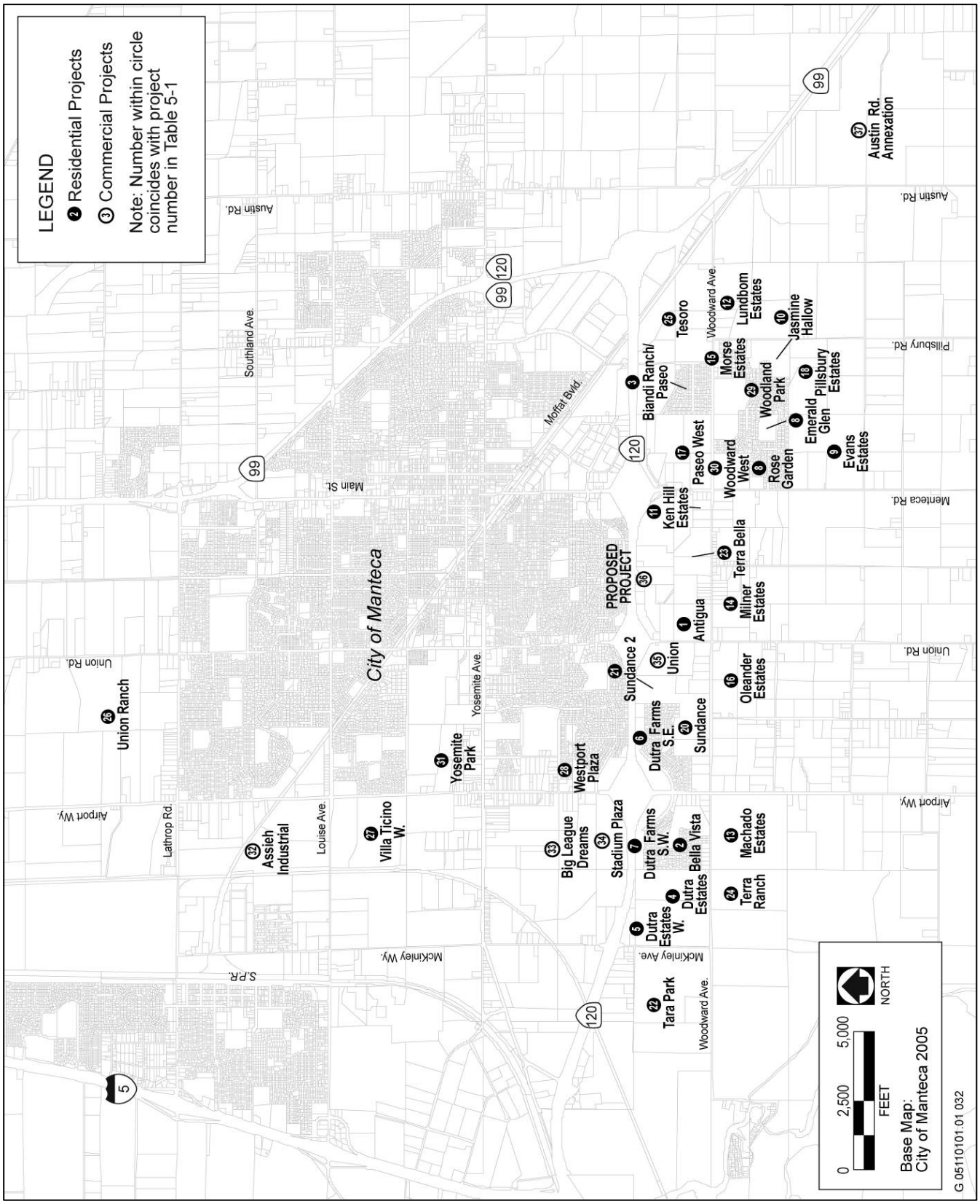
Table 5-1
Related Cumulative Projects in the City of Manteca

Project No. in Exhibit 5-1	Project Name	Status	Acreage	Proposed Residential Units/(Acreage)
1	Antigua	Under construction	36	120
2	Bella Vista	Under construction	66.8	262
3	Bianchi Ranch / Paseo	Built	104.5	454
4	Dutra Estates	Under construction	77.3	426
5	Dutra Estates West	In review	23.1	188

Table 5-1
Related Cumulative Projects in the City of Manteca

Project No. in Exhibit 5-1	Project Name	Status	Acreage	Proposed Residential Units/(Acreage)
6	Dutra Farms S.E.	Built	105	272
7	Dutra Farms S.W.	Built	61	194
8	Emerald Glen	Built	39	78
9	Evans Estates	In review	159	586
10	Jasmine Hollow	Under construction	61.45	245
11	Ken Hill Estates	Approved / Not yet building	4.7	12
12	Lundbom Estates	In review	5	21
13	Machado Estates	In review	158	564
14	Milner Estates	In review	60	215
15	Morse Estates	Under construction	6.3	23
16	Oleander Estates	In review	112	544
17	Paseo West	Under construction	50.8	191
18	Pillsbury Estates	In review	80	275
19	Rose Garden	Built	48	206
20	Sundance	In review	110	451
21	Sundance 2	In review	7.53	79
22	Tara Park	In review	160	583
23	Terra Bella	Under construction	45	158
24	Terra Ranch	In review	74.8	269
25	Tesoro	under construction	128	485
26	Union Ranch	Approved / Not yet building	356	1,960
27	Villa Ticino West	Approved / Not yet building	127	711
28	Westport	Approved / Not yet building	5	24
29	Woodward Park	Built	118	276
30	Woodward West	Built	38.5	116
31	Yosemite Park	In review	29.5	253
32	Assieh Industrial	Under construction	Industrial complex	(79.89)
33	Big League Dreams	Under construction	Commercial soft ball complex	(45)
34	Stadium Plaza	Under construction	Retail (Kohl's, Old Navy, Chili's etc.)	(54.4)
35	Union Commercial	In review, no known tenants	Retail	(51.06)
36	Proposed Project	In review	Retail	(72)
37	Austin Road Annexation	In review	Industrial	(967.5)
38	City of Manteca Wastewater Quality Control Facility Master Plan and Wastewater Collection System Master Plan*	In review	Public/Quasi Public	(210)

*This project is not identified on Exhibit 5-1 as improvements would occur throughout the City.
Source: Data provided by the City of Manteca in 2006



Source: City of Manteca Community Development Department 2006

Location of Related Cumulative Projects in the City of Manteca **Exhibit 5-1**

5.2.3 LIST OF RELATED WATER QUALITY PROJECTS

The list of past, present, and probable future water quality projects used for this cumulative analysis includes those projects that have occurred or are planned to occur in the region. For the purposes of this discussion, the projects that may have a cumulative effect on the resources in the project area will often be referred to as the "related projects." Related water quality projects are identified below.

MANTECA WASTEWATER QUALITY CONTROL FACILITY CURRENT OPERATIONS

The City of Manteca Wastewater Quality Control Facility (WQCF) is included as a cumulative project because it currently discharges wastewater to and affects the water quality of the San Joaquin River and the Sacramento-San Joaquin Delta. The Manteca WQCF serves commercial and residential uses within the City of Manteca and a portion of the City of Lathrop. The WQCF is a combined biofilter and activated-sludge wastewater treatment plant permitted for treatment and discharge of 9.87 mgd ADWF of wastewater. Wastewater flows to the WQCF have steadily increased as the population and commercial and industrial activity in and around the city has grown. Average flows to the plant have increased from just over 4 mgd ADWF in 1991 to approximately 6 mgd ADWF in December 2005. Flows are treated to a secondary treatment level, in compliance with federal Clean Water Act (CWA) requirements, prior to discharge. Because the existing NPDES permitted capacity of the WQCF is 9.87 mgd, even without implementation of the master plan project evaluated in this EIR (proposed expansion to 27 mgd), flows at the WQCF would be expected to increase to 9.87 mgd as growth occurs within the city. Consequently, current operation of the WQCF would continue to contribute to constituent loadings to the San Joaquin River. Section 4.9, "Hydrology and Water Quality," describes existing constituent loading concentrations from the plant.

CITY OF TRACY WASTEWATER TREATMENT PLANT EXPANSION

The City of Tracy Wastewater Treatment Plant (WWTP) is located in the northern portion of the City of Tracy Urban Management Plan (UMP) area and is within City of Tracy limits. The plant provides secondary treatment and disinfection prior to discharging to Old River, which flows into the San Joaquin River prior to entering the Delta. First operated in 1930, the plant has since undergone numerous upgrades and improvements to its treatment facilities to keep pace with the City's increased wastewater loads and to comply with federal and State water quality and environmental regulations.

To accommodate increased wastewater flows and loadings, the City recently proposed to expand the plant's capacity from 9 mgd to 16 mgd. The proposed expansion would increase plant capacity by installing additional secondary treatment facilities, while simultaneously upgrading the plant in anticipation of more stringent effluent discharge requirements. The project includes filtration facilities added after secondary clarification to further reduce BOD, total suspended solids (TSS), and turbidity. Ammonia removal will occur through the addition of aeration basins to provide complete nitrification-denitrification of the secondary effluent. Treatment beyond tertiary level and ammonia removal was assessed but deemed not to be required (Fulton, pers. comm., 2007).

CITY OF LATHROP WASTEWATER TREATMENT/RECYCLING PLANT EXPANSION

The City of Lathrop currently treats and disposes its wastewater at three facilities: a City owned treatment plant located in the Crossroads Business Park, the Water Recycling Plant (WRP-1), and the City of Manteca Wastewater Quality Control Facility (WQCF). The City of Lathrop presently generates approximately 1.08 mgd of wastewater. Approximately 95% of this wastewater is conveyed to the Manteca WQCF, which discharges to the San Joaquin River, with the remainder going to WRP 1. The City of Lathrop has a contractual relationship with the City of Manteca whereby 14.7% of the Manteca WQCF's existing and future expanded capacity is allocated for Lathrop flows. The permitted capacity of the existing Manteca WQCF is 9.87 mgd, thus providing Lathrop with a capacity of 1.45 mgd (14.7% of 9.87 mgd). Flows from Lathrop to Manteca currently average approximately 0.76 mgd. Approximately 0.15 mgd of wastewater generated within the City of Lathrop is treated

at the City's existing Crossroads Business Park facility and 0.16 mgd of wastewater is treated at the City's WRP-1 MBR facility (Gibson, pers. comm., 2007).

At buildout, the City of Lathrop is projected to generate approximately 11.5 mgd of wastewater. The main component of the City's integrated wastewater disposal strategy is to maximize use of recycled water on 1,022 acres of irrigated land within the City. Once the recycled water demand is met, the City plans to maximize the use of its allocated capacity at the Manteca WQCF. At build out, the City would discharge up to 2.2 mgd to the Manteca WQCF, if capacity is available. Lastly, when the recycled water demand and the Manteca WQCF allocation have been met, the City plans to discharge the remaining treated effluent to the San Joaquin River. The project includes a tertiary treatment system, including nitrification-denitrification, coagulation, filtration, and ultraviolet light disinfection. Treated effluent would be discharged to the San Joaquin River through a high rate diffuser system that would rapidly mix the effluent with river water.

The newly expanded WRP-1 plant is designed to treat approximately 0.75 million gallons per day of raw sewage. The treated effluent (i.e., recycled water) meets Title 22 standards for reuse and is used for a variety of purposes including landscape irrigation and farming activities for fodder crops. The new expansion includes advanced membrane bio-reactor (MBR) technology to produce high quality recycled water to be used to irrigate landscaping, schools, and parks and to grow crops on designated land application areas. A new recycled-water system consisting of storage ponds, pump stations, and a distribution system is currently being constructed as part of a WRP-1 expansion project.

CITY OF STOCKTON REGIONAL WASTEWATER CONTROL FACILITY EXPANSION

The City of Stockton Regional Wastewater Control Facility (RWCF) is located in the southern portion of Stockton. The plant is owned and operated by the City of Stockton and provides tertiary treatment prior to effluent discharge to the San Joaquin River. The San Joaquin River bisects the plant site. In general, the preliminary, primary, a portion of the secondary and the solids handling facilities are located east of the river, while the remaining secondary facilities and the tertiary facilities are located west of the river. Although the current dry weather design flow of the secondary plant is 38 mgd, the City optimizes the operation of the tertiary plant, which allows a permitted discharge flow of 55 mgd (Burrell, pers. comm., 2007).

The City is in process of a six-stage plant expansion program for its RWCF. Stages one and two were expected to be completed in 2003. Planning was initiated for stages three through six; however, the master planning process and environmental compliance were put on hold while the City makes a decision regarding privatization of their operation and maintenance of its municipal utilities. Privatization of the facilities was approved in early 2003.

DELTA WETLANDS PROJECT

The Delta Wetlands Project (DW) involves diverting and storing water on two Sacramento–San Joaquin Delta islands (Bacon Island and Webb Tract, termed "reservoir islands") for later discharge for export sales or to meet outflow requirements for the San Francisco Bay/Sacramento San Joaquin Delta estuary. During periods when the reservoir islands are not being used to store water, shallow water would be managed within an inner levee system on the reservoir. The project also involves seasonally diverting water to create and enhance wetlands and to manage wildlife habitat on two Delta islands (Bouldin Island and Holland Tract, referred to as "habitat islands"). These islands would be operated to support wetlands and wildlife habitat. Additionally, recreation facilities would be constructed along the perimeter levees on all four DW islands. To operate the project, DW would improve and strengthen levees on the four islands and install additional siphons and water pumps on the perimeters of the reservoir islands.

The initial water storage capacity of the reservoir islands would be 238,000 acre-feet (AF) and increase to 260,000AF in 50 years due to soil subsidence. The mean annual diversion and discharge is estimated to be 222,000-225,000 AF and 180,000-202,000 AF, respectively. Both reservoir islands could be filled and emptied in

approximately one month. The DW diversion could occur in any month but would occur only when the amount of allowable water for export is greater than the permitted pumping rate of the export pumps.

Potential water quality impacts associated with this project include increases in salinity, dissolved organic carbon, and possibly changes in other water quality variables. In 2001, the SWRCB certified the EIR on the Delta Wetlands Project. In February 2007, the Public Policy Institute of California (PPIC) released a comprehensive study of the DW which assessed current challenges facing the Delta including its ecosystem, water supply reliability, water quality, and existing land uses and also identified potential options that state leaders should explore this year in implementing a long-term solution for preserving the Delta. According to the latest information release (February 7, 2007), the DW is still currently being studied by the California Bay-Delta Authority and the California Department of Water Resources.

5.2.4 LARGE-SCALE WATER QUALITY PROGRAMS

Because the project would influence and be influenced by several large-scale water quality programs, the "plan" approach was used to evaluate cumulative impacts on a regional scale. The regional cumulative analysis area covers the Sacramento-San Joaquin Delta region and includes an evaluation of the following programs:

STATE OF CALIFORNIA TOTAL MAXIMUM DAILY LOAD PROGRAM

The State of California Total Maximum Daily Load (TMDL) Program establishes a process that provides a framework for identifying load reductions or other actions needed to attain water quality standards (i.e., water quality goals to protect aquatic life, drinking water, and other beneficial uses). The Clean Water Act Section 303(d) established the TMDL program to guide application of State standards to individual water bodies/watersheds. The process has three steps:

- **Identify Quality Limited Waters.** California must identify and prepare a list [303(d) list] of waters that do not or are not expected to meet water quality standards after applying existing required controls.

- **Establish Priority Waters/Watersheds.** California must prioritize waters/watersheds and target high priority waters/watersheds for TMDL development.

- **Develop TMDLs.** For each listed water body, California must develop a TMDL that would describe load reductions necessary to achieve water quality standards, allowing for seasonal variations and an appropriate margin of safety. A TMDL is a quantitative assessment of water quality problems, contributing sources, and load reductions or control actions needed to restore and protect individual water bodies.

The State Water Resources Control Board (SWRCB) and the nine Regional Boards are the state agencies responsible for implementing the TMDL program in California. The U.S. Environmental Protection Agency (EPA) provides federal oversight to the process by reviewing and approving both the 303(d) list of quality limited waters and each TMDL. If EPA disapproves lists or TMDLs, EPA is required to establish the lists and/or TMDLs.

TMDLs should address all significant sources of listed pollutants, including point sources, nonpoint sources, and naturally occurring sources. A TMDL is the sum of the individual waste load allocations for point sources, load allocations for nonpoint sources and natural background pollutants, and an appropriate margin of safety. TMDLs must clearly identify the links between the water body use impairment and threat of concern, the causes of the impairment or threat, and the load reductions or actions needed to remedy or prevent the impairment. TMDLs are developed to provide an analytical basis for implementing pollution controls, land management practices, and restoration projects needed to protect water quality. The State of California is required to include approved TMDLs and associated implementation measures in its state water quality management plans, i.e., Basin Plans. USEPA regulations require that NPDES permits be consistent with waste load allocations in approved TMDLs.

The most recently approved (1998) complete CWA Section 303(d) list for California identifies the Delta waterways as water-quality impaired for a number of constituents. The State has completed a public process to update the 303(d) list (SWRCB Resolution No. 2006–0079), and the SWRCB has submitted revisions to EPA for approval. On November 20, 2006, the EPA partially approved California's 2006 303(d) list, and is in the process of reviewing the State's proposed delisting and do not list waters. The recommended changes include the addition of 53 new water bodies and pollutants to the list; removal of 3 water bodies and pollutants from the list; refinement of identified impaired reaches; and changes in TMDL development priorities. Potential sources of the 303(d) listed contaminants for the San Joaquin River and Sacramento-San Joaquin Delta area, and estimated completion dates for their TMDL implementations, are shown in Table 5-2.

Table 5-2
Potential Sources and Proposed TMDL Completion Dates for San Joaquin River and Sacramento-San Joaquin Delta Section 303(d) Listed Pollutants

Pollutant/Stressor	Potential Sources	Proposed TMDL Completion
Chlorpyrifos	Agriculture, Urban Runoff/Storm Sewer	2019
DDT	Agriculture	2011
Diazinon	Agriculture, Urban Runoff/Storm Sewer	2019
Dioxin	Point Source	2019
Electrical Conductivity	Agriculture	2019
Exotic Species	Source Unknown	2019
Furan Compounds	Contaminated Sediments	2019
Group A Pesticides[1]	Agriculture	2011
Mercury	Resource Extraction (abandoned mines)	2006
Pathogens	Urban Runoff/Storm Sewer, Recreational and Tourism Activities (nonboating)	2008
PCBs	Point Source	2019
Unknown Toxicity[2]	Source Unknown	2019

[1] One or more Group A Pesticides (Group A pesticides include aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, BHC (including Lindane), endosulfan, and toxaphene).
[2] Toxicity is known to occur, but the constituent(s) causing toxicity is unknown.
Source: RWQCB 2006 303(d) list. Adapted from the City of Manteca in 2007.

The overall impact of the development and implementation of TMDLs would be to reduce loadings of pollutants of primary concern to the Delta to the point that water quality objectives are achieved or to implement other activities to attain standards. Each TMDL would separately consider available scientific information in a quantitative fashion in establishing load reduction plans. The specific outcomes of these TMDLs, in terms of the reductions to be required on individual sources are highly uncertain at this time. That process must be carried out before judgments can be made regarding the most equitable and cost effective load reduction plan. It would be premature to assume any specific level of reduction for any specific source prior to completion of the individual TMDLs.

Although the regulatory system established under the CWA and state law would require that water quality standards be met, a high degree of uncertainty exists as to when this will be achieved.

STATE NONPOINT SOURCE POLLUTION CONTROL PROGRAM

The purpose of California's Nonpoint Source Pollution Control Program Plan is to improve the state's ability to effectively manage nonpoint source pollution and to conform to the requirements of the federal Clean Water Act and the federal Coastal Zone Act Reauthorization Amendments of 1990. The plan was developed by staffs of the SWRCB and the California Coastal Commission in coordination with the RWQCBs and staffs from more than 20 other state agencies. The plan was submitted for final federal approval to the U.S. Environmental Protection Agency and the National Oceanic and Atmospheric Administration in February 2000 and was approved in July 2000.

STATE STORM WATER PROGRAM

California's storm water program is administered by the SWRCB's Division of Water Quality. NPDES permits, General Permits for Storm Water Discharges from Construction Activity, and other permits are issued as part of this program.

CENTRAL VALLEY RWQCB CONDITIONAL WAIVER FOR AGRICULTURAL DISCHARGES

Agricultural discharges are exempt from Clean Water Act requirements to obtain NPDES permits or waste discharge requirements (WDRs). Such discharges are not exempt from State waste discharge requirements, but have been allowed under conditional waivers of WDRs. The previously existing waiver expired on January 1, 2003, as a result of legislation adopted in 2002. Waivers may not extend for more than 5 years. The Central Valley RWQCB adopted a new 2-year conditional waiver that applies to irrigation return flows and storm runoff from agricultural fields. The conditional waiver requires agricultural interests to form watershed groups and conduct monitoring, with implementation of BMPs to follow. If they do not participate in watershed groups, individual agricultural dischargers are required to file a Notice of Intent with the RWQCB that provides details of a pollution management plan.

In addition, the conditional waiver requires:

- Demonstration that discharges of waste from irrigated lands shall not cause or contribute to conditions of pollution of nuisance, as defined.
- Demonstration that discharges of waste from irrigated lands shall not cause or contribute to exceedances of any regional, state, or federal numeric or narrative water quality standard.

The RWQCB decided to develop a 10-year implementation program to ensure that water quality standards are met, and undertook an associated EIR process.

CHANGES IN COORDINATED CVP/SWP OPERATIONS

Members of the California Water Policy Council and the California Federal Ecosystem Directorate (CALFED) signed the Framework Agreement in 1994. By signing this agreement, participants were committed to setting water quality standards for the Bay-Delta estuary, developing long-term solutions for the Bay-Delta, and coordinating CVP and SWP operations with requirements for endangered species, water quality, and the Central Valley Project Improvement Act. The CALFED Operations Group (Ops Group) coordinates water project operations with the requirements of the SWRCB's Decision 95-6, the biological opinions for the Delta smelt and winter-run salmon, and the CVPIA. The Ops Group oversees three areas of project operations:

- the adjustment of export limits to minimize take of endangered species or to improve fishery conditions in general;

- operation of the Delta Cross Channel; and
- changes in the point of diversion to improve fishery conditions or make up losses to water supply caused by previous operational changes to improve fishery conditions.

Moreover, the Bureau of Reclamation and Department of Water Resources coordinate integrated CVP/SWP operations to achieve Bay-Delta water quality standards, maximize water deliveries, and implement the CVPIA, including protection of fish and wildlife resources.

5.2.5 REGIONAL PLANNING ENVIRONMENT

Because the project would directly influence and be influenced by regional development activities, the "plan" approach was used to evaluate cumulative impacts on a regional scale. The regional cumulative analysis area covers San Joaquin County and includes an evaluation of the following plans:

- San Joaquin County General Plan 2010, adopted in 1992 and as amended (San Joaquin County 1992);
- San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) (San Joaquin County 2000);
- Manteca General Plan, adopted in 1988 and as amended through 2003 (City of Manteca 2003a);
- Manteca General Plan 2023 DEIR (City of Manteca 2003b); and
- 2001 Regional Transportation Plan (SJCOG 2001).

Much of the information on the overall planning and project environment in San Joaquin County was found in the SJMSCP, which evaluated current conditions and anticipated future development throughout the County based on the individual City and County General Plan documents listed above. Additional information on conditions in the County was obtained from San Joaquin Council of Government's (SJCOG's) Research and Forecasting Center (RFC). A summary of the cumulative planning environment in the County used for the regional cumulative impact analysis is provided below.

San Joaquin County covers approximately 909,000 acres with approximately 808,000 acres, or nearly 90% of the County, used or available for agriculture (row and field crops, orchards, vineyards, and grazing lands). The remaining lands are dominated by various types of urban development (approximately 60,000 acres), natural habitats (e.g., woodlands, riparian), and open water (e.g., lakes, rivers, Delta waterways). The County population in the year 2000 was approximately 563,600 (U.S. Census Bureau 2000b) with most County residents and development located in the incorporated cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton, and Tracy.

As stated in the SJMSCP, it is anticipated that 109,000 acres of various categories of open space lands (e.g., agriculture, natural areas, open space lands) in the County, including the City of Manteca, will be converted to nonopen space uses between the years 2001 and 2051 based on full buildout of each of the general plans in the County and construction of all anticipated transportation and other public projects. In addition, approximately 59,000 acres of infill developments would occur in this 50-year timeframe. Population in the County is also expected to more than double by 2040, increasing to 1.46 million (California Department of Finance 2004).

Residential development constitutes the majority of planned future developed uses in San Joaquin County. New residential development is expected to occur in four primary areas of San Joaquin County including incorporated cities (e.g., Escalon, Lathrop, Manteca, Stockton, Tracy), unincorporated areas near cities where services are available, new communities (e.g., Mountain House, New Jerusalem), and existing unincorporated communities (e.g., Acampo, Banta, Chrisman, Glennwood, French Camp, Lockeford, Linden, Thornton, Vernalis).

Commercial development would be concentrated in these same areas as well as along major transportation routes (SJMSCP 2000).

5.3 ANALYSIS OF CUMULATIVE IMPACTS

The following sections contain a discussion of the cumulative effects anticipated from project implementation along with the related projects and regional development for each of the thirteen environmental issue areas evaluated in this DEIR. The analysis conforms with Section 15130 of the State CEQA Guidelines, which specifies that the "discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great a detail as is provided of the effects attributable to the project alone."

5.3.1 LAND USE AND AGRICULTURAL RESOURCES

As described in Section 4.1 of this DEIR, implementation of the project would not physically divide a community or result in land use conflicts between the project area and adjacent land uses. Impacts involving land use plans or policies and zoning generally would not combine to result in cumulative impacts. The determination of significance for impacts related to these issues, as considered in Appendix G of the State CEQA Guidelines, is whether a project would conflict with any applicable land use plan or policy adopted for the purpose of reducing or avoiding environmental impacts. Such a conflict is site specific; it is addressed on a project-by-project basis. As described in Section 4.1, implementation of the project would not result in significant land use planning impacts, and the project would be consistent with City land use plans, policies, and zoning. Because no land use impacts would occur on a project-specific basis, the project would not contribute to any potential cumulative land use impacts.

Implementation of the proposed project would contribute incrementally to the cumulative conversion of Important Farmland to nonagricultural use in San Joaquin County. The incremental contribution of the project would be cumulatively significant.

Most of the land in San Joaquin County is in agricultural production. In the year 2004, San Joaquin County had a total of 624,115 acres of Important Farmland (California Department of Conservation 2007). Between the years 1990 and 2004, the total amount of Important Farmland in San Joaquin County decreased by 11,714 acres or approximately 2 percent (see Table 5-3). Prime Farmland and Farmland of Statewide Importance has decreased by 23,596 acres and 8,344 acres, respectively, since the year 1992. Designation of new areas as Unique Farmland and Farmland of Local Importance has resulted in net increases of 15,449 acres and 4,777 acres in these categories of farmland, respectively, since the year 1992.

Table 5-3
Acreages of Important Farmland in San Joaquin County

Land Use Category	1992	1994	1996	1998	2000	2004
Prime Farmland	436,146	434,476	433,134	429,168	419,227	412,550
Farmland of Statewide Importance	99,566	99,148	98,148	96,795	93,739	91,222
Unique Farmland	47,086	47,206	48,759	52,715	59,118	62,535
Farmland of Local Importance	53,031	54,267	53,479	53,682	58,906	57,808
Total	635,829	635,097	633,535	632,360	626,402	624,115

Source: FMMP 2007

The population of the City of Manteca has increased from 40,773 residents in the year 1990 to 49,258 residents in the year 2000 which equates to a net change of approximately 21% (City of Manteca 2003b). Population growth in both the City of Manteca and San Joaquin County as a whole is expected to continue in the future, as shown in Table 5-4, putting continued pressure on agricultural lands for conversion.

Table 5-4
Population Projections for the City of Manteca and San Joaquin County

Year	City of Manteca	San Joaquin County
2000	49,500	566,600
2005	56,874	633,348
2010	64,248	700,095
2015	71,622	766,843
2020	77,699	821,851
2025	86,370	900,338

Source: City of Manteca 2003b

With or without implementation of the proposed project, the trend of land conversion from agricultural uses to urban and other nonagricultural uses (including wildlife habitat enhancement) in the Central Valley would continue. In San Joaquin County, the acreage of remaining Important Farmland is expected to substantially decrease from approximately 630,000 in the year 2000 to 520,000 in the year 2040 and 270,000 in the year 2080 as a result of urbanization (San Joaquin County 2000).

It is likely that other future projects would convert agricultural lands to nonagricultural uses. These agricultural lands may or may not be designated Important Farmland and/or be under Williamson Act contracts. Because the majority of these future projects are not yet in the environmental planning stage, the acreage of Important Farmland that could be converted by these projects is not known. However, it can be expected from various projections that the acreage of Important Farmland in San Joaquin County will decline. The project would contribute incrementally to this decline.

The permanent conversion of 41 acres of Important Farmland in the project area to nonagricultural use is considered a cumulatively considerable (i.e., significant) impact when considered in connection with the significant cumulative losses that will occur as a result of the project, past farmland conversions, and planned future development in the City of Manteca, surrounding communities, and San Joaquin County as a whole. The City would contribute financial resources to assist in offsetting the conversion of Important Farmland. The city would use these agricultural mitigation resources to purchase conservation easements on agricultural lands and/or farmland deed restrictions thus providing greater protection to these farmlands in San Joaquin County. However, implementation of this measure would not fully mitigate the project's cumulatively considerable contribution to the loss of agricultural land in San Joaquin County; therefore, cumulative impacts would be significant and the project's incremental contribution would also be significant.

5.3.2 VISUAL RESOURCES

Past and current development in the project area has increasingly changed the visual character along SR 120, Airport Way, and Woodward Avenue from agricultural and open space uses to urban uses, thus altering and limiting the views available to motorists on these roadways. This trend would continue as future projects are implemented in the region and the project would contribute to this cumulative change in views. As development proceeds in the Manteca region as a whole, substantial changes in visual conditions would continue as agricultural lands and open space are replaced by urban development. Increased urban development would also lead to

increased nighttime light and glare in the region and more limited views of the night sky. The cumulative effect of these changes on visual resources from past and planned future projects, as well as the contribution from the project, is considered significant. Although these cumulative impacts can be minimized to a degree through vegetative and topographic screening of structures, use of downward emitting outdoor lighting, appropriate building design, and other measures, the significant cumulative impact cannot be fully mitigated. Therefore, the cumulative change of agricultural and open space views in the project region to urban land uses and the associated increase in nighttime light and glare are considered cumulative significant and unavoidable impacts. In addition, the project's incremental contribution to these impacts is cumulatively considerable.

5.3.3 AIR QUALITY

The project would result in a significant and unavoidable cumulative impact related to short-term construction emissions after implementation of mitigation measures identified in Section 4.3, "Air Quality." For future development projects, assuming all related projects identified in Section 5.2.2, "List of Related Local Projects," plus other development in the air basin also implement all feasible construction emission control measures consistent with San Joaquin Valley Air Pollution Control District (SJVAPCD) Guidelines (SJVAPCD 2002), construction emissions on a project-by-project basis could be less than significant. However, the related projects taken in total and combined with the nonattainment status of the San Joaquin Valley Air Basin (SJVAB) for ozone and respirable particulate matter (PM_{10}) would nonetheless result in a significant and unavoidable cumulative construction-related air quality impact. Therefore, the project's incremental contribution would also be significant and unavoidable.

While there is a potential for odors to occur at the WQCF site from operation of WQCF facilities, compliance with industry standard odor control practices and SJVAPCD Rule 4102 (Nuisance) would limit potential odor impacts. It is assumed that other future project would also be required to comply with adopted odor-control requirements. Design of the WQCF would incorporate all feasible odor control technologies to reduce the potential for the exposure of sensitive receptors to odors. However, the project's odor impacts were determined to be significant and unavoidable because it is not possible to determine if odor control technologies would reduce the number of odor complaints to less than one per year on average. Further, no additional odor reduction measures are feasible. While the project would result in a significant and unavoidable odor impact, odor impact issues are site specific. Because other future projects would be expected to comply with adopted odor-control requirements, cumulative odor impacts would be less-than-significant and the project's contribution would not be considerable.

The project would generate a trip increase that is less than 1.0% of existing traffic volumes on local area roadways and would not decrease the LOS of these roadways. Therefore, the project would not contribute to CO concentrations that exceed the CAAQS of 9.0 ppm for 8 hours or 20 ppm for 1 hour. As a result, cumulative mobile-source CO concentrations would be less than significant and the project's contribution would not be considerable.

The project's contribution to long-term cumulative increases in construction-related equipment or stationary source TAC concentrations would be minor and less than significant because construction emissions would be temporary and would rapidly dissipate with distance from the source and proposed operations would not result in the exceedance of the SJVAPCD's screening criteria for project's resulting in significant TAC emissions. Because all other TAC issues are site specific, the project would not result in a considerable contribution to any regional TAC impacts.

Operational emissions of the project would not exceed SJVAPCD's significance thresholds for reactive organic gasses (ROG) and nitrogen oxides (NO_X) (10 tons per year). Based on the modeling conducted, operation-related activities would not result in total project-generated emissions of ROG or NO_X that exceed SJVAPCD's significance threshold of 10 tpy. Thus, project-generated, operation-related emissions of criteria air pollutants and precursors would not violate or contribute substantially to an existing or projected air quality violation, expose

sensitive receptors to substantial pollutant concentrations, or conflict with air quality planning efforts. Although emissions from other reasonably foreseeable future projects in the SJVAB as a whole, would continue to contribute to long-term increases in emissions that would exacerbate existing and projected nonattainment conditions, the project's emissions of ozone precursors (i.e., ROG and NO_X) and PM would not result in a considerable contribution to any regional criteria air pollutants or ozone precursor impacts.

5.3.4 NOISE

Construction activities occurring during daytime hours are exempt from the provisions of the city's noise ordinance if all construction equipment is fitted with factory installed muffling devices and maintained in good working order. The noise impact analysis conducted in this DEIR (see Section 4.4, "Noise") determined that adherence to these noise regulations and implementation of Mitigation Measure 4.4-1 would be sufficient to avoid significant construction noise impacts. Construction noise sources associated with related projects would also be considered exempt during daytime hours, but there is no guarantee that all construction equipment associated with related projects would incorporate similar noise restricting devices. Therefore, cumulatively significant noise impacts associated with construction noise sources could occur. However, the project would not result in significant construction noise impacts and would not contribute to any cumulatively significant noise impacts because all noise from project-related construction activities would be consistent with the city's noise ordinance.

Transportation related noise has the potential to extend beyond project areas along existing roadways and result in less-than-significant traffic noise impacts to sensitive land uses (i.e., residential) located along these roadways. As described under Impact 4.4-2, "Long-Term Increases in Traffic Source Noise Levels," project implementation would not result in a noticeable change in the traffic noise contours of area roadways and long-term increases in traffic source noise levels would not result in the exposure of persons to or generation of noise levels in excess of applicable standards or create a substantial permanent increase in ambient noise levels at existing noise-sensitive receptors. This is considered a less-than-significant cumulative traffic noise impact and the project's contribution would not be cumulatively considerable.

Construction-related temporary ground vibration associated with the project and related projects could potentially result in exceeding FTA's maximum-acceptable vibration standard of 80 VdB with respect to human response for residential uses (i.e., annoyance) at vibration-sensitive land uses. However, mitigation is recommended to reduce the project's ground vibration impacts to a less-than-significant level by limiting activities that would generate vibrational noise within 60 feet of occupied residences. Ground vibration originating from related project construction areas would likely be required to implement similar mitigation to reduce the effects of ground vibration. Therefore, this would be a less-than-significant cumulative ground vibration impact and the project's contribution would not be cumulatively considerable.

5.3.5 TERRESTRIAL BIOLOGICAL RESOURCES

Most of the native vegetation in the project area and the larger region has been lost over the past 150 years, primarily as a result of conversion to agricultural and urban land uses. This habitat conversion has substantially affected numerous plant and wildlife species, resulting in various species being listed as threatened or endangered under the California and federal Endangered Species Acts; although, some species that use agricultural habitats and others that can thrive in developed areas have benefited. Future conversions of open space lands in San Joaquin County would primarily consist of converting agricultural lands to residential and urban development.

The SJMSCP anticipates conversion of up to approximately 109,000 acres of open space land to nonopen space uses in the County between 2001 and 2051. The proposed project and related projects in the city would contribute to this countywide conversion. The SJMSCP was developed to minimize and mitigate impacts on plant and wildlife habitat (and associated species) resulting from this regional loss of open space lands. The SJMSCP relies, in part, on compensation for such conversion through preservation of agricultural lands and preservation and creation of natural habitats to be managed in perpetuity through the establishment of conservation easements and

preserves. The goal of the SJMSCP is to provide approximately 101,000 acres of agricultural and habitat preserve; the SJMSCP concludes that this would adequately compensate for cumulative impacts on plant and wildlife species covered by the plan. Because the SJMSCP potentially provides a streamlined mechanism to mitigate impacts on resources covered under the plan (such as special-status bird species, special-status plant species, vernal pool crustaceans, California tiger salamander, western spadefoot toad, and giant garter snake), it is assumed that most qualifying projects within the County would use the SJMSCP for mitigation. Therefore, cumulative impacts on terrestrial biological resources covered under the SJMSCP are considered less than significant.

Biological impacts resulting from the proposed project that are not expected to be compensated for by coverage under the SJMSCP are the loss of protected trees and impacts to sensitive habitats. Mitigation Measures 4.5-9 and 4.5-10 would fully compensate for the loss of protected trees and sensitive habitats. It is assumed that mitigation requirements would be applied to all related projects that may affect protected trees and sensitive habitats; therefore, no cumulative net loss of protected trees and sensitive habitats should occur. Therefore, potential cumulative impacts on protected trees and sensitive habitats are considered less than significant. Because the City would participate in the SJMSCP and would implement mitigation measures to compensate for the loss of protected trees and sensitive habitats, the proposed project and related projects would result in less-than-significant cumulative impacts on terrestrial biological resources. .

5.3.6 HAZARDS AND HAZARDOUS MATERIALS

The proposed project and related projects would all involve the storage, use, disposal, and transport of hazardous materials to varying degrees during construction and operation. Impacts related to these activities are considered less than significant under the project because the storage, use, disposal, and transport of hazardous materials are extensively regulated by various federal, state, and local agencies and it is assumed that related projects would also comply with these hazardous materials regulations. Because all of the project's hazards and hazardous materials impacts would be less than significant, no mitigation measures are required. Therefore, significant hazards to the public would not occur. Because these laws and regulations would also apply to each related project, this impact would be considered less than significant on both an individual project and cumulative basis.

5.3.7 GEOLOGY, SOILS, AND SEISMICITY

Various areas in the City of Manteca and the project region are subject to ground shaking, liquefaction, lateral spreading, settlement, levee failure, and other seismically induced hazards. Although the city is located in an area of low seismic activity, faults in the greater San Joaquin Valley could cause moderate ground shaking throughout the region. In addition, expansive soils underlay portions of the project area. Expansive soils could over time damage building foundations, underground utilities, and other subsurface facilities. Implementation of related projects could expose additional structures and people to seismic hazards and unstable soils. The potential seismic and soil hazards in the City of Manteca, therefore, could represent a significant cumulative impact if projects are not developed to the latest building standards and do not incorporate recommendations from site-specific geotechnical reports and grading/erosion plans prepared for these projects.

As discussed in Section 4.7, "Geology, Soils, and Seismicity," the project area would be exposed to potentially significant seismic hazard impacts and expansive soils impacts. However, these impacts would be mitigated to less-than-significant levels through completion of site-specific geotechnical studies and implementation of construction and design measures developed in response to the studies. Each related project must individually meet building code requirements; therefore, additive effects would not result from the combination of the related projects and the proposed project. Implementation of the project would not create additional facilities under increased risk of hazards and would not result in any cumulatively considerable incremental contributions to any significant cumulative impacts. This would be a less-than-significant cumulative impact.

5.3.8 PALEONTOLOGICAL RESOURCES

Cumulative impacts to paleontological resources are based on analysis of past, present, and reasonably foreseeable future actions in the vicinity of the proposed project in combination with potential effects of implementing the project. Paleontological resources in project area and vicinity would be located within sediments of the Modesto Formation, which is a rock unit of high paleontological sensitivity under the Society of Vertebrate Paleontology guidelines. A vertebrate fossil site at Littlejohns Creek (UCMP V-5107) has been recorded in sediments of the Modesto Formation within two miles of the project area. This site yielded 7 specimens from Rancholabrean-age Columbian mammoth, horse, and an unidentified carnivore. Another vertebrate fossil specimen (Rancholabrean-age Columbian mammoth) was recovered from sediments of the Modesto Formation in the City of Lathrop, 3 miles west of the WQCF site. Previous development activities disturbed, destroyed, or compromised numerous paleontological resources. This would be a cumulatively significant impact. However, because no significant paleontological resources have been identified within the project area, the project's incremental contribution would not be considerable and this would be less-than-significant cumulative impact.

5.3.9 HYDROLOGY AND WATER QUALITY

SURFACE WATER QUALITY

The proposed project and other related projects would require use of a storm water pollution prevention plan to ensure compliance with future applicable storm water discharge permits. These and related actions (e.g., implementation of BMPs) that would be taken would ensure that future construction and operation of the WQCF facilities and control of stormwater runoff would result in less-than-significant cumulative stormwater quality impacts in adjacent water bodies.

Numerous future projects, actions, and programs will be implemented over the next 20 years that will affect Delta water quality. Key factors that will affect further Delta water quality include, but are not necessarily limited to the following:

- Urban growth and other land use changes and associated runoff,
- Agricultural practices and regulations intended to control agricultural pollutant runoff,
- System-wide hydrology as affected by diversions and Central Valley Project/State Water Project operations,
- Mine drainage controls, and
- Point-source discharges.

The collective effects on surface water quality within the project vicinity (i.e., downstream of the outfall) is not possible to know at this point. While some water quality effects may be adverse, a number of regulatory programs (as discussed above) will improve water quality. Although there are numerous ongoing and future State programs that are intended to improve Delta water quality, planned and approved growth will continue to occur in the Sacramento metropolitan area and communities throughout the Sacramento River and Delta watersheds over the next two decades. The increase in size of the urban area will likely lead to increased discharges of treated wastewater to the San Joaquin River and Delta, increased urban runoff, and possibly greater volumes of storm water runoff due to increased amounts of impervious area within the watershed. Programs and regulations that affect water quality are becoming increasingly stringent, which may offset, in whole or in part, these changes. Also, project-specific urban runoff and storm water discharge mitigation measures will be required as planned growth occurs.

It should be acknowledged that the regulatory system under the CWA is geared to prevent significant adverse changes in water quality. Further, TMDL programs are intended to result in net reductions in pollutant concentrations that exceed the "assimilative capacity" of the affected waterway. Thus, it could be argued that regulatory requirements will result in improved water quality in the future for listed parameters in listed water

bodies. The results of monitoring will be used to assess trends in important water quality parameters, and the results of that work would be used in the CEQA process and in regulation of future projects/controllable factors affecting water quality to assure that water quality and beneficial uses are protected in accordance with the mandates of the CWA and the California Water Code.

All of the project's water quality impacts were determined to be less-than-significant because effluent concentrations of water quality constituents would either be below existing adopted Basin Plan objectives or would below levels that have been determined to be protective of water quality. The project and related projects would be required to comply with NPDES permit limits from the RWQCB, which are, in turn, based on the lowest criteria determined to be protective of beneficial uses. In consideration of the existing water quality policies, standards, and programs in place to protect and improve water quality of the San Joaquin River and Delta and that the project would result in less-than-significant impacts to water quality for all constituents evaluated, cumulative water quality effects would be less than significant and the project's incremental contribution would not be considerable.

GROUNDWATER SUPPLY AND QUALITY

The City is a participant in the South San Joaquin Irrigation District (SSJID) South County Surface Water Supply Project (SCSWSP), designed to ultimately reduce the City's dependence on groundwater resources which have historically been overdrafted. As a result, it is anticipated that providing potable water needed to serve land uses associated with the project would result in less-than-significant impacts to groundwater resources. However, cumulatively significant impacts could occur because of overdrafting or an increase of salinity intrusion resulting from cumulative groundwater usage by entities other than the City of Manteca. The City of Manteca would continue to limit its contribution to this impact by limiting its own groundwater usage to what has been determined to be sustainable levels. Despite the City of Manteca's limitations on its own groundwater usage, groundwater impacts could be cumulatively considerable because the city cannot be certain that other groundwater users would similarly limit their own groundwater usage to sustainable levels. Implementation of the proposed project would contribute to this cumulatively significant impact. No feasible mitigation is available.

SURFACE DRAINAGE

Other projects in the city would be required to construct stormwater conveyance and detention facilities to control surface runoff. All stormwater management systems constructed to serve individual projects would be required to comply with the policies of the city's drainage master plans. In addition, cumulative impacts from related projects would undergo separate environmental review to ensure that adequate stormwater conveyance facilities would be constructed to serve those projects. Therefore, it is anticipated that future development would result in less-than-significant cumulative stormwater conveyance impacts. The project would direct stormwater to the on-site stormwater system at the WQCF and to the neighborhood stormwater systems where proposed wastewater pump stations would be located. These stormwater facilities could adequately accommodate the minor volumes of stormwater generated by proposed facilities. As a result, cumulative stormwater impacts would be less than significant and the project's contribution would not be considerable.

FLOOD CONTROL

The project area is located outside the 100-year floodplain. Therefore, the project would not contribute to a cumulative increase in flood elevations through the removal of areas from the 100-year floodplain. This would be a less-than-significant cumulative impact.

5.3.10 PUBLIC SERVICES AND UTILITIES

The City of Manteca is responsible for ensuring that water and wastewater services are adequately provided within its jurisdictional boundaries. The City general plan identifies goals and policies associated with providing

water, wastewater, and stormwater flow. The 2000 Urban Water Management Plan and City of Manteca Sewer Master Plan provides for all the water and wastewater needs for cumulative development in the city.

WATER SUPPLY

In 2002, the City completed the 2000 Urban Water Management Plan, which plans for the provision of adequate water supply, storage, and delivery for the city. It is assumed that the development of related projects, and/or the development of the additional utility systems required to serve them, would be preceded by the required environmental impact review as required by CEQA. However, it cannot be assumed that all potential environmental impacts associated with the development of the additional water capacity and infrastructure required to serve related projects would necessarily be mitigated to less-than-significant levels. Therefore, potentially significant cumulative utilities impacts could occur related to water supply and treatment capacity.

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 SSJID's SCWSP. Deliveries from the SCWSP began in the year 2005 and, assuming normal precipitation years, will range from 11,500 acre feet per year (AFY) in the year 2005 to 18,500 AFY after development of a subsequent phase. It is projected that future water demand (i.e., project plus existing plus future cumulative development) would range from 15,270 AFY in the year 2005 to 35,000 AFY in the year 2025. Future water supply available to the City from groundwater sources and the SCWSP would be adequate to meet future water demand during all horizon (2005, 2010, 2015, 2020, 2025) years. Therefore, the project and future related projects would not result in a significant cumulative impact related to water supply and the project would not result in any cumulatively considerable incremental contributions to any significant cumulative water supply impacts.

WASTEWATER

The City of Manteca WQCF Master Plan (2007) defines sewer facilities required to meet the city's level of service standard for serving future development. It is assumed that the development of future related projects and/or development of additional utility systems required to serve future projects would undergo environmental review as required by CEQA. However, it cannot be assumed that all potential environmental impacts associated with development of additional wastewater capacity and infrastructure required to serve these related projects would necessarily be mitigated to less-than-significant levels. Therefore, potentially significant cumulative utilities impacts could occur related to wastewater treatment and disposal capacity expansions, as needed, and the project's contribution to this significant cumulative impact would be cumulatively considerable.

SOLID WASTE DISPOSAL

Solid waste generated by development projects in the City of Manteca is disposed of at the Forward Landfill which has an estimated capacity to accept solid wastes through 2017. The proposed project and all cumulative projects create a demand for hauling solid wastes and the need for someplace to dispose of solid wastes. Although the project contributes to a cumulative need for solid waste disposal, the Forward Landfill has sufficient capacity to serve the cumulative projects for at a minimum of 10 years. Therefore, the project's contribution to solid waste disposal services is considered a less-than-significant cumulative impact.

FIRE PROTECTION

Recent approval of Measure M increased the sales tax rate in the City of Manteca to provide funding for necessary public services including funding for additional fire protection services. The proposed project and cumulative projects create an increased demand for fire protection services. Although the project contributes to a cumulative need for fire protection in the city, the Manteca Fire Department has indicated that fire protection services are sufficient to meet the needs of all development in the city from existing and future facilities and personnel because of additional funding that is made available from the approval of Measure M (see Section 4.10,

"Public Services and Utilities"). Therefore, the project's contribution to the need for fire protection services is considered a less-than-significant cumulative impact.

POLICE SERVICES

Recent approval of Measure M increased the sales tax rate in the City of Manteca to provide funding for necessary public services including funding for additional law enforcement services. The proposed project and cumulative projects create an increased demand for law enforcement services. Although the project contributes to a cumulative need for law enforcement in the city, the Manteca Police Department has indicated that police facilities and personnel are sufficient to meet the needs of all development in the city because of additional funding that is made available from the approval of Measure M (see Section 4.10, "Public Services and Utilities"). Therefore, the project's contribution to the need for law enforcement services is considered a less-than-significant cumulative impact.

5.3.11 TRANSPORTATION AND CIRCULATION

The project would slightly increase traffic volumes on local area roadways. As described under Impact 4.11-2, the project would generate 20 one-way employee passenger vehicle trips per day and less than one truck haul trip per day. These trips are less than 1.0 % of existing traffic volumes on local area roadways and would not decrease the LOS of these roadways. Conditions would be essentially the same with and without the project. This is considered a less-than-significant cumulative transportation and circulation impact and the project's contribution would not be cumulatively considerable.

5.3.12 CULTURAL RESOURCES

Cumulative impacts to historic and unique archaeological resources are based on analysis of past, present, and reasonably foreseeable future actions in the vicinity of the proposed project in combination with potential effects of implementing the project. In general, archaeological resources in San Joaquin Valley result from thousands of years of human occupation. Previous development activities disturbed, destroyed, or compromised numerous archaeological resources and also resulted in a degradation of the historic fabric and integrity of the rural farming and ranching landscape surrounding the City of Manteca. This would be a cumulatively significant impact. However, because no significant historic properties or unique archaeological resources have been identified within the project area, the project's incremental contribution would not be considerable and this would be less than significant cumulative impact.

5.3.13 FISHERIES AND AQUATIC RESOURCES

At full build-out (capacity increase to 27 mgd) and under conservative worst-case conditions, the proposed project would result in an increased thermal plume size and changes in certain aspects of the plume's internal characteristics (e.g., temperature contours) and/or the frequency with which specific characteristics would occur, relative to the existing (permitted - 9.87 mgd) condition. This was determined to be a significant impact. However, mitigation recommended for the project (see Mitigation Measure 4.13-2) would require the City to construct cooling towers to cool a portion of the WQCF effluent prior to its discharge to the San Joaquin River. With implementation of this mitigation, the temperature of the effluent would be minimized, and the project's fishery impacts would be reduced to a less-than-significant level.

For present and future water quality projects, assuming all related projects identified in Section 5.2.3, "List of Related Water Quality Projects," plus other water quality control projects in the Delta also implement all feasible thermal control measures, thermal impacts to the Delta on a project-by-project basis would be less than significant. Therefore, this would be a less-than-significant cumulative fishery resource impact and the project's contribution would not be considerable.

6 OTHER CEQA REQUIRED SECTIONS

6.1 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

CEQA Section 21100(b)(2)(A) states that an EIR shall include a detailed statement setting forth "in a separate section: any significant effect on the environment that cannot be avoided if the project is implemented." Chapter 4 of this DEIR provides a detailed analysis of all potential significant environmental impacts of the project, feasible mitigation measures that could reduce or avoid the project's significant impacts, and whether these mitigation measures would reduce these impacts to less-than-significant levels. Chapter 5, "Cumulative Impacts," identifies the significant cumulative impacts of the project. If a specific impact cannot be reduced to a less-than-significant level, it is considered a significant and unavoidable impact. Significant unavoidable environmental impacts (direct, indirect, and cumulative) of the proposed project include:

6.1.1 PROJECT IMPACTS

IMPACT 4.1-3: Land Use and Agricultural Resources—Conversion of Important Farmland to Nonagricultural Use. Implementation of the proposed project would result in the conversion of approximately 41 acres of Prime Farmland and Farmland of Statewide Importance to nonagricultural use. Conversion of agricultural land would be a **significant** impact.

Implementation of Mitigation Measure 4.1-3 would substantially reduce the project's agricultural resource impact, but this measure would not eliminate the project's Important Farmland impact to a less-than-significant level. Therefore, this impact would be considered significant and unavoidable.

IMPACT 4.3-1: Air Quality—Generation of Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors. Modeled short-term project-generated emissions from construction equipment for projects constructed during Phase 1(2008 to 2010 based on construction projections presented in Table 3-4) would exceed SJVAPCD's significance threshold of 10 tpy and project applicable SJVAPCD-required and other control measures for fugitive dust are not currently part of the project description. Project-generated, construction-related emissions of criteria air pollutants and precursors could violate or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, especially considering the nonattainment status of San Joaquin County, and/or conflict with air quality planning efforts. As a result, this impact would be **significant**.

Implementation of Mitigation Measure 4.3-1 would result in the required minimum 20% reduction in NO_X emissions and a 45% reduction in PM_{10} emissions from heavy-duty diesel equipment, as compared with statewide average emissions. In addition, implementation of this measure would also result in a 5% reduction in ROG emissions from heavy-duty diesel equipment, and would reduce temporary, short-term, construction-related emissions of ROG and NO_X generated by the proposed project, but not to a less-than-significant level, as emissions would still exceed SJVAPCD's significance thresholds. As a result, this impact (generation of construction-related NO_X emissions) would remain significant and unavoidable.

IMPACT 4.3-5: Air Quality—Exposure of Sensitive Receptors to Odors. The WQCF is known to produce odors and there has been at least one confirmed compliant per year over a three year period. While the design of the project incorporates all feasible odor control technologies to reduce project-generated odors, it is unknown whether these technologies would limit odor complaints to less than one per year, which is the significance standard used by the SJVAPCD for significant odor problems. No other feasible odor control technologies are available to reduce the intensity of odors at the City of Manteca Wastewater Quality Control Facility (WQCF) site and that would guarantee that odor complaints would be limited to one per year. Therefore, this impact would be **significant and unavoidable.**

Design of the WQCF would incorporate all feasible odor control technologies to reduce the potential for the exposure of sensitive receptors to odors. However, at this time it is not possible to determine if these measures would reduce the number of complaints to less than one per year averaged over three years. No further odor reduction measures are feasible, and the impact would remain significant and unavoidable.

6.1.2 CUMULATIVE IMPACTS

As indicated in Chapter 5, "Cumulative Impacts," project implementation would result in direct and indirect cumulatively considerable incremental contributions to significant cumulative impacts related to agriculture, visual resources, and air quality. No additional feasible mitigation is available for the cumulative impacts identified. Because these impacts are a product of cumulative growth, and because no feasible mitigation is available to reduce these impacts to less-than-significant levels, these significant impacts cannot be avoided and thus represent significant and unavoidable adverse impacts.

6.2 SIGNIFICANT IRREVERSIBLE AND ENVIRONMENTAL CHANGES

CEQA Section 21100 (b)(2) states that an EIR shall include a detailed statement setting forth "[i]n a separate section…[a]ny significant effect on the environment that would be irreversible if the project is implemented." However, a discussion of significant irreversible environmental effects need only be included in EIRs for three types of projects as listed in CEQA Section 21100.1. Specifically, CEQA Section 21100.1(a) requires that a discussion of significant irreversible environmental effects be included in an EIR prepared in connection with "[t]he adoption, amendment, or enactment of a plan, policy, or ordinance of a public agency." Because the project is a master plan update for the expansion of the City of Manteca WQCF and a master plan update for the expansion of the City's wastewater collection system proposed for adoption by the City of Manteca, a discussion of significant irreversible environmental changes is provided in this section.

State CEQA Guidelines Section 15126.2 (c) provides the following guidelines for analyzing the significant irreversible environmental changes of a project:

> Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible because a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvements which provide access to a previously inaccessible area) generally commit future generations to similar uses. Also irreversible damage can result from an environmental accident associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified.

The irreversible and irretrievable commitment of resources is the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled or those that are consumed or reduced to unrecoverable forms. The proposed project would result in the irreversible and irretrievable commitment of energy and material resources during project construction, operation, and maintenance, including the following:

- construction materials, including such resources as rocks, wood, concrete, glass, and steel;
- human labor for project construction;
- land area committed to new project facilities;
- conversion of agricultural land to urban uses; and
- energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction and operation.

The use of these nonrenewable resources is expected to account for a minimal portion of the region's resources and would not affect the availability of these resources for other needs within the region. Long-term operational energy and natural resource consumption is expected to be significant, although it would not exceed the capacity of energy suppliers to meet local demand once the new infrastructure is in place. Construction activities would not result in inefficient use of energy or natural resources. Construction contractors selected would use best available engineering techniques, construction and design practices, and equipment operating procedures. Because implementation of the proposed project would result in substantial long-term consumption of energy and natural resources, these potential irreversible changes would be significant.

Further, the project would result in the permanent conversion of approximately 14 acres of Important Farmland to nonagricultural use (i.e., public/quasi-public land uses). As described in Section 6.1, "Significant Unavoidable Adverse Impacts," this would be a significant and unavoidable irreversible environmental change.

6.3 GROWTH INDUCEMENT AND SECONDARY EFFECTS OF GROWTH

6.3.1 INTRODUCTION

The State CEQA Guidelines (Section 15126[d]) require that an EIR evaluate the growth-inducing impacts of a project. Growth-inducing impacts are described in Section 15126.2(d) as follows:

> [T]he ways in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth…. Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects…. [In addition,] the characteristics of some projects…may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

Included in this definition are public works projects that would remove obstacles to population growth. Direct growth inducement would result if a project, for example, involved the construction of new housing. Indirect growth inducement would result, for example, if project implementation resulted in any of the following:

- substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises);
- a construction effort with substantial short-term employment opportunities that indirectly stimulates the need for additional housing and services to support the new temporary employment demand; and/or
- removal of an obstacle to additional growth and development, such as removing a constraint on a required public utility or service (e.g., construction of a major sewer line with excess capacity through an undeveloped area).

Growth inducement may lead to adverse environmental impacts if the induced growth is not consistent with or accommodated by the land use plans and growth management plans and policies for the area affected and thus would lead to adverse physical effects that might not occur otherwise. Local land use plans provide for land use development patterns and growth policies that encourage orderly urban development supported by adequate urban public services such as water supply, roadway infrastructure, sewer services, and solid waste services. A project that would induce "disorderly" growth (i.e., growth that would conflict with the local land use plans) could indirectly cause additional adverse environmental impacts and other public services impacts.

Growth in itself does not have physical environmental impacts and is thus not treated as an environmental resource; however, growth may foreseeably lead to physical environmental effects, which could include increased demand for public services, increased traffic and noise, degradation of air or water quality, or conversion of agricultural and open space land to urban uses.

6.3.2 GROWTH INDUCEMENT POTENTIAL

The 2007 WQCF master plan was finalized in January 2007 and the 2006 collection system master plan is in draft form. The master plans identify wastewater treatment and conveyance improvements to support development envisioned in the City general plan up to the secondary urban service boundary (buildout). City buildout is anticipated to occur by the year 2023.

The purpose of the 2007 WQCF master plan and the 2006 collection system master plan are to provide the City with direction and policy guidance for planning future wastewater collection system and treatment facilities that are essential for meeting changing environmental regulations and future growth demands. The overall goal of the two plans is to provide a phased program of recommended conveyance systems and treatment facilities to accommodate planned growth while maintaining treatment reliability, meeting applicable regulatory requirements, and optimizing costs. In December 2005, wastewater flows at the City of Manteca WQCF averaged approximately 6.0 mgd ADWF. The existing permitted capacity of the WQCF is 9.87 mgd ADWF. Expected buildout ADWF within the areas served by the City of Manteca WQCF is projected to be 27 mgd. As wastewater flows and loads increase, additional conveyance system capacity and treatment facilities would be required.

The 2007 WQCF master plan and 2006 collection system master plan (master plans) would not support or stimulate growth that is inconsistent with the City general plan. The master plans would support planned growth in the urban areas as approved by the City general plan. The master plans would not alter the location or amount of growth and development envisioned under the approved City general plan nor would they dictate the timing of this growth. Because the project involves the extension of wastewater collection service to areas not currently served by the existing wastewater collection system, new areas would be provided direct sewer service as a result of the project. However, the location of future growth would continue to be controlled by the City general plan. The planned incremental expansion of the WQCF facilities and wastewater collection system pipelines would allow treatment capacity to expand as growth occurs. The City of Manteca would routinely assess actual growth and revise near-term growth projections to determine when the next phase of WQCF and wastewater collection system expansion as described in the master plans is appropriate. Therefore, implementation of the proposed project would not induce “disorderly” growth.

As described in Section 3, “Project Description,” the project would involve a substantial construction effort over two approximately 24 month periods (see Table 3-4, “WQCF and Collection System Master Plan Projects”). Project construction would bring approximately 80 construction workers to the project area on a daily basis during peak periods. Because construction workers typically do not change where they live each time they are assigned to a new construction site, it is not anticipated that there would be any substantial relocation of construction workers to the City of Manteca associated with the project. The existing number of residents in the City and County who are employed in the construction industry would likely be sufficient to meet the demand for construction workers that would be generated by the project. Therefore, no substantial increase in demand for housing or goods and services would be created by project construction workers, and thus no growth inducement associated with these workers would occur.

The project is estimated to generate 14 employees by project buildout. The 2000 jobs-housing index for San Joaquin County and the City of Manteca was 1.22 and 1.34, respectively, indicating an imbalance between housing (i.e., reflected as employed residents) and jobs, with housing growth outpacing employment growth (City of Manteca 2003). Because of the few number of employment opportunities generated by the project and the “housing rich” index for the City of Manteca, these jobs are anticipated to be filled in large part by the existing

resident labor pool in the City and region. Therefore, the project is not anticipated to spur significant population growth or need for additional housing.

Implementation of the proposed project would expand wastewater collection service into rural areas of the city (Exhibit 3-3). As the proposed project develops, it would help facilitate the placement of urban development adjacent to agricultural land. Historically, this type of land use pattern results in conflicts between the ongoing agricultural operations and the urban development uses. Further, economic returns from urban development are typically substantially higher than continued agricultural use of land, and encroaching urban uses typically make attractive the conversion of adjacent agricultural land to urban uses. Thus, it can be expected that the proposed project would place pressure on agricultural land near wastewater collection system alignments in the northern and southern portions of the city to convert to urban uses. Conversion of lands for urban uses is consistent with the long-term planning for the project area as identified in the City's General Plan. Wastewater treatment service is one of the chief public services needed to support urban development. Implementation of the proposed Manteca WQCF and Collection System Master Plans would increase the WQCF's wastewater treatment and disposal capacity to serve additional urban growth that is planned and anticipated to occur within the area it serves. The City's provision of expanded wastewater treatment and disposal capacity would remove an obstacle to further urban development and population growth in the Manteca area. Therefore, the long-term urbanization of these areas would be considered a reasonably foreseeable indirect effect of the proposed project. (See State CEQA Guidelines Section 15358 [defines "effects" for purposes of CEQA as including "[i]ndirect or secondary effects which are caused by the project and are later in time or farther removed in distance, but are still reasonably foreseeable"] [emphasis added].). Overall, the proposed project would be growth inducing for the reasons described above.

6.3.3 SECONDARY EFFECTS OF GROWTH

Because the proposed project would support planned growth as allowed for by the City general plan, it would indirectly result in secondary environmental effects of growth that are associated with the adopted City general plan. These secondary effects of planned growth are addressed in the City general plan and associated EIR. A summary of potential secondary effects of planned growth is presented below, based on a review of the general plan and associated EIR.

TRAFFIC AND CIRCULATION

With respect to traffic and circulation, new patterns of development could result in significant traffic pattern and land use compatibility changes. To prevent leapfrog development and mitigate potential impacts on traffic patterns, the City has adopted policies that prohibit approval of land use projects that result in non-contiguous development.

The City general plan EIR indicates that planned development would result in unacceptable service levels on various roadways. The City adopted several policy measures to address traffic impacts including demand management policies and level of service (LOS) standards for new development. The EIR indicates traffic congestion within the City's roadway system would be less than significant with implementation of recommended mitigation measures.

WATER SUPPLY

The City general plan EIR indicates surface and groundwater supplies may not be available to serve planned growth within the City's service area. However, the City has adopted several policy measures to address water supply impacts, including the development of new water sources to serve new development, and the maintenance of adequate levels of service in the City's water system to meet the needs of existing and new development. The City has also adopted a water conservation policy. The EIR indicates water supply impacts would be less than significant with implementation of recommended mitigation measures.

AGRICULTURAL LAND, OPEN SPACE, AND HABITAT

While the City has adopted various policies to avoid and minimize the impact of development on agricultural lands, the general plan EIR indicates development as planned could result in a decrease in the viability of continuing agricultural production in City's service area. No feasible mitigation measures were proposed and the EIR acknowledged this potential impact as significant and unavoidable.

The EIR also acknowledged that planned development would result in the conversion of open space to urban land uses and increased demand for parks. Feasible mitigation was identified in the EIR to reduce impacts on parklands to a less-than-significant level.

With respect to habitat impacts, planned development could eliminate or render unsuitable habitat for special status wildlife species. The conversion of undeveloped land to developed uses would contribute to the regional loss of various habitats that may support species which may become rare.

AIR QUALITY

The general plan EIR indicates that planned development would result in increases of both stationary and area source emission rates and mobile source emission rates relative to the California Air Resources Board year 2010 emission projections for nonattainment pollutants. The City has adopted several policies to mitigate air quality impacts; however, air quality impacts associated with planned growth in the City's service area remain significant and unavoidable.

7 ALTERNATIVES TO THE PROPOSED PROJECT

State CEQA Guidelines Section 15126.6(a) requires an evaluation of "a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The project objectives are stated in Section 3.5, "Project Objectives", of this Draft EIR. Alternatives are used to determine whether or not a variation of the project would reduce or eliminate, significant project impacts, within the basic framework of the objectives. State CEQA Guidelines Section 15126.6(f) specifies that the range of alternatives is governed by the "rule of reason," requiring evaluation of only those alternatives "necessary to permit a reasoned choice." The choice of alternatives shall be "limited to ones that would avoid or substantially lessen any of the significant effects" of implementing the proposed project (State CEQA Guidelines Section 15126.6[f]). Further, an EIR "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (State CEQA Guidelines Section 15126.6[f][3]).

State CEQA Guidelines Section 15126.6(e) requires that, among other alternatives, a "no-project" alternative be evaluated in comparison to the proposed project. State CEQA Guidelines Section 15126.6(e) requires that the no-project analysis "discuss the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with the available infrastructure and community services." Accordingly, the No Project Alternative is evaluated below.

7.1 SUMMARY OF ENVIRONMENTAL CONSTRAINTS

The purpose of this section is to summarize the site-specific environmental constraints, as identified and discussed in Chapter 4, "Affected Environment, Thresholds of Significance, Environmental Impacts, and Mitigation Measures" of this Draft EIR. These site-specific environmental constraints, if not avoided through either project design or mitigation, could result in significant or potentially significant environmental impacts.

Potential site-specific environmental constraints include conversion of Important Farmland, generation of odors, air quality, ground vibration impacts, impacts to sensitive biological resources and habitats, soils and seismicity impacts, potential impacts to cultural and paleontological resources, and impacts to juvenile fish species. With the exception of farmland and odor impacts, all other impacts were determined to be less-than-significant or less than significant with mitigation.

The project would result in the following significant and unavoidable impacts:

- Agricultural Resources. The project would result in the conversion of 41 acres of Important Farmland to public uses (project and cumulative impacts) (discussed in Section 4.1, "Land Use and Agricultural Resources."

- Air Quality. Construction-related air emission contributions would exceed the San Joaquin Valley Air Pollution Control District (SJVAPCD) standards and sensitive receptors could be exposed to odorous emissions (project and cumulative impacts) (discussed in Section 4.3, "Air Quality").

The potential for the alternatives to avoid or reduce the project's significant impacts was considered in the analysis of alternatives.

7.2 ALTERNATIVES APPROACH

The Manteca Wastewater Quality Control Facility (WQCF) is a relatively large wastewater treatment facility that serves the cities of Manteca and Lathrop. As described in Chapter 3, "Project Description," WQCF operations

began in 1959 and since then the WQCF has undergone several major expansions. The objectives of the proposed project are:

- provide sufficient conveyance and treatment capacity to meet projected growth within the City of Manteca's WQCF service area through the year 2023;
- provide for orderly and cost-effective expansion of City WQCF facilities and conveyance systems;
- comply with current water quality standards and provide flexibility to address changes in standards and regulations; and
- address community concerns in relation to the planning, design, construction, and operation of City WQCF and collection system facilities and programs.

The existing WQCF and wastewater collection system constitute a large-scale wastewater collection, treatment, and disposal system, representing a substantial public investment. The WQCF is located on 210 acres of land surrounded by areas that are undergoing rapid urbanization. The relatively large project site provides sufficient land for the treatment facility and its proposed expansion, plus a buffer from urbanizing land uses. It is located at the terminus of several trunk sewers that convey sewage from all areas of the city, and this also represents a substantial public investment. This substantial public investment (represented by existing facilities), the urbanizing nature of the area, and the location of wastewater conveyance and effluent outfall pipelines all serve to limit feasible alternatives. An alternative location for the plant is not feasible. The project also provides a crucial need: collection, treatment and disposal of wastewater for over 63,000 people. Consequently, alternatives to the project are limited to how the wastewater is treated, how it is disposed, and the location of wastewater collection system, effluent outfall, and recycled water distribution system pipelines and facilities.

As a practical matter, only three general options are available for wastewater disposal: wastewater may be treated and discharged to surface waters; treated and discharged to land; or treated, stored, and reused for landscape irrigation, agricultural irrigation, wetland creation or enhancement, or other uses. The City currently treats wastewater for discharge to the San Joaquin River, with a small (0.87 mgd) on-site agricultural land application component.

7.3 ALTERNATIVES ANALYSIS

Based on the above discussion, the City identified and this EIR evaluates four alternatives to the proposed project: No Project Alternative (9.87 mgd); Increased Land Disposal Alternative; Advanced Wastewater Treatment Alternative; and Modified Pipeline Alignment Alternative. Other alternatives were considered, including an off-site location and an offsets alternative. These other alternatives are discussed in Section 7.4, "Alternatives Eliminated from Detailed Consideration." The Modified Pipeline Alignment Alternative focuses on impacts associated with wastewater collection system, treated effluent outfall, and recycled water distribution system pipelines.

Each of the four alternatives to the proposed project is analyzed below. For each alternative, a description of the alternative is followed by an analysis of impacts. The impact analyses are primarily qualitative. To avoid unnecessary redundancy in the analysis, summary statements have been provided whenever possible to indicate whether the impacts of the alternative under consideration are greater than, similar to, or less than those of the project.

7.3.1 NO PROJECT ALTERNATIVE (9.87 MGD)

Under the No Project Alternative (9.87 mgd), the 2007 WQCF and 2006 collection system master plans would not be implemented, and discharge at the WQCF would not exceed the currently permitted discharge rate of 9.87

mgd. The WQCF would be projected to accommodate increased urban growth in the City service area for the next 5-10 years depending on the buildout rate of proposed development, at which time the average dry weather flow (ADWF) discharge from the WQCF is projected to reach the plant's currently permitted ADWF capacity of 9.87 mgd. Under this alternative, WQCF discharges would be "capped" at 9.87 mgd ADWF, and growth in the City's service area would be constrained. Plant improvements needed to address regulatory requirements, ongoing maintenance needs, or technical upgrades (including buildout of the WQCF) would still be implemented, but capacity would not be increased above 9.87 mgd. If the No Project Alternative were implemented, other options would need to be considered to address the wastewater treatment demands associated with future development in the City's service area. Because any discussion of the size, location, and infrastructure requirements of a potential new wastewater treatment plant would be speculative, a potential new plant is not discussed in this alternative analysis.

ENVIRONMENTAL ANALYSIS

Land Use and Agricultural Resources

The No Project Alternative would avoid the project's conversion of 41 acres of agricultural land to nonagricultural use because no development would occur. Therefore, this alternative would result in substantially less agricultural resource impacts compared to the project. ***[Less]***

Visual Resources

Under this alternative, no new development would occur. Thus, there would be no alteration in the visual character of the project area, views of the project site from surrounding areas would be unchanged, and no new sources of light and glare would be created. By comparison, the project would result in minor alterations the visual character of the WQCF site and at the location of the proposed pump stations; however, these impacts were determined to be less-than-significant because visual screening (e.g., separation distances, landscaping, fencing) of proposed facilities would be provided. Although visual impacts of the project would be less than significant, this alternative would not result in any changes in the visual environment; therefore, impacts would be less. ***[Less]***

Air Quality

The No Project Alternative would not include any new development, and thus would not generate new construction or operation-related emissions. The project would result in significant and unavoidable impacts related to generation of substantial odors. While this alternative would not construct any new facilities at the WQCF, the WQCF would continue to treat wastewater at current permitted levels (e.g., up to 9.87 mgd) with existing treatment processes. These processes have been documented in the past to produce substantial odors (i.e., generated more than 1 complaint per year). It is likely that a similar potential for the generation of odors would continue under this alternative. Therefore, odor impact would be similar to the project and this alternative would not avoid this significant and unavoidable impact of the project. However, because this alternative would not generate any construction-related emissions or increased operational emission, overall this alternative would result in less air quality impacts. ***[Less]***

Noise

Under the No Project Alternative, no new construction would occur, no new noise-generating land uses would be developed, and no additional traffic would be generated. Therefore, there would be no increase in potential noise conflicts under this alternative. By comparison, the project would result in significant impacts related to exposure of sensitive receptors to ground borne vibration. However, these impacts would be mitigated to less-than-significant levels through restriction of construction activities generating groundborne vibration within 60 feet of sensitive receptors. Nonetheless, implementation of the No Project Alternative would not result in any noise impacts and overall impacts would be less than the project. ***[Less]***

Terrestrial Biological Resources

The No Project Alternative would not include any development in the project area and would thus not disturb any existing on-site species or habitats. The project area would be retained in its existing state and would continue to provide the same type, extent, and quality of habitat. By comparison, the proposed project would develop the project area with wastewater collection system, effluent outfall, and recycled water distribution system pipelines and wastewater treatment facilities, resulting in potentially significant impacts on sensitive and special-status plant and wildlife species and trees. Although these impacts would be reduced to less-than-significant levels after mitigation, this alternative would not result in the substantial disturbance or removal of on-site habitat and impacts would be less. ***[Less]***

Hazards and Hazardous Materials

Under the No Project Alternative, no new development would occur; therefore, no new facilities that use hazardous materials would be located in the project area and no new workers or visitors would have the potential to be exposed to existing or new sources of hazardous materials. The use of hazardous substances by the WQCF would continue; however, it is assumed that existing storage, transportation, and disposal regulations would continue to be followed. By comparison, the project would result in increased storage, use, and transport of hazardous materials during construction and operation of project facilities. There would be increased potential for construction workers and residents to be exposed to hazardous materials at existing and new contaminated areas on the project site. However, all these effects are considered less than significant through adherence to applicable regulations. Because no significant impacts related to hazardous materials and public health were identified for the project, the No Project Alternative would not reduce or avoid any significant impacts related to this issue area and similar impacts would occur. ***[Similar]***

Geology, Soils, and Seismicity

The No Project Alternative would not include any new construction activities and existing buildings and other facilities would remain in their current state in the project area. Therefore, there would be no construction-related erosion potential and no potential increase in risk of exposure to injury or property damage because of a seismic event. By comparison, the project would result in potentially significant impacts related to seismic ground shaking, unstable soils, and soil erosion. However, all impacts would be reduced to less-than-significant levels after mitigation. Because the project would not result in any significant impacts related to geology, soils, and seismicity after mitigation, the No Project Alternative would not reduce or avoid any significant impacts related to this issue area and similar impacts would occur. ***[Similar]***

Paleontological Resources

The No Project Alternative would not require any construction activities, thereby avoiding impacts related to the disturbance, destruction, and physical or visual alteration of any previously undiscovered fossils. Under the project, ground disturbance and development of new structures would occur, resulting in potentially significant impacts related to the potential disturbance of undiscovered fossils. This impact would be reduced to less-than-significant levels after mitigation. However, because ground disturbance would not occur under this alternative, this alternative would avoid the potential disturbance of undiscovered paleontological resources and paleontological resources impacts would be slightly less under this alternative. ***[Less]***

Hydrology and Water Quality

The No Project Alternative would result in similar surface water quality impacts compared to the project. Although implementation of the project would increase treated effluent flows from 9.87 mgd ADWF to 27 mgd ADWF, treated effluent pollutant concentrations would not appreciably increase, and the quality of the treated effluent would remain high. In fact, near- and far-field pollutants are expected to exhibit only minor increases in concentration in the San Joaquin River at well-mixed conditions downstream of the effluent discharge at the

proposed 27 mgd ADWF capacity. The wastewater treatment process upgrades associated with the project, including nitrification-denitrification, tertiary filtration and ultraviolet (UV) disinfection facilities, would result in a discharge that is very high-quality. The project and particularly the Schedule D improvements have been designed to reliably reduce pollutant concentrations to typical tertiary treatment levels for BOD, total suspended solids, turbidity, ammonia, and nitrogen. These tertiary treatment goals are consistent with NPDES permit limitations. Overall, water quality impacts would be similar to the project. ***[Similar]***

Public Services and Utilities

The No Project Alternative would not include any new development. Therefore, this alternative would not generate increased demand for fire, police, solid waste disposal services, or utilities (i.e., gas, electric, and water), and it would not potentially obstruct access by emergency vehicles because of construction activities. By comparison, the project would slightly increase staffing requirements (addition of 14 staff) at the WQCF. These staffing requirements would not result in substantial increased demand for public services and utilities. Because the project would not result in significant public services and utilities impacts, the No Project Alternative would not avoid significant impacts related to the provision of adequate public services and utilities. Overall impacts would be similar to the project. ***[Similar]***

Transportation and Circulation

The No Project Alternative would not include any new development and thus would not generate any new traffic-related impacts. By comparison, the project is estimated to generate approximately 40 daily round trips and potentially significant construction-related roadway hazards would increase. With mitigation, potentially significant impacts would be reduced to less than significant levels. Because the project would not result in significant transportation and circulation impacts, the No Project Alternative would not avoid significant impacts. Regardless, the No Project Alternative would avoid increases in construction and operation vehicle trips and potential roadway hazards during construction. Therefore, traffic impacts would be less under this alternative. ***[Less]***

Cultural Resources

The No Project Alternative would not require any construction activities, thereby avoiding impacts related to the disturbance, destruction, and physical or visual alteration of any previously undiscovered/ unrecorded cultural resource sites. Under the project, ground disturbance and development of new structures would occur, resulting in potentially significant impacts related to the potential disturbance of undiscovered/unrecorded subsurface archaeological sites and human remains. These impacts would be reduced to less-than-significant levels after mitigation. However, because the No Project Alternative does not include any new development or ground disturbance, it has a lesser potential to result in the disturbance of previously undiscovered subsurface archaeological resources and/or human remains. Therefore, cultural resources impacts would be slightly less under this alternative. ***[Less]***

Fisheries and Aquatic Resources

For fisheries and aquatic resources, the No Project Alternative would result in slightly less surface water quality impacts compared to the project. Implementation of the project would increase treated effluent flows from 9.87 mgd ADWF to 27 mgd ADWF, and treated effluent pollutant concentrations would also increase slightly. However, the quality of the treated effluent would remain high. In fact, near- and far-field pollutants are expected to exhibit only minor increases in concentration in the San Joaquin River at well-mixed conditions downstream of the effluent discharge at the proposed 27 mgd ADWF capacity. The wastewater treatment process upgrades associated with the project, including nitrification-denitrification, tertiary filtration and ultraviolet (UV) disinfection facilities, would result in a discharge that is very high-quality. The project and particularly the Schedule D improvements have been designed to reliably reduce pollutant concentrations to typical tertiary treatment levels for BOD, total suspended solids, turbidity, ammonia, and nitrogen. These tertiary treatment goals

are consistent with NPDES permit limitations. However, project treated effluent pollutant concentrations would be slightly higher than No Project Alternative treated effluent pollutant concentrations.

The project will produce pollutant concentrations that are consistent with applicable regulatory criteria/objective and NPDES permit limitations, and consistent compliance with applicable water quality criteria/objectives and NPDES permit limitations would be considered protective of aquatic resources (and would therefore not adversely affect fisheries and aquatic resources). However, as previously discussed, project treated effluent pollutant concentrations would be slightly higher than No Project Alternative treated effluent pollutant concentrations. This slight increase in treated effluent pollutant concentration would have a small adverse affect (i.e., increased impact) on fisheries and aquatic resources compared to the No Project Alternative. Therefore, the No Project Alternative would result in slightly less water quality impacts compared to the project. ***[Less]***

Regarding thermal impacts, the No Project Alternative would result in slightly greater impacts to fisheries and aquatic resources compared to the project. The existing WQCF does not comply with one objective of the 1972 "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California," also referred to as the Thermal Plan. While the project would increase the effluent discharge rate 27 mgd, which would result in the exceedance of all three thermal plan objectives (see Section 4.13, "Fisheries and Aquatic Resources"), recommended mitigation would require the construction of cooling towers at the WQCF. The cooling towers would bring the WQCF's effluent into compliance with all three objectives of the Thermal Plan and would eliminate the WQCF's existing exceedance of one Thermal Plan objective. The No Project Alternative would not eliminate this exceedance. Overall, because the No Project Alternative would result in less water quality impacts, fisheries and aquatic resources impacts would be similar under this alternative. ***[Similar]***

7.3.2 INCREASED LAND DISPOSAL ALTERNATIVE

The Increased Land Disposal Alternative would maximize the discharge of treated effluent to nearby agricultural lands. In order to maintain existing water quality and constituent loadings to the San Joaquin River from the time the WQCF reaches its current permitted capacity of 9.87 mgd ADWF through the proposed buildout capacity of 27 mgd ADWF, it is estimated that a maximum effluent-to-land disposal capacity of 18 mgd would be required.

Treated effluent from the WQCF is currently either land applied to approximately 190 acres of City-owned land or discharged to the San Joaquin River. The City has examined a number of effluent-to-land disposal strategies that would have sufficient capacity for disposal of 18 mgd of treated wastewater year-round. Because of the relatively high unit cost and other implementation constraints of urban water reuse, the increased land disposal alternative would apply undisinfected, denitrified, secondary effluent to existing City-owned land surrounding the WQCF and to future City-purchased land at some distance from the WQCF. While the City has examined the costs of purchasing land from one to 10 miles away for effluent disposal, economic considerations and land availability make the purchase of land farther away from the WQCF a more tenable proposition. To that end, the increased land disposal alternative includes high-rate irrigation (260 in/yr) of City-owned land at the WQCF property (4,600 ac-ft/year or 4.11 mgd) and agricultural irrigation on acreage within 10 miles of the WQCF that would be purchased by the City (15,560 ac-ft/year or 13.89 mgd) as a means of collectively applying 18 mgd of undisinfected, denitrified, secondary effluent to land year-round. This alternative would allow the reclamation of up to approximately two thirds of WQCF effluent at the proposed build-out capacity of 27 mgd ADWF. Additional pipelines would be required to convey treated effluent from the WQCF to the selected land disposal site. All facilities proposed at the WQCF to treat up to 27 mgd of wastewater and proposed collection system and recycled water distribution pipelines would be constructed under this alternative.

ENVIRONMENTAL ANALYSIS

Land Use and Agricultural Resources

Because this alternative would result in the construction of the same facilities at the WQCF, the collection system pipeline, and the recycled water distribution pipelines, this alternative would result in the conversion of 41 acres of Important Farmland. Depending on where the distribution pipeline would be constructed to convey treated effluent from the WQCF to the selected land disposal site this alternative also has the potential to result in the conversion of additional Important Farmland. As such, this alternative would result in similar or greater impacts to Important Farmland impacts compared to the project. ***[Similar or Greater]***

Visual Resources

This alternative would result in the construction of the same treatment facilities at the WQCF and collection system and recycled water pipelines. Visual impacts associated with these facilities were determined to be less than significant with the project because visual screening (e.g., separation distances, landscaping, fencing) of proposed facilities would be provided. While this alternative would result in the construction of additional pipeline to convey treated effluent to new land disposal areas, this pipeline would be located below ground and would not be visible. As a result, no significant visual impact would occur and overall visual impacts under this alternative would be similar to the project. ***[Similar]***

Air Quality

The Increased Land Disposal Alternative would result in similar construction-related air emissions because similar levels of construction-related activities would occur in the project area. Operational air emissions would also be similar because the same number of staff would be employed and the same volume of wastewater would be treated at the WQCF. This alternative would not avoid the project's significant and unavoidable odor impacts because the same treatment processes would be employed and no additional mitigation would be available to reduce this impact. Overall, this alternative would result in similar air quality impacts. ***[Similar]***

Noise

Under the Increased Land Disposal Alternative, new construction would occur, new noise-generating land uses would be developed, and additional traffic would be generated. These impacts would be similar to the project because similar facilities would be constructed and similar construction methods would be employed. Mitigation recommended for the project would reduce noise impacts under this alternative to a less-than-significant level. ***[Similar]***

Terrestrial Biological Resources

The Increased Land Disposal Alternative would result in the same habitat disturbance impacts at the WQCF and associated with collection and recycled water pipelines. This alternative would increase the amount of pipeline needed to convey treated wastewater to off-site land disposal areas. Depending on where the land disposal areas are located, this alternative could result in the construction of up to 10 miles of additional pipeline. Construction activities associated with the additional pipeline could result in the disturbance of sensitive habitats and species along its alignment. While mitigation recommended for the project and compliance with the San Joaquin Multi-Species Habitat Conservation Plan would likely reduce impacts to these habitats and species to a less-than-significant level, this alternative would result in greater impacts to biological resources. ***[Greater]***

Hazards and Hazardous Materials

Under the Increased Land Disposal Alternative, new development would occur; therefore, new facilities that use hazardous materials would be located in the project area and new workers or visitors would have the potential to

be exposed to existing or new sources of hazardous materials. The use of hazardous substances by the WQCF would continue; however, it is assumed that existing storage, transportation, and disposal regulations would continue to be followed. By comparison, the project would also result in increased storage, use, and transport of hazardous materials during construction and operation of project facilities. There would be increased potential for construction workers and residents to be exposed to hazardous materials at existing and new contaminated areas on the project site. However, all these effects are considered less than significant through adherence to applicable regulations. Because no significant impacts related to hazardous materials and public health were identified for the project, the Increased Land Disposal Alternative would not reduce or avoid any significant impacts related to this issue area and similar impacts would occur. ***[Similar]***

Geology, Soils, and Seismicity

Similar to the project the Increased Land Disposal Alternative would include the construction of new facilities at the WQCF and would install new pipeline along area roadways and through undeveloped properties. Geology, soils, and seismiscity impacts would be similar to the project. ***[Similar]***

Paleontological Resources

The Increased Land Disposal Alternative would require construction activities that could result in the disturbance, destruction, and physical or visual alteration of any previously undiscovered fossils. Under the project, ground disturbance and development of new structures would occur, resulting in potentially significant impacts related to the potential disturbance of undiscovered fossils. This impact would be reduced to less-than-significant levels after mitigation. Because the Increased Land Disposal Alternative includes new development and ground disturbance, it has a similar potential to result in the disturbance of previously undiscovered fossils. Therefore, paleontological resources impacts would be similar under this alternative. ***[Similar]***

Hydrology and Water Quality

The impacts of this alternative on surface water quality would be slightly less than the proposed project. Because this alternative would maintain WQCF effluent pollutant loading in the San Joaquin River at the currently permitted 9.87 mgd ADWF level as the WQCF discharge capacity increases, treated effluent pollutant concentrations would not increase, the quality of the treated effluent would remain high, and near- and far-field pollutant concentrations would not increase. However, the project's water quality impacts were determined to be less than significant because the effluent discharged at WQCF buildout (27 mgd) would comply with all adopted water quality standards. Therefore, this alternative would not reduce or avoid any significant water quality impacts. Overall, this alternative would result in similar surface water quality impacts as the project. ***[Similar]***

This alternative would increase the volume of effluent discharged to land and that could ultimately percolate to groundwater. Because the effluent would comply with RWQCB requirement for land disposal, impacts to the groundwater quality would be less-than-significant and would not be substantially different from existing land disposal impacts at the WQCF. Therefore, this alternative would result in similar groundwater quality impacts as the project. ***[Similar]***

Public Services and Utilities

The Increased Land Disposal Alternative would not result in any substantial staff increases compared to the project, nor would utility demands (e.g., gas, electricity) substantially increase compared to the project. This alternative would result in the treatment of the same volume of wastewater as the project (i.e., 27 mgd). Overall, public services and utilities impacts would be similar to the project. ***[Similar]***

Transportation and Circulation

The Increased Land Disposal Alternative would result in construction of similar facilities at the WQCF and construction of additional pipelines to convey effluent to new land disposal areas. This alternative would result in slightly greater construction-related transportation impacts because a greater number of roadways would be disturbed and a greater number of construction personnel would be required to construct the pipelines. While it is likely that construction-related transportation impacts would be less than significant, nonetheless, overall impacts would be slightly greater than the project. ***[Greater]***

Cultural Resources

The Increased Land Disposal Alternative would require the construction of wastewater treatment and effluent conveyance pipelines, potentially resulting in impacts related to the disturbance, destruction, and physical or visual alteration of any previously undiscovered/ unrecorded cultural resource sites. Under the project, ground disturbance and development of new structures would occur, resulting in potentially significant impacts related to the potential disturbance of undiscovered/unrecorded subsurface archaeological sites and human remains. These impacts would be reduced to less-than-significant levels after mitigation. However, because the Increased Land Disposal Alternative would also include new development or ground disturbance, it could also result in the disturbance of previously undiscovered subsurface archaeological resources and/or human remains. Therefore, cultural resources impacts would be similar under this alternative. ***[Similar]***

Fisheries and Aquatic Resources

The Increased Land Disposal Alternative would result in greater impacts to fisheries and aquatic resources compared to the project. The existing WQCF does not comply with one objective of the Thermal Plan. While the project would increase the effluent discharge rate to 27 mgd, which would result in the exceedance of all three thermal plan objectives (see Section 4.13, "Fisheries and Aquatic Resources"), mitigation is recommend that would require the construction of cooling towers at the WQCF. The cooling towers would bring the WQCF's effluent in compliance with all three objectives of the Thermal Plan and would eliminate the WQCF's existing exceedance of one Thermal Plan objective. This alternative would not eliminate this exceedance; therefore, thermal impacts would be greater under this alternative. ***[Greater]***

7.3.3 ADVANCED WASTEWATER TREATMENT ALTERNATIVE

Because the proposed project includes nitrification-denitrification, tertiary filtration and UV disinfection facilities, the remaining advanced wastewater treatment options available to the City are microfiltration and reverse osmosis (MF/RO). RO is a membrane separation process that is used for the removal of dissolved constituents from wastewater remaining after advanced treatment with tertiary filtration or microfiltration. RO treatment relies on applied pressure to force water through a semi-permeable membrane while restraining the passage of particulate and high molecular weight constituents. Membranes exclude ions, but require high pressures to produce the deionized water. Passage of water through the membrane produces a relatively ion free effluent stream and a concentrated brine stream. MF occurs prior to RO in order to remove larger organic and inorganic particles that foul the RO membrane and thus increase membrane resistance to water flow and reduce membrane service life.

The Advanced Wastewater Treatment alternative would involve the implementation of advanced microfiltration and reverse osmosis (MF/RO) technology. In order to maintain existing water quality and TDS loadings in the San Joaquin River from the time the WQCF reaches its current permitted capacity of 9.87 mgd ADWF through the proposed buildout capacity of 27 mgd ADWF, it is estimated that a maximum MF/RO capacity of 21 mgd would be required (LWA 2007). This alternative assumes that the blending of effluent streams of different qualities is permitted and, therefore, only a portion of WQCF tertiary effluent would need to undergo MF/RO prior to blending with non-MF/RO tertiary effluent and discharge to the San Joaquin River.

Although no significant water quality impacts were identified for the project, the project would exceed currently adopted standards for aluminum (although a water effects ratio [WER] study has been completed to identify an appropriate site-specific objective for total aluminum in the San Joaquin River that is both sufficiently protective of aquatic life and identifies available assimilative capacity for aluminum in the river under which the WQCF can discharge its effluent); however, this impact was determined to be less than significant because the current adopted standard is believed, based on available science, to be overly protective of water quality and aquatic resources. The MF/RO process would reduce the concentration and loadings of aluminum and other metals in the effluent compared to the proposed project. This treatment technology is evaluated in the analysis provided below.

ENVIRONMENTAL ANALYSIS

Environmental Impacts

This alternative would increase WQCF treatment capacity to 27 mgd ADWF and would expand the wastewater collection system and treated effluent disposal system with the same facilities proposed as part of the project. In addition, this alternative would construct additional facilities within the developed boundaries of the WQCF. Because similar facilities would be constructed in similar areas, the Advanced Wastewater Treatment Alternative would have impacts similar to the proposed project for land use and agricultural resources, terrestrial biological resources, soils and seismicity, paleontological resources, public services and utilities, cultural resources, transportation and circulation, noise, air quality, visual. ***[Similar]***

Hazardous Materials

Implementation of the Advanced Wastewater Treatment Alternative would maintain WQCF effluent pollutant loading to the San Joaquin River at the currently permitted 9.87 mgd level as WQCF discharge capacity increases to 27 mgd. However, advanced wastewater treatment employing MF/RO technology could result in “cross media impacts,” or the interrelated impacts caused by removal of a pollutant from one medium to one or more other media. In the case of MF/RO, the process removes a pollutant at a certain concentration from wastewater and partitions it at a significantly higher concentration in brine and/or residuals. Pollutants, such as metals, are not destroyed, but transferred from one medium to another. Organic pollutants can be destroyed or converted to other toxic or non-toxic forms and can also be transferred from one medium to another. It should be noted that in transferring from one medium to another, the bioavailability of the pollutant may be changed significantly. MF/RO treatment results in the transfer of pollutants from wastewater into biosolids, air, and/or concentrated waste streams. Depending on regulatory limits, additional treatment of the biosolids, air, or waste streams may be required. Therefore, this alternative could result in similar or greater hazardous material impacts. ***[Similar or greater]***

Surface Water Quality

Because this alternative would maintain WQCF effluent pollutant loading in the San Joaquin River at the currently permitted 9.87 mgd ADWF level as the WQCF discharge capacity increases, treated effluent pollutant mass loading to the river would not increase above that realized once the WQCF discharges at its current permitted capacity of 9.87 mgd ADWF. Similarly, near- and far-field pollutant concentrations would not increase above those expected to occur once the WQCF discharges effluent at its current permitted capacity. Furthermore, RO would reduce effluent concentrations of TDS, metals (including aluminum), ammonia, and organic compounds, and would lower electrical conductivity. While this alternative is projected to reduce pollutant concentrations in WQCF effluent compared to post-project levels at 27 mgd, the extent of MF/RO treatment considered in this alternatives analysis would not decrease downstream constituent concentrations from pre-project (9.87 mgd) conditions; the MF/RO facilities would be designed to maintain downstream TDS and metals mass loading to the San Joaquin River at pre-project levels. Further, it is anticipated that implementation of the Advanced Wastewater Treatment Alternative would reduce aluminum levels to below the existing NPDES daily maximum effluent limit for the parameter. Although effluent pollutant concentrations would decrease with

implementation of this alternative, no significant water quality impacts were identified for the project; therefore, this alternative would not avoid or lessen any significant impacts. Nonetheless, because effluent constituent concentrations would be reduced compared to the project, overall impacts of this alternative on surface water quality would be less than the proposed project. ***[Less]***

Fishery Resources

The existing WQCF does not comply with one objective of the 1972 "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California," also referred to as the Thermal Plan. While this alternative would increase the effluent discharge rate to 27 mgd, which would result in the exceedance of all three thermal plan objectives (see Section 4.13, "Fisheries and Aquatic Resources"), recommended mitigation would require the construction of cooling towers at the WQCF. The cooling towers would bring the WQCF's effluent into compliance with all three objectives of the Thermal Plan and would eliminate the WQCF's existing exceedance of one Thermal Plan objective. As such, thermal impacts to fisheries under this alternative would be similar to the project.

While no significant water quality impacts were identified for the project, this alternative would result in an effluent with lower concentrations of specific constituents including TDS, metals (including aluminum), ammonia, and organic compounds, and electrical conductivity. Therefore, existing constituent-based impacts to fishery resources (although less than significant) would be reduced compared to what would occur under the project. Further, this alternative would reduce the project's cumulative contribution to constituent based impacts in the San Joaquin River and Delta. Overall, fishery impacts would be less than significant, similar to the project, but would be less than the project because of reduced constituent concentrations that would be present in the WQCF effluent. ***[Less]***

7.3.4 MODIFIED PIPELINE ALIGNMENT ALTERNATIVE

The proposed project would incrementally add new collection system sewer pipelines to meet the development goals adopted in the City of Manteca General Plan 2023. Building upon the existing wastewater collection system, new wastewater collection system pipelines would convey wastewater to an influent pump station at the WQCF. In addition, a new recycled water distribution system would be constructed in stages to supply recycled water citywide. Implementation of the proposed project would also result in construction of an approximately 14,000-foot 48-inch diameter outfall pipeline parallel to the existing outfall pipeline. Although proposed pipelines would mainly be constructed within developed roadways, some proposed pipeline segments would traverse sensitive biological habitats such as freshwater marsh and riparian forest habitats. This alternative would modify the pipeline alignments to avoid sensitive biological habitats wherever feasible.

The proposed pipeline routes for the wastewater collection system, effluent outfall, and recycled-water distribution system cross or are located immediately adjacent to three canals that contain sensitive biological habitats (Exhibits 4.5-1, 4.5-2a, 4.5-2b, and 4.5-2c). The proposed wastewater collection system would cross a drainage canal north of Yosemite Avenue and west of Airport Way (Exhibit 4.5-2a). The crossing, referred to as Alignment A, is located 1,000 feet east of the confluence of the drainage canal with the French Camp Outfall Canal. Beginning at a point just west of Airport Way and north of the Southern Pacific Railroad tracks, another portion of the proposed wastewater collection system route (referred to as Alignment B) would be located within 5 feet of a drainage canal for approximately 2,000 feet (Exhibit 4.5-2b). This canal is also a tributary of the French Camp Outfall Canal and averages 20 feet wide. Water and dense freshwater marsh vegetation types are present within and along the banks of the channel. The proposed wastewater collection system also crosses the French Camp Outfall Canal south of the WQCF property and north of SR 120 (Exhibit 4.5-2c). This area, referred to as Alignment C, contains water and freshwater marsh vegetation in the channel of the canal.

The modified pipeline alignment alternative would alter the three pipeline alignments that cross or are located immediately adjacent to canals that contain sensitive biological habitats. At Alignment A, the alternative would

realign the pipeline to the east and north of the French Camp Outfall Canal to avoid crossing the drainage canal. At Alignment B, the pipeline alignment would be realigned northeast and away from the drainage canal to avoid dense freshwater marsh habitat.

At Alignment C, the City has determined that it is infeasible to modify the collection system alignment. The collection system pipeline alignment south of the WQCF was established considering the location and depth of the influent pump station constructed at the WQCF under the Phase III improvements project. Due to topography and long trunk sewer lengths, there is minimal flexibility in modifying the collection system pipeline route in the vicinity of freshwater marsh habitat north of SR 120 and east of McKinley Avenue without compromising the ability to convey wastewater to the influent pump station by gravity. Because of the congested core of the treatment plant site and the desire to limit construction impacts, the influent pump station was sited along the easterly boundary of the city property. Therefore, it would be infeasible to realign the collection system at Alignment C because it is essentially fixed to allow for connection to a previously constructed stub within the treatment plant core.

ENVIRONMENTAL ANALYSIS

Environmental Impacts

The environmental analysis for the Modified Pipeline Alignment Alternative focuses on the environmental impacts that would change as a result of the proposed alignment changes. Impacts associated with the project (e.g., facility construction, water quality impacts, fishery impacts) would be the same under this alternative as those described in Chapter 4 of this DEIR.

As described above, most impacts to sensitive habitats would be avoided through implementation of this alternative. Where impacts would occur, they would be unavoidable because it would be infeasible to re-align the pipelines while continuing to meet design standards for conveyance of wastewater. Impacts would be less under this alternative because most sensitive habitats would be avoided. Construction-related impacts (air quality, noise, agricultural resources) would be similar, because a similar length of pipeline would be constructed compared to the project. Overall, impacts would be less under this alternative. ***[Less]***

7.4 ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

Three additional alternatives were considered during the planning process but were eliminated from detailed consideration in this EIR because they could not feasibly attain proposed project objectives:

- use of an off-site location,
- site reorientation alternative, and
- offsets alternative.

These alternatives are summarized below, in accordance with State CEQA Guidelines Section 15126.6(c). The environmental impacts of the alternatives eliminated from detailed consideration need not be discussed further in this EIR.

7.4.1 OFF-SITE ALTERNATIVE

An off-site alternative would require the location of another potentially feasible site for development of uses consistent with those of the project. As directed in the State CEQA Guidelines Section 15126.6(f) (2) (A), “the key question and first step in analysis is whether any of the significant effects of the project would be avoided or substantially lessened by putting the project in another location.” Because certain significant effects of the project are site-specific (such as the conversion of Important Farmland), it would be conceivable that an alternative

location could avoid the significant effect. Therefore, it is valid to determine if feasible alternative locations may exist in the area.

The State CEQA Guidelines Section 15126.6(f) (2) (B) indicates that "if the lead agency concludes that no feasible alternative locations exist, it must disclose the reasons for this conclusion." If feasible alternative locations do not exist, the EIR analysis need not continue to consider the issue of an off-site alternative. As discussed in Section 7.1, "Alternatives Approach" above, the existing WQCF and wastewater collection system constitute a large-scale wastewater collection, treatment, and disposal system, representing a substantial public investment. The WQCF is located on 210 acres of land surrounded by rapid urbanization, and is located at the terminus of several trunk sewers that convey sewage from all areas of the city. This substantial public investment (represented by existing facilities), the urbanizing nature of the area, and the location of wastewater conveyance and effluent outfall pipelines all serve to limit feasible alternatives. In addition, the construction of off-site wastewater collection and treatment pipelines and facilities, in addition to being impractical, could result in significant environmental impacts to biological, cultural and other resources. Therefore, an off-site location for the plant is not feasible. Given the impracticality, high costs, and likely additional environmental impacts, this alternative was rejected from further consideration.

7.4.2 SITE REORIENTATION ALTERNATIVE

Implementation of the proposed project would result in the construction of a secondary effluent equalization pond, tertiary disinfection facilities, anaerobic digesters, secondary clarifiers, and aeration basins at the WQCF site (Figure 3-6). These new facilities would expand the footprint of the existing WQCF site and result in the conversion of approximately 14 acres of Important Farmland to nonagricultural use. This impact would be significant and unavoidable. To avoid this significant and unavoidable impact, the Site Reorientation Alternative would alter the design of the proposed project such that new construction would not require the conversion of Important Farmland to a nonagricultural use. However, the WQCF site is completely surrounded by Important Farmland (Exhibit 4.1-1), and it would not be practical to locate these facilities elsewhere. The WQCF and wastewater collection system constitute a large-scale wastewater collection, treatment, and disposal system, representing a substantial public investment. The WQCF is surrounded by rapid urbanization, and is located at the terminus of several trunk sewers that convey sewage from all areas of the city. This substantial public investment (represented by existing facilities), the urbanizing nature of the area, and the location of wastewater conveyance and effluent outfall pipelines all serve to limit feasible design alternatives at the WQCF site. Therefore, an alternative WQCF site design alternative is not feasible, and this alternative was rejected from further consideration.

7.4.3 OFFSETS ALTERNATIVE

The Offsets Alternative is the same as the proposed project except that it also involves the use of offsets to reduce the amount of mercury that enters the San Joaquin River. The use of offsets involves reducing another mercury source in the San Joaquin watershed, along with earning of credits for pollutant reductions. This alternative was considered because the San Joaquin River is Section 303(d) listed for mercury. Waterways that are Section 303(d) listed are not expected to meet the water quality standards for particular constituents using technology-based controls alone. The City is studying the feasibility of using offsets, but there is substantial uncertainty in the regulatory environment, a number of liability issues, lack of an institutional framework, and uncertainty about the sources of mercury and the effectiveness of this approach. Importantly, the project would not result in any significant mercury impacts. For the reasons stated above, this alternative is neither necessary nor feasible, and has been eliminated from detailed consideration.

7.5 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The State CEQA Guidelines require identification of an environmentally superior alternative. If the No Project Alternative is environmentally superior, CEQA requires selection of the "environmentally superior alternative other than the no project alternative" from among the project and the alternatives evaluated.

Table 7-1 identifies whether each of the three alternatives would have "greater," "less," or "similar" impacts as the project for each of the 13 environmental issue areas evaluated in this Draft EIR. Based on the listing of lesser and greater impacts as identified in Table 7-1, the No Project Alternative would appear to be the environmentally superior alternative. The No Project Alternative would avoid the project's significant and unavoidable impacts associated with Important Farmland and generation of substantial odors. Because the No Project Alternative would not result in any significant and unavoidable impacts, it is the environmentally superior alternative and it is superior to all other alternatives considered. However, this alternative would not meet any project objectives. Further, it would not resolve existing non-compliance issues associated with the temperature of the effluent. Most importantly, this alternative would not result in the expansion of the WQCF to meet buildout demands associated with the City's General Plan (2023). As such, this alternative may result in the curtailment of growth within the City until an alternate plan for wastewater disposal could be developed.

Table 7-1
Comparison of the Impacts of the Alternatives with Those of the Proposed Project

Environmental Issues	Alternative			
	No Project (9.87 mgd)	Increased Land Disposal	Advanced Wastewater Treatment	Modified Pipeline Alignment
Land Use and Agricultural Resources	Less	Similar or Greater	Similar	Similar
Visual Resources	Less	Similar	Similar	Similar
Air Quality	Less	Similar	Similar	Similar
Noise	Less	Similar	Similar	Similar
Terrestrial Biological Resources	Less	Greater	Similar	Less
Hazards and Hazardous Materials	Similar	Similar	Similar or Greater	Similar
Geology, Soils, and Seismicity	Similar	Similar	Similar	Similar
Paleontological Resources	Less	Similar	Similar	Similar
Hydrology and Water Quality	Similar	Similar	Less	Similar
Public Services and Utilities	Similar	Similar	Similar	Similar
Transportation and Circulation	Less	Greater	Similar	Similar
Cultural Resources	Less	Similar	Similar	Similar
Fisheries and Aquatic Resources	Similar	Greater	Less*	Similar*

* Assumes construction of a treated effluent cooling tower to reduce thermal impacts.
Source: EDAW 2007

The Increased Land Disposal Alternative would not be environmentally superior to the project because it would not avoid any of the project significant and unavoidable impacts related to Important Farmland and generation of odors and it would result in greater environmental impacts in 4 resource areas including greater impacts to Important Farmland, sensitive habitats and species, construction-related traffic impacts, and fishery impacts. While this alternative may achieve most project objectives, because of the substantial expense involved with

securing additional land for effluent disposal, it may not be able to meet the project objective of providing for the "cost-effective" expansion of City WQCF facilities.

The Advanced Wastewater Treatment alternative would result in environmental tradeoffs compared to the proposed project. While impacts to water quality and fisheries would be reduced compared to the proposed project as a result of greater constituent removal efficiencies, this alternative could result in greater hazardous material impacts as a result of the brine that is produced as a by-product of the MF/RO process. This alternative would not reduce or eliminate the project's significant and unavoidable impacts (e.g., Important Farmland and odors). While this alternative may achieve most project objectives, because of the substantial expense involved with constructing and operating MF/RO facilities, it may not be able to meet the project objective of providing for the "cost-effective" expansion of City WQCF facilities. However, from a water quality perspective, the Advanced Wastewater Treatment Alternative would be the environmentally superior alternative because this alternative would have greater constituent removal efficiencies than the project.

Overall, the Modified Pipeline Alignment Alternative would be environmentally superior to the project. This alternative would not avoid the project's significant and unavoidable impacts (e.g., Important Farmland and odors); however, this alternative would substantially reduce the project's impacts to sensitive resources. Further, all project objectives would be achieved with implementation of this alternative.

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9 REPORT PREPARATION

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APPENDIX A

Notice of Preparation and Comments

NOTICE OF PREPARATION

DRAFT ENVIRONMENTAL IMPACT REPORT

TO: REVIEWING AGENCIES

FROM: CITY OF MANTECA
Public Works Department
1001 W. Center Street
Manteca, CA 95337

Subject: Notice of Preparation of a Draft Environmental Impact Report

The City of Manteca will be the Lead Agency and will prepare an environmental impact report (EIR) for the project identified below. We need to know your views as to the scope and content of the environmental information that is germane to your agency's statutory responsibilities or your interests in connection with the proposed project. Your agency will need to use the EIR when considering City permits or other project approvals.

The project description, location, and a summary of the environmental issues to be evaluated in the EIR are contained in the attached materials.

Because of the time limits mandated by State law, your responses must be sent at the earliest possible date but not later than 30 days after receipt of this notice.

Please send your response to **Phil Govea, Senior Engineer,** at the address shown above. We will need the name for a contact person in your agency.

Project Title: **Manteca Wastewater Quality Control Facility Master Plan and Collection System Master Plan 2005 Update**

Project Applicant: **City of Manteca**

SCOPING MEETING: **Date & Time:** **June 14, 2006 at 5 p.m.**

Location: **COUNCIL CHAMBERS**
CITY OF MANTECA
1001 W. CENTER STREET
MANTECA, CA 95337

Date 5/22/06 Signature Phil Govea

Title: Senior Engineer
Telephone: (209) 239-8463
Facsimile: (209) 239-8495
Email: pgovea@ci.manteca.ca.us

1 INTRODUCTION

In accordance with the California Environmental Quality Act (CEQA) and the State CEQA Guidelines, the City of Manteca (as lead agency) will be preparing an Environmental Impact Report (EIR) to evaluate the environmental effects associated with the proposed Manteca Wastewater Quality Control Facility (WQCF) 2005 Master Plan Update and the 2005 Collection System Master Plan Update project (together known as the proposed project). The proposed project would: incrementally increase the treatment capacity of the WQCF from 9.87 million gallons per day (mgd) to 27 mgd average dry weather flow (ADWF), increase wastewater effluent discharges to the San Joaquin River, result in discharge of wastewater effluent on urban and agricultural lands, result in minor improvements to existing sewer lines, and result in construction of three new trunk sewers measuring a total of approximately 21 miles. The EIR will identify any significant environmental impacts of the project and recommend mitigation measures to reduce the project's environmental impacts where feasible.

In accordance with Section 15082 of the CEQA Guidelines, the City of Manteca has prepared this Notice of Preparation to provide responsible and trustee agencies and other interested parties with information describing the project and the issue areas that will be evaluated in the EIR.

2 PROJECT LOCATION AND BACKGROUND

2.1 LOCATION

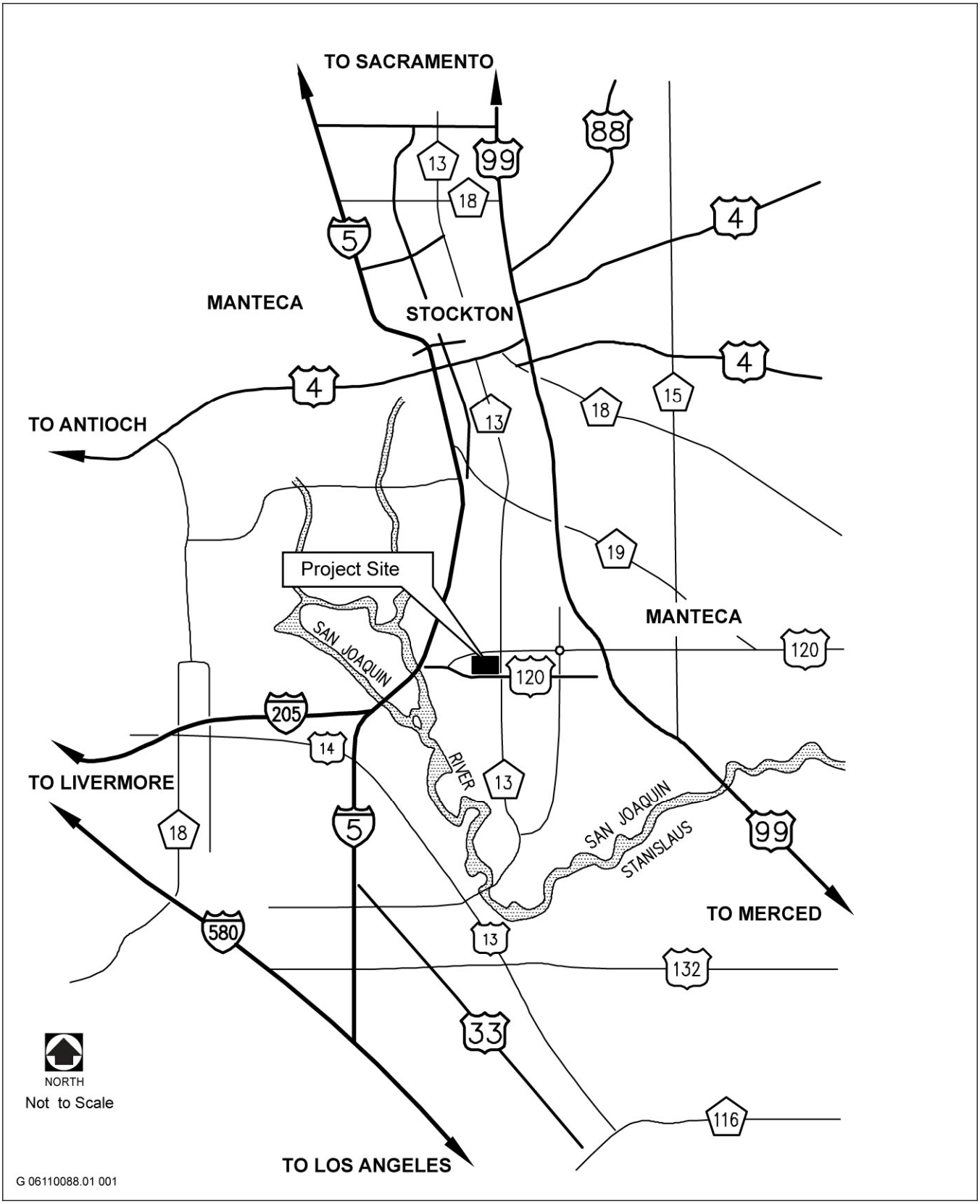
The project would result in the construct of wastewater treatment facilities on City-owned property near downtown Manteca, and wastewater conveyance infrastructure in and around the City. Manteca is located at the northern end of the San Joaquin Valley of central California, at the junction of State Route (SR) 99 and SR 120, approximately 75 miles east of San Francisco and 55 miles south of Sacramento. The WQCF is located approximately 1.5 miles west of the City of Manteca in southern San Joaquin County. Exhibit 1 shows the project's regional location.

Proposed wastewater conveyance infrastructure would be located along the SR 120 and SR 99 corridors and other roads surrounding the City. Regional access to the project is provided by Interstate 5 (I-5) to the west, SR 120 to the south, and SR 99 to the east. The street address for the WQCF is 2450 West Yosemite Avenue, and it includes Assessor Parcel Numbers 241-300-47, 48, 49, & 50 and 241-310-16, 18, 32, 44, 48, 52, 53, 57, & 58. Local roadways near the WQCF include Yosemite Avenue, Woodward Avenue, McKinley Avenue, Airport Way, and Union Road as shown in Exhibit 2. Local roadways in the vicinity of the proposed trunk sewers include Woodward Avenue, Lathrop Road, and Airport Way.

2.2 WQCF EXPANSION HISTORY

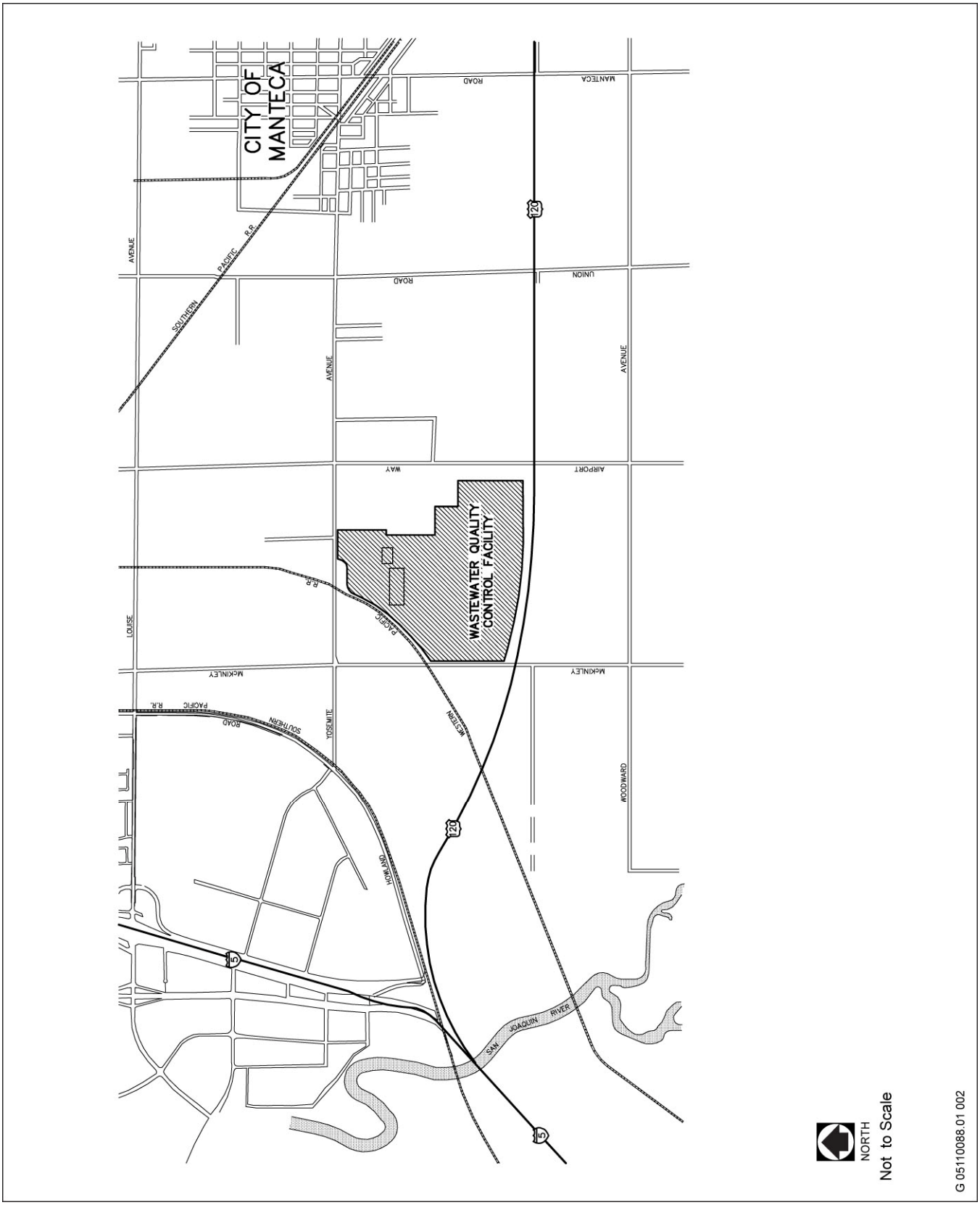
The Manteca WQCF has expanded several times since operations began in 1959. From 1986-1988, a major expansion to the plant known as Phase I was constructed. The Phase I expansion project included the construction of secondary treatment facilities, anaerobic sludge digesters, sludge drying beds, a chlorine disinfection system, and an outfall to the San Joaquin River. Design capacity of the plant following the Phase I project was 5.45 mgd (ADWF). The Phase II expansion project constructed in 1992 and 1993 added a primary sedimentation basin, a secondary clarifier, and four sludge drying beds, increasing capacity to 6.95 mgd ADWF.

The City's *Wastewater Quality Control Facility Master Plan* adopted August 21, 1995, identified Phase III improvements which included the construction of nitrification facilities (increasing plant capacity from 6.95 to 7.5 mgd ADWF), improved primary and secondary treatment facilities (increasing capacity from 7.5 to 9.87 mgd ADWF), and solids handling and tertiary filtration and ultraviolet (UV) disinfection facilities. The City has divided Phase III improvements into four schedules: A, B, C, and D.



Source: Nolte and Associates, Inc, 2005

Regional Location Map **Exhibit 1**



Source: Nolte and Associates, Inc. 2005

WQCF Location Map **Exhibit 2**

Schedule A and B improvements have been completed. Schedule A improvements included two new aeration basins, three modified secondary clarifier sludge collection mechanisms, two new centrifugal blowers, and a skid-mounted centrifugal dewatering system. Schedule B improvements included a new influent pump station, two aerated grit tanks, three primary sedimentation basins, five aeration basins, two secondary clarifiers, an odor control biofilter, and an expanded laboratory and administration building.

Schedule D improvements are currently being constructed at the WQCF. Schedule D improvements include a secondary effluent equalization pond, a filter feed pump station, coagulation and flocculation facilities, tertiary filters, a chemical storage and handling facility, a UV disinfection system, an effluent pumping station, two odor control biofilters, recycled water pumping stations, a groundwater well, and a construction truck recycled water filling station. Schedule D improvements will allow for the off-line storage and timed discharge of treated effluent to the San Joaquin River. Schedule C improvements, which are scheduled to begin construction in February 2007, include a sludge control building, a mechanical dewatering facility, and a shop maintenance building. Schedule D improvements are anticipated to be constructed and operational by March 2007 while Schedule C improvements are anticipated to be constructed and operational by July 2008. It is anticipated that Phase III improvements would satisfy the City's wastewater treatment capacity demands for the next 5-10 years depending on the buildout rate of proposed development.

Beyond the Phase III expansion, the City has identified the need to program future facilities to accommodate growth planned for in its General Plan. As such, the City has prepared its 2005 WQCF Master Plan. This master plan contemplates providing the necessary treatment facilities to accommodate up to 27 mgd ADWF.

2.3 COLLECTION SYSTEM PLANNING HISTORY

In 1989, the City developed the *City of Manteca Sewer System Master Plan* to address the 10-year planning period from 1989 to 1999 using information from the City's 1988 General Plan. A 1993 master plan, *Sewer Master Plan for the City of Manteca Public Facilities Implementation Plan*, addressed the 21-year planning period from 1993 to 2014 and focused on future growth areas. The 1993 Master Plan proposed construction of north and south trunk sewers to accommodate new service areas, with central and southwest sewers connecting the two.

On October 6, 2003, the City adopted a new General Plan (*City of Manteca General Plan 2023 Policy Document*) which identified areas to be developed within the City to the year 2023. The new General Plan expanded the collection system service areas (to be served by the north and south trunk sewers) beyond the service areas identified in the 1993 Master Plan. As a result, the north and south trunk sewers would need to be enlarged to accommodate increased wastewater flows. To ensure that the City's collection system can adequately meet the development goals adopted in the new General Plan, the City developed the *City of Manteca Wastewater Collection System Master Plan Update* in July 2005 (subject of this NOP).

2.4 EXISTING FACILITIES

The Manteca WQCF and collection system serves commercial and residential uses within the City of Manteca, a portion of the City of Lathrop, and one frozen food packager (Eckert Cold Storage). The WQCF is permitted for treatment and discharge of 9.87 mgd ADWF of wastewater, with 8.42 mgd (or 85.3%) capacity allocated to the City of Manteca and 1.45 mgd (or 14.7%) allocated to the City of Lathrop.

The existing wastewater collection system consists of 6- to 36-inch diameter gravity flow pipes, 6- to 18-inch diameter force mains, and 11 wastewater pump stations. The majority of the collection system serves the core of the City (i.e., the central trunk sewer shed), which is approximately bound by SR 120 to the south, Austin Road to the east, Lathrop Road to the north, and Airport Way to the west. Several residential subdivisions located on the perimeter of the City or beyond the central trunk sewer shed have installed temporary wastewater pump stations and facilities to connect to the central trunk shed. The majority of the collection system within the central trunk sewer shed flows by gravity to the Union Road pump station (located at the intersection of Union Road and Center Street). Downstream of the Union Road pump station, wastewater flows to the WQCF by gravity via a 36-inch diameter sewer.

The current WQCF is a combined biofilter-activated sludge plant which treats wastewater by mechanical screening, primary treatment, and secondary aeration and settling. Solids are thickened and biologically decomposed, and then trucked to a landfill. Within the cities of Manteca and Lathrop, wastewater is collected in buried pipelines and conveyed to the WQCF for treatment and disposal. Flows enter the plant at the influent pump station, pass through two mechanical screens to separate out large debris, and then move to the grit structures for primary treatment.

PRIMARY TREATMENT

Once screened for large debris, the influent enters aerated grit tanks where air is injected into the influent wastewater to separate solids from liquid. The purpose of the grit tanks is to remove relatively high-density inorganic particles from the wastewater stream. Flows from the grit chambers then enter the primary sedimentation basins to remove settleable solids and floatable scum such as oil and grease. Here, remaining solids are allowed to settle to the bottom of the basin where they are collected and then pumped to the digesters.

SECONDARY TREATMENT

Primary effluent is then sent through a biofilter feed pump station and two biotowers with high-rate plastic media. The plastic media serves as a base for fixed-film treatment that removes solids and organics from the wastewater. From the biotowers, wastewater flows into five fine-bubble activated sludge aeration basins where the effluent is infused with oxygen to provide a food source for microscopic organisms (which break down the effluent). Oxygen helps to speed up natural processes and causes the organisms to multiply, enlarge, and settle more quickly. From the activated sludge basins, flows are conveyed to three secondary clarifiers where suspended matter is removed by gravity while the effluent becomes clearer. Solids removed from the clarifiers are returned to the aeration basins or wasted to the solids handling facilities.

DISINFECTION AND DISCHARGE

Following secondary treatment, undisinfected secondary effluent is used to irrigate approximately 190 acres of City-owned cropland surrounding the WQCF. Effluent not used to irrigate cropland is directed to on-site chlorination and dechlorination facilities, and is subsequently discharged to the San Joaquin River via an existing side bank outfall.

As a result of the Phase III Schedule B improvements (discussed above), effluent is nitrified and denitrified to address low dissolved oxygen concentration concerns. Ammonia generated by the digestion process reduces dissolved oxygen in water, which leads to aquatic toxicity problems. To reduce ammonia, nitrification, or the process of converting nitrogen compounds (primarily ammonia) to nitrates and nitrites (from NH_3 to NO or NO_2), is utilized. To control nitrates, denitrification, or the process of converting the nitrate/nitrite to free nitrogen (nitrogen gas) is utilized. Although not normally harmful, the nitrate/nitrite compounds can be harmful to fish in high concentrations. By decreasing effluent ammonia levels, nitrification-denitrification thus increases dissolved oxygen concentrations in receiving waters to non-toxic levels. The specific process currently employed at the WQCF should allow the plant to avoid future ammonia toxicity problems.

Secondary effluent discharged to the San Joaquin River is only allowed when the river has a certain downstream flow condition. To address this operational constraint, Schedule D disinfected effluent off-line storage improvements will allow the WQCF to store effluent during certain river flow conditions. River flow data from an existing real time in-stream flow meter located at the Mossdale Bridge monitors the flow within the river.

SOLIDS HANDLING

Sludge removed in the secondary treatment process is thickened in two dissolved air flotation units, where air is injected into the activated sludge to separate the solids from the liquid. The sludge is then sent to two anaerobic digesters where organic constituents within the solids are broken down (“digested”) in the absence of oxygen

(anaerobic). A high-solids sludge centrifuge is then used to dewater the sludge, where it is subsequently taken to a local landfill for disposal.

3 PROJECT CHARACTERISTICS

The proposed project would expand WQCF capacity from 9.87 to 27 mgd ADWF and construct new trunk sewers to accommodate growth planned for in the City's General Plan (2003). The project includes treatment plant improvements for both river and land-based wastewater effluent disposal based on current and future probable water quality discharge requirements and projected flows.

The proposed project would construct treatment facilities to achieve compliance with water quality limitations including rapid mixing and flocculation tanks to address turbidity requirements, and a tertiary ultraviolet light disinfection treatment system to address wastewater reuse requirements. The proposed project would reach buildout via a two-phase, incremental expansion, with capacity increasing from 9.87 to 17.5 mgd (ADWF) in the first phase (Phase IV) and then from 17.5 to 27 mgd in the second phase (Phase V). The proposed increase in capacity would be accommodated using the City's long-term effluent disposal strategy of on-site land application, urban landscape irrigation, and river discharge.

The proposed project would also involve the incremental construction of three new trunk sewers and improvements to the existing collection system. These elements are described in greater detail below.

3.1 PROPOSED TREATMENT PLANT IMPROVEMENTS

The proposed project considers increasing the capacity of the WQCF by 17.13 mgd ADWF. This increase would provide an additional allocation of 2.52 mgd for the City of Lathrop and 14.61 mgd for the City of Manteca. This proposed expansion is consistent with adopted growth projections and adopted land use plans including the *City of Manteca General Plan 2023*. To achieve this proposed increase in WQCF capacity, the following physical improvements are proposed for the WQCF. All improvements, with the exception of the parallel 48-inch outfall pipe, would be located on-site, within the existing WQCF boundaries.

Proposed improvements include:

- expanded influent pump station;
- one mechanical screen;
- seven aerated grit removal tanks;
- ten primary sedimentation basins;
- seven aeration basins;
- seven secondary clarifiers;
- nine secondary effluent filters (for tertiary treatment);
- two rapid mixing tanks and six flocculation tanks;
- UV disinfection facility including four UV channels and effluent pumps;
- new equalization pond for off-line storage and timed discharge;
- seven new dissolved air flotation units for waste activated sludge thickening;
- four new anaerobic sludge digesters, and sludge heating and cogeneration facilities;
- one new sludge dewatering centrifuge;
- odor control facilities;
- one new 48-inch outfall pipe; and
- a side bank outfall structure.

3.2 WASTEWATER EFFLUENT DISPOSAL OPTIONS

The WQCF currently disposes of treated effluent through land application to City-owned property surrounding the WQCF or discharge to the San Joaquin River. At plant buildout, the City proposes to discharge treated effluent through a combination of on-site land application, urban landscape irrigation, and discharge to the San

Joaquin River. On-site land application would involve the disposal of approximately 0.73 mgd of wastewater on 190 acres of City-owned land. Urban landscape irrigation would involve the discharge of approximately 3.28 mgd of wastewater to 817 acres of irrigable City-owned urban land including parks, schools, cemeteries, and golf courses. All other treated effluent (22.99 mgd) would be pumped through the existing outfall pipe and a newly constructed outfall pipe to the San Joaquin River. Table 1 summarizes proposed treated effluent disposal methods for the WQCF at plant buildout:

Table 1
Treated Effluent Disposal Methods at Buildout

Disposal Option	Average Discharge Rate, mgd	Percentage of Total Discharge
On-Site Land Application	0.73	3%
San Joaquin River Discharge	22.99	85%
Urban Landscape Irrigation	3.28	12%
Total	**27.00**	**100%**

Source: Nolte Associates, Inc. 2005.

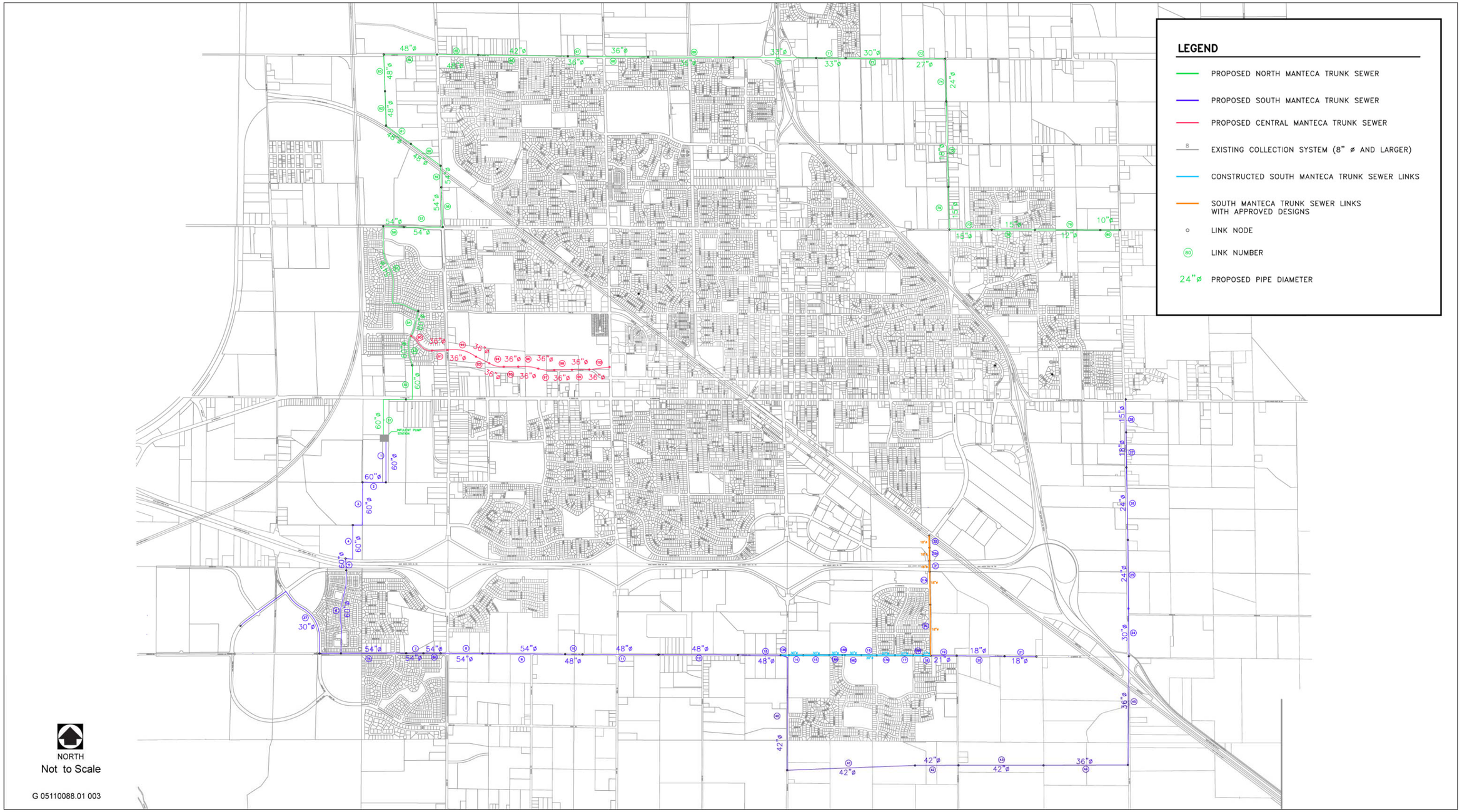
3.3 PROPOSED TRUNK SEWERS

The proposed project would incrementally add new trunk sewer segments to meet the development goals adopted in the *City of Manteca General Plan 2023*. Building upon the existing collection system, a gravity trunk sewer collection system would convey wastewater to an influent pump station located at the WQCF. As shown on Exhibit 3, the proposed project would construct three large diameter trunk sewers to collect wastewater from the north, central, and south sections of the City. The north and south trunk sewers would collect flow from areas where future growth is expected, while the central trunk sewer would connect the existing collection system to the north trunk sewer.

The proposed north trunk sewer would include thirty 10- to 60-inch diameter sewer segments measuring 44,219 feet (approximately 8.4 miles), while the south trunk sewer would include forty-six 15- to 60-inch diameter sewer segments measuring 63,561 feet (approximately 12 miles). Measuring 4,522 feet (approximately 0.9 mile), the central trunk sewer would include twelve 36-inch diameter sewer segments, and would eliminate the need for the existing Union Road pump station.

3.4 EXISTING COLLECTION SYSTEM IMPROVEMENTS

The proposed project also includes several minor improvements to existing sewer lines. Hydraulic modeling and a review of historical records found no major deficiencies in the existing collection system; however, several minor problems were identified including pipeline obstructions and miscellaneous flow problems. To address these problems, the proposed project includes a total of 11 collection system improvement projects such as manhole rehabilitations and eliminating pipeline sags throughout the City. These improvements would generally be located within the existing collection system network.



Source: Nolte Associates, Inc. 2005.

Proposed Trunk Sewer Alignments **Exhibit 3**

4 REQUIRED APPROVALS AND PERMITS

Implementation of the project would require approval by the Manteca City Council as the Lead Agency. Other permitting agencies with permitting approval or review authority over portions of the project may include:

- Regional Water Quality Control Board (RWQCB) – National Pollutant Discharge Elimination System (NPDES) General Construction Stormwater Permit, General Order for Dewatering, NPDES Waste Discharge Permit.
- San Joaquin Valley Air Pollution Control District – Authority to Construct and Permit to Operate.
- California Department of Health Services rules concerning the use of wastewater effluent for urban irrigation purposes.

5 POTENTIAL ENVIRONMENTAL EFFECTS

Proposed wastewater treatment facility construction would occur within the existing WQCF boundaries, while construction of new trunk sewers would occur in several areas throughout the City primarily within existing roadway alignments. The proposed 48-inch effluent outfall would be constructed alongside the existing outfall in the east bank of the San Joaquin River.

The EIR will identify and describe the potential environmental impacts associated with implementation of the proposed project. Mitigation measures will be recommended where appropriate to reduce potentially significant and significant impacts. The following issues are proposed for analysis.

5.1 AESTHETICS

The proposed project would increase the size of the existing WQCF and involve the construction of pipelines and pump stations in area roadways. The potential visual impacts from construction of new wastewater treatment facilities and trunk sewers, and operation of the proposed wastewater treatment plant will be evaluated through the use of ground-level site photographs from sensitive viewpoints near the project site. The EIR will evaluate the extent of visibility of the project from surrounding, sensitive, public viewpoints.

5.2 AIR QUALITY

The proposed project would involve both construction and operational air quality impacts. The EIR will describe regional and local air quality in the vicinity of the project site and evaluate construction and operational impacts to air quality. The project's estimated air emissions will be quantified and compared to emissions thresholds of the San Joaquin Valley Air Pollution Control District (SJVAPCD). A list of mitigation measures will be prepared for any impacts found to be significant or potentially significant.

5.3 BIOLOGICAL RESOURCES

The proposed project has the potential to affect several special status species including Swainson's hawk, valley elderberry longhorn beetle, California tiger salamander, and San Joaquin kit fox. Of particular concern is the impact of effluent discharge on the thermal conditions of the river and corresponding migratory fish patterns. The EIR will assess all potentially significant direct and indirect impacts on biological resources posed by the project. Feasible and practical mitigation measures that would minimize or eliminate potential adverse impacts on biological resources will be recommended, including parameters for protection/enhancement of environmentally sensitive habitat. Increased wastewater discharges also have the potential to affect fisheries resources in the San Joaquin River. The EIR will assess all potentially significant direct and indirect impacts (including thermal

impacts) on fisheries and aquatic resources resulting from the proposed project. The impact analysis will focus on evaluating the effects of increased effluent discharge on aquatic life in the San Joaquin River and its tributaries. Mitigation measures to minimize or avoid potential adverse affects will be recommended where appropriate.

5.4 CULTURAL RESOURCES

The EIR will include recommendations for the management or treatment of significant and potentially significant archaeological and historical resources, as necessary, with a focus on mitigation measures that may be needed to avoid or substantially lessen potentially significant impacts.

5.5 GEOLOGY, SOILS, AND SEISMICITY

The proposed project would require grading, trenching, and other earthwork to upgrade and expand the City's WQCF and wastewater collection system. The EIR will evaluate potential geologic hazards related to soil erosion, strong ground shaking, subsidence, and liquefaction. Recommendations will be made to mitigate significant adverse impacts where feasible.

5.6 HAZARDS AND HAZARDOUS MATERIALS

The proposed project could expose humans to hazardous materials or hazardous waste. The analysis presented in the EIR will qualitatively evaluate the potential for human and environmental exposure to any pre-existing hazardous materials/waste in the project area. The EIR will identify mitigation measures to ensure that any significant potential for exposure to hazardous materials/waste is avoided.

5.7 HYDROLOGY AND WATER QUALITY

The proposed project would increase treated effluent discharges, and has the potential to adversely affect water quality in the San Joaquin River. The EIR will include a hydrology and water quality impact assessment that is focused on short-term temporary construction-related effects, long-term operations-related water quality impacts, and cumulative onsite and offsite hydrology and water quality impacts. The EIR will analyze impacts related to changes in the water quality of San Joaquin River and downstream surface water bodies caused by proposed changes in treated effluent discharges.

5.8 LAND USE

The proposed project would include direct land use effects associated with WQCF and trunk sewer construction, and indirect land use effects of providing wastewater capacity to serve future growth areas of the City. To the degree that analysis of growth-related effects provided in the City's General Plan (2003) and other relevant environmental documents is applicable to the project, it will be summarized in the EIR where appropriate. The compatibility of project facilities with existing and planned land uses will be evaluated. Mitigation measures will be recommended if land use issues contribute to significant physical environmental impacts.

5.9 NOISE

The EIR will describe the project's construction and operational noise impacts including noise generated from existing and proposed traffic and will compare these impacts to applicable noise thresholds.

5.10 PUBLIC SERVICES

The WQCF and collection system master plan project is a wastewater collection, treatment, and disposal project, and environmental impacts associated with construction of these facilities will be addressed throughout the EIR.

The EIR will analyze the additional capacity required to meet projected needs, and if significant effects to public services are identified, they will be discussed in the EIR.

5.11 TRANSPORTATION AND TRAFFIC

The EIR will analyze the project's construction-related and operations-related vehicle trips and their impacts to local roadways within the project area. The analysis will identify the maximum construction at any one time, truck haul routes, employee and truck trips, staging areas, emergency access, increases in roadway hazards, and increased congestion during construction. The EIR will also address operational traffic impacts associated with operation of the expanded wastewater treatment plant.

5.12 UTILITIES AND SERVICE SYSTEMS

The WQCF and collection system master plan project is a wastewater collection, treatment, and disposal project, and environmental impacts associated with construction of these facilities will be addressed throughout the EIR. The EIR will analyze the additional capacity required to meet projected needs, and if significant effects to public services are identified, they will be discussed in the EIR.

APPENDIX B

Air Quality Modeling Data

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca WQCF
Project Name: Manteca WQCF Phase 1 Year 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.12	0.82	0.99	0.00	0.31	0.03	0.28
TOTALS (tpy, mitigated)	0.12	0.82	0.99	0.00	0.31	0.03	0.28

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.04	0.30	0.36	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.04	0.30	0.36	0.00	0.01	0.01	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca WQCF
Project Name: Manteca WQCF Phase 1 Year 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2008
Construction Duration: 12
Total Land Use Area to be Developed: 5 acres
Maximum Acreage Disturbed Per Day: 1.25 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 15000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.28	-	0.28
Off-Road Diesel	0.08	0.49	0.63	-	0.02	0.02	0.00
On-Road Diesel	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Total tons/year	0.08	0.51	0.64	0.00	0.30	0.02	0.28
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.04	0.31	0.33	-	0.01	0.01	0.00
Bldg Const Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.04	0.31	0.35	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.12	0.82	0.99	0.00	0.31	0.03	0.28
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.04	0.30	0.34	-	0.01	0.01	0.00
Bldg Const Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.04	0.30	0.36	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.04	0.30	0.36	0.00	0.01	0.01	0.00

Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '08
Phase 2 Duration: 2 months
On-Road Truck Travel (VMT): 46
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Crawler Tractors	143	0.575	8.0
0	Graders	174	0.575	8.0
0	Off Highway Trucks	417	0.490	8.0
0	Rubber Tired Loaders	165	0.465	8.0
0	Scrapers	313	0.660	8.0
0	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Aug '08
Phase 3 Duration: 10 months
  Start Month/Year for SubPhase Building: Aug '08
  SubPhase Building Duration: 10 months
  Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
0	Other Equipment	190	0.620	8.0

  SubPhase Architectural Coatings Turned OFF
  SubPhase Asphalt Turned OFF

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Construction

The user has overridden the Default Phase Lengths

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Grading Yr 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.48	3.46	3.90	0.00	0.29	0.14	0.15

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.35	2.36	2.86	0.00	0.20	0.09	0.11

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Grading Yr 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2008
Construction Duration: 12
Total Land Use Area to be Developed: 31 acres
Maximum Acreage Disturbed Per Day: 0.2 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.15	-	0.15
Off-Road Diesel	0.46	3.23	3.59	-	0.13	0.13	0.00
On-Road Diesel	0.01	0.22	0.05	0.00	0.01	0.01	0.00
Worker Trips	0.01	0.01	0.26	0.00	0.00	0.00	0.00
Total tons/year	0.48	3.46	3.90	0.00	0.29	0.14	0.15
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total all phases tons/yr	0.48	3.46	3.90	0.00	0.29	0.14	0.15
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.11	-	0.11
Off-Road Diesel	0.33	2.20	2.64	-	0.09	0.09	0.00
On-Road Diesel	0.01	0.15	0.03	0.00	0.00	0.00	0.00
Worker Trips	0.01	0.01	0.19	0.00	0.00	0.00	0.00
Total tons/year	0.35	2.36	2.86	0.00	0.20	0.09	0.11
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total all phases tons/yr	0.35	2.36	2.86	0.00	0.20	0.09	0.11

Phase 3 - Building Construction Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '08
Phase 2 Duration: 12 months
On-Road Truck Travel (VMT): 136
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Other Equipment	190	0.620	2.0
2	Rubber Tired Loaders	165	0.465	3.0
2	Signal Boards	119	0.820	8.0
2	Tractor/Loaders/Backhoes	79	0.465	3.0

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Install Yr 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.29	1.92	2.38	0.00	0.07	0.07	0.00
TOTALS (tpy, mitigated)	0.29	1.92	2.38	0.00	0.07	0.07	0.00

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.30	1.32	1.74	0.00	0.05	0.05	0.00
TOTALS (tpy, mitigated)	0.30	1.32	1.74	0.00	0.05	0.05	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Install Yr 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2008
Construction Duration: 12
Total Land Use Area to be Developed: 36 acres
Maximum Acreage Disturbed Per Day: 0.2 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.29	1.92	2.33	-	0.07	0.07	0.00
Bldg Const Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.29	1.92	2.38	0.00	0.07	0.07	0.00
Total all phases tons/yr	0.29	1.92	2.38	0.00	0.07	0.07	0.00
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.21	1.32	1.70	-	0.05	0.05	0.00
Bldg Const Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.09	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.30	1.32	1.74	0.00	0.05	0.05	0.00
Total all phases tons/yr	0.30	1.32	1.74	0.00	0.05	0.05	0.00

Phase 2 - Site Grading Assumptions: Phase Turned OFF

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jun '08
Phase 3 Duration: 12 months
Start Month/Year for SubPhase Building: Jun '08
SubPhase Building Duration: 12 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Other Equipment	190	0.620	4.0
2	Rubber Tired Loaders	165	0.465	5.0

Start Month/Year for SubPhase Architectural Coatings: Apr '09
SubPhase Architectural Coatings Duration: 1.2 months
SubPhase Asphalt Turned OFF

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Pave Yr 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.09	0.45	0.70	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.09	0.45	0.70	0.00	0.01	0.01	0.00

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.07	0.33	0.49	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.07	0.33	0.49	0.00	0.01	0.01	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Pave Yr 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2008
Construction Duration: 12
Total Land Use Area to be Developed: 36 acres
Maximum Acreage Disturbed Per Day: 0.2 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.02	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.06	0.37	0.55	-	0.01	0.01	0.00
Asphalt On-Road Diesel	0.00	0.07	0.02	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.01	0.01	0.13	0.00	0.00	0.00	0.00
Total tons/year	0.09	0.45	0.70	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.09	0.45	0.70	0.00	0.01	0.01	0.00
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.02	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.05	0.27	0.39	-	0.01	0.01	0.00
Asphalt On-Road Diesel	0.00	0.05	0.01	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.01	0.09	0.00	0.00	0.00	0.00
Total tons/year	0.07	0.33	0.49	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.07	0.33	0.49	0.00	0.01	0.01	0.00

Phase 2 - Site Grading Assumptions: Phase Turned OFF

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jun '08
Phase 3 Duration: 12 months
SubPhase Building Turned OFF
SubPhase Architectural Coatings Turned OFF
Start Month/Year for SubPhase Asphalt: Jun '08
SubPhase Asphalt Duration: 12 months
Acres to be Paved: 31
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Pavers	132	0.590	1.5
2	Rollers	114	0.430	1.5

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca WQCF
Project Name: Manteca WQCF Phase 1 Year 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.07	0.43	0.63	0.00	0.02	0.02	0.00
TOTALS (tpy, mitigated)	0.07	0.43	0.63	0.00	0.02	0.02	0.00

*** 2010 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.21	0.30	0.49	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.21	0.30	0.49	0.00	0.01	0.01	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca WQCF
Project Name: Manteca WQCF Phase 1 Year 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2009
Construction Duration: 12
Total Land Use Area to be Developed: 5 acres
Maximum Acreage Disturbed Per Day: 1.25 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 15000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.06	0.42	0.48	-	0.02	0.02	0.00
Bldg Const Worker Trips	0.01	0.01	0.15	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.07	0.43	0.63	0.00	0.02	0.02	0.00
Total all phases tons/yr	0.07	0.43	0.63	0.00	0.02	0.02	0.00
*** 2010***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.04	0.28	0.36	-	0.01	0.01	0.00
Bldg Const Worker Trips	0.00	0.01	0.11	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.17	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.01	0.02	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.21	0.30	0.49	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.21	0.30	0.49	0.00	0.01	0.01	0.00

Phase 2 - Site Grading Assumptions: Phase Turned OFF

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jun '09
Phase 3 Duration: 12 months
Start Month/Year for SubPhase Building: Jun '09
SubPhase Building Duration: 12 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
0	Other Equipment	190	0.620	8.0

Start Month/Year for SubPhase Architectural Coatings: Apr '10
SubPhase Architectural Coatings Duration: 1.2 months
Start Month/Year for SubPhase Asphalt: May '10
SubPhase Asphalt Duration: 0.6 months
Acres to be Paved: 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
0	Pavers	132	0.590	8.0
0	Rollers	114	0.430	8.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Construction

Architectural Coatings: # ROG/ft2 (non-res) changed from 0.0185 to 0.0116

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Grading Yr 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.48	3.29	3.98	0.00	0.27	0.12	0.15

*** 2010 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.35	2.24	2.92	0.00	0.19	0.08	0.11

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Grading Yr 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2009
Construction Duration: 12
Total Land Use Area to be Developed: 31 acres
Maximum Acreage Disturbed Per Day: 0.2 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.15	-	0.15
Off-Road Diesel	0.46	3.08	3.70	-	0.12	0.12	0.00
On-Road Diesel	0.01	0.20	0.04	0.00	0.01	0.00	0.00
Worker Trips	0.01	0.01	0.24	0.00	0.00	0.00	0.00
Total tons/year	0.48	3.29	3.98	0.00	0.27	0.12	0.15
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total all phases tons/yr	0.48	3.29	3.98	0.00	0.27	0.12	0.15
*** 2010***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.11	-	0.11
Off-Road Diesel	0.33	2.10	2.72	-	0.08	0.08	0.00
On-Road Diesel	0.01	0.13	0.03	0.00	0.00	0.00	0.00
Worker Trips	0.01	0.01	0.17	0.00	0.00	0.00	0.00
Total tons/year	0.35	2.24	2.92	0.00	0.19	0.08	0.11
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total all phases tons/yr	0.35	2.24	2.92	0.00	0.19	0.08	0.11

Phase 3 - Building Construction Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '09
Phase 2 Duration: 12 months
On-Road Truck Travel (VMT): 136
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Other Equipment	190	0.620	2.0
2	Rubber Tired Loaders	165	0.465	3.0
2	Signal Boards	119	0.820	8.0
2	Tractor/Loaders/Backhoes	79	0.465	3.0

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Install Yr 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.29	1.85	2.43	0.00	0.07	0.07	0.00
TOTALS (tpy, mitigated)	0.29	1.85	2.43	0.00	0.07	0.07	0.00

*** 2010 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.30	1.28	1.77	0.00	0.04	0.04	0.00
TOTALS (tpy, mitigated)	0.30	1.28	1.77	0.00	0.04	0.04	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Install Yr 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2009
Construction Duration: 12
Total Land Use Area to be Developed: 36 acres
Maximum Acreage Disturbed Per Day: 0.2 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.29	1.85	2.38	-	0.07	0.07	0.00
Bldg Const Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.29	1.85	2.43	0.00	0.07	0.07	0.00
Total all phases tons/yr	0.29	1.85	2.43	0.00	0.07	0.07	0.00
*** 2010***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.21	1.28	1.73	-	0.04	0.04	0.00
Bldg Const Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.09	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.30	1.28	1.77	0.00	0.04	0.04	0.00
Total all phases tons/yr	0.30	1.28	1.77	0.00	0.04	0.04	0.00

Phase 2 - Site Grading Assumptions: Phase Turned OFF

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jun '09
Phase 3 Duration: 12 months
Start Month/Year for SubPhase Building: Jun '09
SubPhase Building Duration: 12 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Other Equipment	190	0.620	4.0
2	Rubber Tired Loaders	165	0.465	5.0

Start Month/Year for SubPhase Architectural Coatings: Apr '10
SubPhase Architectural Coatings Duration: 1.2 months
SubPhase Asphalt Turned OFF

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Pave Yr 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.09	0.45	0.68	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.09	0.45	0.68	0.00	0.01	0.01	0.00

*** 2010 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.07	0.31	0.49	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.07	0.31	0.49	0.00	0.01	0.01	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Long
Project Name: Manteca Long Pave Yr 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2009
Construction Duration: 12
Total Land Use Area to be Developed: 36 acres
Maximum Acreage Disturbed Per Day: 0.2 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.02	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.06	0.37	0.55	-	0.01	0.01	0.00
Asphalt On-Road Diesel	0.00	0.07	0.01	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.01	0.01	0.12	0.00	0.00	0.00	0.00
Total tons/year	0.09	0.45	0.68	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.09	0.45	0.68	0.00	0.01	0.01	0.00
*** 2010***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.02	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.05	0.27	0.39	-	0.01	0.01	0.00
Asphalt On-Road Diesel	0.00	0.04	0.01	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.09	0.00	0.00	0.00	0.00
Total tons/year	0.07	0.31	0.49	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.07	0.31	0.49	0.00	0.01	0.01	0.00

Phase 2 - Site Grading Assumptions: Phase Turned OFF

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jun '09
Phase 3 Duration: 12 months
SubPhase Building Turned OFF
SubPhase Architectural Coatings Turned OFF
Start Month/Year for SubPhase Asphalt: Jun '09
SubPhase Asphalt Duration: 12 months
Acres to be Paved: 31
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Pavers	132	0.590	1.5
2	Rollers	114	0.430	1.5

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Out-
Project Name: Manteca Outfall Central Grading
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.23	1.68	1.83	0.00	0.14	0.06	0.08

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.06	0.46	0.54	0.00	0.04	0.02	0.02

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Out-
Project Name: Manteca Outfall Central Grading
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2008
Construction Duration: 9
Total Land Use Area to be Developed: 10.6 acres
Maximum Acreage Disturbed Per Day: 0.1 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.08	-	0.08
Off-Road Diesel	0.22	1.52	1.70	-	0.06	0.06	0.00
On-Road Diesel	0.01	0.15	0.03	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.01	0.10	0.00	0.00	0.00	0.00
Total tons/year	0.23	1.68	1.83	0.00	0.14	0.06	0.08
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total all phases tons/yr	0.23	1.68	1.83	0.00	0.14	0.06	0.08
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.02	-	0.02
Off-Road Diesel	0.06	0.42	0.50	-	0.02	0.02	0.00
On-Road Diesel	0.00	0.04	0.01	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00
Total tons/year	0.06	0.46	0.54	0.00	0.04	0.02	0.02
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total all phases tons/yr	0.06	0.46	0.54	0.00	0.04	0.02	0.02

Phase 3 - Building Construction Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '08
Phase 2 Duration: 9 months
On-Road Truck Travel (VMT): 90
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Other Equipment	190	0.620	8.0
1	Rubber Tired Loaders	165	0.465	3.0
1	Tractor/Loaders/Backhoes	79	0.465	3.0

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Out-
Project Name: Manteca Outfall Central Install
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.14	0.96	1.22	0.00	0.04	0.04	0.00
TOTALS (tpy, mitigated)	0.14	0.96	1.22	0.00	0.04	0.04	0.00

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.13	0.26	0.36	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.13	0.26	0.36	0.00	0.01	0.01	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Out-
Project Name: Manteca Outfall Central Install
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2008
Construction Duration: 9
Total Land Use Area to be Developed: 36 acres
Maximum Acreage Disturbed Per Day: 0.2 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.14	0.96	1.17	-	0.04	0.04	0.00
Bldg Const Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.14	0.96	1.22	0.00	0.04	0.04	0.00
Total all phases tons/yr	0.14	0.96	1.22	0.00	0.04	0.04	0.00
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.04	0.26	0.34	-	0.01	0.01	0.00
Bldg Const Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.09	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.13	0.26	0.36	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.13	0.26	0.36	0.00	0.01	0.01	0.00

Phase 2 - Site Grading Assumptions: Phase Turned OFF

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jun '08
Phase 3 Duration: 9 months
Start Month/Year for SubPhase Building: Jun '08
SubPhase Building Duration: 9 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Other Equipment	190	0.620	4.0
1	Rubber Tired Loaders	165	0.465	5.0

Start Month/Year for SubPhase Architectural Coatings: Feb '09
SubPhase Architectural Coatings Duration: 0.9 months
SubPhase Asphalt Turned OFF

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Out-
Project Name: Manteca Outfall Central Pave
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.04	0.22	0.33	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.04	0.22	0.33	0.00	0.01	0.01	0.00

*** 2009 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.01	0.06	0.10	0.00	0.00	0.00	0.00
TOTALS (tpy, mitigated)	0.01	0.06	0.10	0.00	0.00	0.00	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Out-
Project Name: Manteca Outfall Central Pave
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2008
Construction Duration: 9
Total Land Use Area to be Developed: 36 acres
Maximum Acreage Disturbed Per Day: 0.2 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 5000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.01	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.03	0.19	0.27	-	0.01	0.01	0.00
Asphalt On-Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Total tons/year	0.04	0.22	0.33	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.04	0.22	0.33	0.00	0.01	0.01	0.00
*** 2009***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.01	0.05	0.08	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Total tons/year	0.01	0.06	0.10	0.00	0.00	0.00	0.00
Total all phases tons/yr	0.01	0.06	0.10	0.00	0.00	0.00	0.00

Phase 2 - Site Grading Assumptions: Phase Turned OFF

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jun '08
Phase 3 Duration: 9 months
SubPhase Building Turned OFF
SubPhase Architectural Coatings Turned OFF
Start Month/Year for SubPhase Asphalt: Jun '08
SubPhase Asphalt Duration: 9 months
Acres to be Paved: 10.6
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Pavers	132	0.590	1.5
1	Rollers	114	0.430	1.5

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca WQCF
Project Name: Manteca WQCF Phase 2 Year 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2018 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.12	0.75	1.02	0.00	0.31	0.03	0.28
TOTALS (tpy, mitigated)	0.12	0.75	1.02	0.00	0.31	0.03	0.28

*** 2019 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.04	0.28	0.37	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.04	0.28	0.37	0.00	0.01	0.01	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca WQCF
Project Name: Manteca WQCF Phase 2 Year 1
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2018
Construction Duration: 12
Total Land Use Area to be Developed: 5 acres
Maximum Acreage Disturbed Per Day: 1.25 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 15000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2018***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.28	-	0.28
Off-Road Diesel	0.08	0.46	0.64	-	0.02	0.02	0.00
On-Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Total tons/year	0.08	0.47	0.65	0.00	0.30	0.02	0.28
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.04	0.28	0.36	-	0.01	0.01	0.00
Bldg Const Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.04	0.28	0.37	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.12	0.75	1.02	0.00	0.31	0.03	0.28
*** 2019***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.04	0.28	0.36	-	0.01	0.01	0.00
Bldg Const Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.04	0.28	0.37	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.04	0.28	0.37	0.00	0.01	0.01	0.00

Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '18
Phase 2 Duration: 2 months
On-Road Truck Travel (VMT): 46
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Crawler Tractors	143	0.575	8.0
0	Graders	174	0.575	8.0
0	Off Highway Trucks	417	0.490	8.0
0	Rubber Tired Loaders	165	0.465	8.0
0	Scrapers	313	0.660	8.0
0	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Aug '18
Phase 3 Duration: 10 months
Start Month/Year for SubPhase Building: Aug '18
SubPhase Building Duration: 10 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
0	Other Equipment	190	0.620	8.0

SubPhase Architectural Coatings Turned OFF
SubPhase Asphalt Turned OFF

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca WQCF
Project Name: Manteca WQCF Phase 2 Year 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

CONSTRUCTION EMISSION ESTIMATES

*** 2019 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.06	0.40	0.59	0.00	0.02	0.02	0.00
TOTALS (tpy, mitigated)	0.06	0.40	0.59	0.00	0.02	0.02	0.00

*** 2020 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (tpy, unmitigated)	0.21	0.29	0.44	0.00	0.01	0.01	0.00
TOTALS (tpy, mitigated)	0.21	0.29	0.44	0.00	0.01	0.01	0.00

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca WQCF
Project Name: Manteca WQCF Phase 2 Year 2
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

Construction Start Month and Year: June, 2019
Construction Duration: 12
Total Land Use Area to be Developed: 5 acres
Maximum Acreage Disturbed Per Day: 1.25 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 15000

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (tons/year)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2019***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.06	0.40	0.50	-	0.02	0.02	0.00
Bldg Const Worker Trips	0.00	0.00	0.09	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.06	0.40	0.59	0.00	0.02	0.02	0.00
Total all phases tons/yr	0.06	0.40	0.59	0.00	0.02	0.02	0.00
*** 2020***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.04	0.28	0.36	-	0.01	0.01	0.00
Bldg Const Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.17	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.01	0.02	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons/year	0.21	0.29	0.44	0.00	0.01	0.01	0.00
Total all phases tons/yr	0.21	0.29	0.44	0.00	0.01	0.01	0.00

Phase 2 - Site Grading Assumptions: Phase Turned OFF

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jun '19
Phase 3 Duration: 12 months
Start Month/Year for SubPhase Building: Jun '19
SubPhase Building Duration: 12 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
0	Other Equipment	190	0.620	8.0

Start Month/Year for SubPhase Architectural Coatings: Apr '20
SubPhase Architectural Coatings Duration: 1.2 months
Start Month/Year for SubPhase Asphalt: May '20
SubPhase Asphalt Duration: 0.6 months
Acres to be Paved: 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
0	Pavers	132	0.590	8.0
0	Rollers	114	0.430	8.0

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Oper
Project Name: Manteca operations
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Tons/Year)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (tpy, unmitigated)	0.05	0.15	0.12	0.00	0.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (tpy, unmitigated)	0.04	0.02	0.23	0.00	0.07

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (tpy, unmitigated)	0.09	0.17	0.35	0.00	0.07

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Documents and Settings\Kurtzj\My Documents\Active\SAC\Manteca\Manteca AQ\Urbemis\Manteca Oper
Project Name: Manteca operations
Project Location: San Joaquin Valley
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Tons/Year)

AREA SOURCE EMISSION ESTIMATES (Tons per Year, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.01	0.15	0.12	0.00	0.00
Hearth	0.00	0.00	0.00	0.00	0.00
Landscaping	0.00	0.00	0.00	0.00	0.00
Consumer Prdcts	0.00	-	-	-	-
Architectural Coatings	0.03	-	-	-	-
TOTALS (tpy, unmitigated)	0.05	0.15	0.12	0.00	0.00

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
General light industry	0.04	0.02	0.23	0.00	0.07
TOTAL EMISSIONS (tons/yr)	0.04	0.02	0.23	0.00	0.07

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2020 Season: Annual

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Acreage	Trip Rate	No. Units	Total Trips
General light industry		1.00 trips/1000 sq. ft.	30.00	30.00
		Sum of Total Trips		30.00
		Total Vehicle Miles Traveled		252.75

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.40	0.40	99.40	0.20
Light Truck < 3,750 lbs	15.30	0.70	98.00	1.30
Light Truck 3,751- 5,750	16.40	0.60	98.80	0.60
Med Truck 5,751- 8,500	10.10	0.00	98.60	1.40
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.80	0.00	0.00	100.00
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.00	0.00	50.00	50.00
Motorcycle	0.60	50.00	50.00	0.00
School Bus	0.00	0.00	0.00	100.00
Motor Home	0.00	0.00	93.30	6.70

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip Speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

% of Trips - Commercial (by land use)

General light industry	50.0	25.0	25.0

Changes made to the default values for Land Use Trip Percentages

Changes made to the default values for Area

The hearth option switch changed from on to off.
The landscape option switch changed from on to off.
The nonresidential Arch. Coatings ROG emission factor changed from 0.0185 to 0.0116.

Changes made to the default values for Operations

The med truck 5751-8500 percentage changed from 7.3 to 10.1.
The urban bus percentage changed from 0.2 to 0.
The motorcycle percentage changed from 1.6 to 0.6.
The school bus percentage changed from 0.1 to 0.
The motorhome percentage changed from 1.5 to 0.
The operational emission year changed from 2005 to 2020.

Manteca TAC - POTW worksheet 120506

San Joaquin Valley Unified Air Pollution Control District

basic worksheet updated january 2006

		GMBM	MMBM	
Facility Score		17.290623	5.9976493	**If MMBM ≥10, HRA is required**

Facility Name:	Manteca WQCF
Hour of Operation:	8760
Influent (MGD)=	27

	Y/N
Primary Treatment	Y
Secondary Treatment	Y
Sludge Drying Beds	N
Chlorine Contact Tank	N

Digester Gas

	Rate in
External/Internal	MMCFH
External	0.00575
Hours of Operation	24

LPG

External		
MMBTUH	Gal/hr	FLARE (Y/N)
Hours of Operation:		0

LPG

Internal		
HP	Gal/hr	Turbine (Y/N)
0	0	
Hours of Operation:		0

Receptor Information

Receptor Distance	
Receptor Description	

POTW EMISSION ESTIMATION

Substance Name:	CAS	ug/l		GMBM lbs/yr	GMBM lbs/hr		MMBM lbs/yr	MMBM lbs/hr
Chloroform	67663	8.1		664.848	0.0758959		1.89E+02	2.15E-02
!,4,Dichlorobenzene	106467	4.65		381.672	0.0435699		1.07E+02	1.22E-02
Ethyl Benzene	100414	2.25		184.68	0.0210822		5.17E+01	5.90E-03
Methylene Chloride	750992	7.8		640.224	0.0730849		1.79E+02	2.05E-02
Trichloroethylene	79016	2.6		213.408	0.0243616		5.98E+01	6.82E-03
1,1,1,Trichoroethane	71556	2.65		217.512	0.0248301		6.09E+01	6.95E-03
Phenol	108952	9.8		804.384	0.0918247		5.63E+01	6.43E-03
Benzene	71432	0.58		47.6064	0.0054345		1.33E+01	1.52E-03
Styrene	100425	5		410.4	0.0468493		1.15E+02	1.31E-02
Toluene	108883	4.9		402.192	0.0459123		1.13E+02	1.29E-02
Xylene	1210	5.86		480.9888	0.0549074		1.35E+02	1.54E-02
Ammonia	7664417	299.5		24582.96	2.806274		3.56E+03	4.07E-01
Hydrogen Sulfide	7783064	19.5		1600.56	0.1827123		1.17E+03	1.34E-01

DIGESTER GAS CALCULATIONS

Substance Name:	CAS	External	Internal		Digester lbs/hr		Digester lbs/yr	
Ammonia	7664417	3.72E-03	2.48E-02		2.14E-05		5.13E-04	
Benzene	71432	1.33E-03	8.85E-03		7.65E-06		1.84E-04	
Chlorobenzene	108907	3.08E-04	2.05E-03		1.77E-06		4.25E-05	
Ethyl Benzene	100414	2.61E-02	2.61E-02		1.50E-04		3.60E-03	
Formaldehyde	50000	1.46	5.10E-01		8.40E-03		2.01E-01	
Hydrogen Choloride	7647010		2.89E+00		0.00E+00		0.00E+00	
Hydrogen Sulfide	7783064	1.17	5.84E-01		6.73E-03		1.61E-01	
Methyl Chloroform	71556	4.19E-03	4.19E-03		2.41E-05		5.78E-04	
Methylene Chloride	75092	8.67E-02	8.67E-02		4.99E-04		1.20E-02	
Perchloroethylene	127184	2.43E-03	1.62E-04		1.40E-05		3.35E-04	
Toluene	108883	9.59E-03	9.59E-03		5.51E-05		1.32E-03	
Trichloroethylene	79061	7.31E-04	4.87E-05		4.20E-06		1.01E-04	
Vinyl Chloride	75014	1.32E-03	6.87E-03		7.59E-06		1.82E-04	
Vinylidene Chloride	75354	3.08E-04	5.13E-04		1.77E-06		4.25E-05	
Xylene	1210	5.57E-02	1.15E-01		3.20E-04		7.69E-03	

Facility Prioritization								
		GMBM						
Substance Name:	CAS	TOTAL						
		lbs/yr	lbs/hr		Cancer	Chronic	Acute	
1,4,Dichlorobenzene	106467	381.672	0.04357		7.1372664	0.0082	0	0.00816935
1,1,1,Trichoroethane	71556	217.512	0.02483		0	0.0037	0.000548	0.00372452
Acetaldehyde	75070	0	0		0	0	0	0
Acrolein	107028	0.00E+00	0.00E+00		0	0	0	0
Ammonia	7664417	2.46E+04	2.81E+00		0	2.1047	1.315451	2.10472152
Benzene	71432	4.76E+01	5.44E-03		2.3470046	0.0136	0.006279	0.01360542
Chlorobenzene	108907	4.25E-05	1.77E-06		0	3E-07	0	2.6565E-07
Chloroform	67663	664.848	0.075896		5.9902805	0.0379	0.758959	0.7589589
Ethyl Benzene	100414	1.85E+02	2.12E-02		0	0.0016	0	0.00159242
Formaldehyde	50000	2.01E-01	8.40E-03		0.0020551	0.4198	0.133963	0.41975
Hydrogen Choloride	7647010	0.00E+00	0.00E+00		0	0	0	0
Hydrogen Sulfide	7783064	1.60E+03	1.89E-01		0	2.8416	6.765708	6.76570817
Napthalene	91203	0.00E+00	0.00E+00		0	0	0	0
Methyl Chloroform	71556	5.78E-04	2.41E-05		0	4E-06	5.31E-07	3.6139E-06
Methylene Chloride	75092	6.40E+02	7.36E-02		1.0884011	0.0276	0.007884	0.0275938
PAH's	1150	0.00E+00	0.00E+00		0	0	0	0
Perchloroethylene	127184	3.35E-04	1.40E-05		3.363E-06	6E-05	1.05E-06	5.9882E-05
Phenol	108952	804.384	0.091825		0	0.0689	0.023748	0.06886849
Propylene	115071	0	0		0	0	0	0
Styrene	100425	410.4	0.046849		0	0.0078	0.003346	0.00780822
Toluene	108883	4.02E+02	4.60E-02		0	0.023	0.001864	0.02298374
Trichloroethylene	79016	2.13E+02	2.44E-02		0.7255875	0.0061	0	0.00609146
Vinyl Chloride	75014	1.82E-04	7.59E-06		2.415E-05	4E-05	6.33E-08	4.3788E-05
Vinylidene Chloride	75354	4.25E-05	1.77E-06		0	4E-06	0	3.795E-06
Xylene	1210	4.81E+02	5.49E-02		0	0.0118	0.003744	0.0117675
				TOTALS	**17.290623**			
						17.291	10.22145	

Group A									
	Ethyl Benzene	Benzene	Styrene	Toluene	Xylene				
Primary Treatment	18.468	4.76064	41.04	40.2192	48.09888		Input	Removed	Removal
Secondary Treatment	33.2424	8.569152	73.872	72.39456	86.57798		1	0.4	0.1
Sludge Drying Beds	0	0	0	0	0		0.6	0.564	0.18
Chlorine Contact Tank	0	0	0	0	0		0	0	0
Total Lbs/Yr	51.7104	13.329792	114.912	112.6138	134.6769		0.036	0.036	0
								1	0.28
Group B									
	Dichloro-	Methylene-	Trichloro-	Trichloro-					
	benzene	chloride	ethylene	ethane					
Primary Treatment	38.1672	64.0224	21.3408	21.7512			Input	Removed	Removal
Secondary Treatment	68.70096	115.24032	38.41344	39.15216			1	0.4	0.1
Sludge Drying Beds	0	0	0	0			0.6	0.42	0.18
Chlorine Contact Tank	0	0	0	0			0	0	0
Total Lbs/Yr	106.86816	179.26272	59.75424	60.90336			0.18	0.162	0
								0.982	0.28
Group C									
	Phenol								
			Input	Removed	Removal				
Primary Treatment	8.04384		1	0.4	0.01				
Secondary Treatment	48.26304		0.6	0.444	0.06				
Sludge Drying Beds	0		0	0	0				
Chlorine Contact Tank	0		0.156	0.15288	0				
Total Lbs/Yr	56.30688			0.99688	0.07				

Group D									
	Chloroform								
			Input	Removed	Removal				
Primary Treatment	66.4848		1	0.4	0.1				
Secondary Treatment	119.67264		0.6	0.42	0.18				
Sludge Drying Beds	0		0	0	0				
Chlorine Contact Tank	2.3934528		0.18	0.1656	0.0036				
Total Lbs/Yr	188.5508928			0.9856	0.2836				
Group E									
	Ammonia								
			Input	Removed	Removal				
Primary Treatment	0		1	0	0				
Secondary Treatment	2458.296		1	0.1	0.1				
Sludge Drying Beds	0		0	0	0				
Chlorine Contact Tank	1106.2332		0.9	0.225	0.045				
Total Lbs/Yr	3564.5292			0.325	0.145				
Group F									
	Hydrogen								
	sulfide		Input	Removed	Removal				
Primary Treatment	1120.392		1	0.7	0.7				
Secondary Treatment	48.0168		0.3	0.24	0.03				
Sludge Drying Beds	0		0	0	0				
Chlorine Contact Tank	4.80168		0.06	0.06	0.003				
Total Lbs/Yr	1173.21048			1	0.733				

LPG EMISSION CALCULATIONS									
EXTERNAL									
		MMBTUH							
Substance Name:		<10	10-100	>100	Flare		lbs/hr	lbs/yr	
Benzene	71432	1.66E-06	1.19E-05	3.58E-07	1.03E-05		0	0	
Formaldehyde	50000	3.66E-06	2.65E-06	7.79E-07	1.02E-04		0	0	
PAH's	1150	1.76E-05	1.76E-05	1.76E-05	2.44E-06		0	0	
Naphthalene	91203	1.60E-06	1.60E-05	1.60E-05			0	0	
Acetaldehyde	75070	3.16E-06	2.31E-06	6.54E-07	1.02E-05		0	0	
Acrolein	107028	1.17E-06	9.85E-07	1.96E-07	1.02E-06		0	0	
Propylene	115071	2.45E-05	1.78E-05	5.21E-06	1.43E-06		0	0	
Toluene	108883	5.28E-07	3.85E-07	1.16E-07	5.16E-06		0	0	
Xylene	1210	1.97E-07	1.43E-07	4.48E-08	5.16E-06		0	0	
INTERNAL									
		Hp							
Substance Name:		<1000	>1000	Turbine		lbs/hr	lbs/yr		
Benzene	71432	1.02E-04	1.23E-04	1.65E-06		0	0		
Formaldehyde	50000	2.16E-03	2.59E-03	1.63E-05		0	0		
PAH's	1150	1.76E-05	1.76E-05	2.44E-06		0	0		
Naphthalene	91203	1.60E-05	1.60E-05			0	0		
Acetaldehyde	75070	1.69E-04	2.02E-04	1.63E-06		0	0		
Acrolein	107028	6.74E-05	8.08E-05	1.61E-07		0	0		
Propylene	115071	1.53E-03	1.84E-03	2.88E-05		0	0		
Toluene	108883	3.30E-05	3.97E-05	8.24E-07		0	0		
Xylene	1210	1.20E-05	1.44E-05	8.24E-07		0	0		

Facility Prioritization

		MMBM						
Substance Name:	CAS	TOTAL						
		lbs/yr	lbs/hr		Cancer	Chronic	Acute	
1,4,Dichlorobenzene	106467	106.86816	0.0122		1.998435	0.002287	0	0.002287
1,1,1,Trichoroethane	71556	60.90336	0.006952		0	0.001043	0.000153	0.001043
Acetaldehyde	75070	0	0		0	0	0	0
Acrolein	107028	0.00E+00	0.00E+00		0	0	0	0
Ammonia	7664417	3.56E+03	4.07E-01		0	0.305198	0.190749	0.305198
Benzene	71432	1.33E+01	1.53E-03		0.657168	0.003823	0.001765	0.003823
Chlorobenzene	108907	4.25E-05	1.77E-06		0	2.66E-07	0	2.66E-07
Chloroform	67663	188.550893	0.021524		1.698844	0.010762	0.215241	0.215241
Ethyl Benzene	100414	5.17E+01	6.05E-03		0	0.000454	0	0.000454
Formaldehyde	50000	2.01E-01	8.40E-03		0.002055	0.41975	0.133963	0.41975
Hydrogen Choloride	7647010	0.00E+00	0.00E+00		0	0	0	0
Hydrogen Sulfide	7783064	1.17E+03	1.41E-01		0	2.109835	5.023416	5.023416
Napthalene	91203	0.00E+00	0.00E+00		0	0	0	0
Methyl Chloroform	71556	5.78E-04	2.41E-05		0	3.61E-06	5.31E-07	3.61E-06
Methylene Chloride	75092	1.79E+02	2.10E-02		0.304767	0.007861	0.002246	0.007861
PAH's	1150	0.00E+00	0.00E+00		0	0	0	0
Perchloroethylene	127184	3.35E-04	1.40E-05		3.36E-06	5.99E-05	1.05E-06	5.99E-05
Phenol	108952	56.30688	0.006428		0	0.004821	0.001662	0.004821
Propylene	115071	0	0		0	0	0	0
Styrene	100425	114.912	0.013118		0	0.002186	0.000937	0.002186
Toluene	108883	1.13E+02	1.29E-02		0	0.006455	0.000523	0.006455
Trichloroethylene	79016	5.98E+01	6.83E-03		0.203165	0.001706	0	0.001706
Vinyl Chloride	75014	1.82E-04	7.59E-06		2.42E-05	4.38E-05	6.33E-08	4.38E-05
Vinylidene Chloride	75354	4.25E-05	1.77E-06		0	3.8E-06	0	3.8E-06
Xylene	1210	1.35E+02	1.54E-02		0	0.003296	0.001049	0.003296
				TOTALS	**4.86446**			5.997649
						5.997649		

APPENDIX C

Antidegradation Analysis Report (June 2007)

JUNE 2007

CITY OF MANTECA

Antidegradation Analysis for Proposed Wastewater Quality Control Facility Discharge Modification

prepared by

LARRY WALKER ASSOCIATES

LARRY WALKER ASSOCIATES

Acknowledgements

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Executive Summary

The City of Manteca (City) has requested the Central Valley Regional Water Quality Control Board (Regional Water Board) to increase the NPDES-permitted capacity of its Wastewater Quality Control Facility (WQCF) to 27 million gallons per day (MGD) average dry weather flow (ADWF) from the current permitted discharge capacity of 9.87 MGD (ADWF). The City requests the additional discharge capacity to accommodate planned community growth and development. The State's Porter-Cologne Water Quality Control Act requires that waters of the State be regulated so as to maintain the highest water quality that is reasonable. The State Water Resources Control Board's (State Water Board) Antidegradation Policy (Resolution 68-16) requires that the quality of existing high quality waters be maintained unless it has been demonstrated that any change will be consistent with the maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses, and will not result in water quality less than that prescribed in State policies. The policy also requires that dischargers proposing to increase their discharge to high quality waters employ best practicable treatment or control to assure the highest water quality that is reasonable. The Federal Antidegradation Policy requires that existing high quality waters be maintained unless a lowering of water quality is necessary to accommodate important economic and social development.

The purpose of this antidegradation analysis is to demonstrate that the requested increase in permitted capacity is consistent with the Porter-Cologne Act and State and Federal antidegradation policies.

WATER QUALITY IMPACTS OF AN INCREASE IN PERMITTED CAPACITY

The wastewater treatment process upgrades associated with the WQCF Phase III expansion, including nitrification-denitrification, tertiary filtration, and ultraviolet (UV) disinfection facilities, will allow it to discharge very high quality tertiary treated effluent to the San Joaquin River. The WQCF proposes to discharge this same high quality effluent to the river at higher flowrates as the plant increases its discharge capacity from the currently permitted 9.87 MGD (ADWF) to 27 MGD (ADWF). The near-field and far-field water quality impact assessments presented in the previous two sections of this report show that the proposed increase in WQCF discharge capacity to the San Joaquin River will generally have very minor impacts on the water quality of the San Joaquin River and Sacramento-San Joaquin Delta (Delta), with the exception of a near-field exceedance of the U.S. EPA chronic ambient water quality criterion (87 µg/L) for total aluminum (USEPA, 2002) and possible excursions to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan; SWRCB, 1972). The exceedance of the aluminum water quality objective in the receiving water is the result of the ambient levels of the parameter already exceeding standards upstream of the WQCF discharge. Exceedances of Thermal Plan objectives will be mitigated as necessary (e.g., through the construction of an effluent cooling tower) based on the expert opinion of a fisheries biologist charged with determining the significance of the WQCF thermal plume to migrating salmonids and other resident fish species.

The City recently completed a Water Effects Ratio (WER) study (City of Manteca, 2007) to identify an appropriate site-specific water quality objective for aluminum in the San Joaquin River that is both sufficiently protective of aquatic life and identifies available assimilative capacity for aluminum in the river under which the WQCF can discharge its effluent. The study

indicates that a WER of 22.7 in scientifically defendable. To this end, the next lowest water quality standard for aluminum (Title 22 Secondary Maximum Contaminant Level (MCL) of 200 µg/L) may be applicable to WQCF effluent. Title 22 Secondary MCLs are set to evaluate potable water that has received treatment, including filtration that generally removes the particulate materials from the water, leaving essentially only the dissolved fraction. However, Title 22 standards do not directly specify whether the total or dissolved phase should be considered. Applying Secondary MCLs directly to surface water warrants consideration in that only the dissolved fraction would ultimately pass through a drinking water treatment plant. While the California Department of Health Services (DHS) has recently stated that application of Secondary MCLs as dissolved is sufficient to protect municipal and drinking water uses, it has be the Regional Water Board's policy to apply it as a total concentration objective to be protective of taste and odor for direct consumption of San Joaquin River water. Most importantly, an increase in WQCF permitted discharge capacity from 9.87 MGD (ADWF) to 27 MGD (ADWF) does not negatively impact the San Joaquin River with regard to this parameter, and in fact will decrease total aluminum concentrations in the receiving water.

The Thermal Plan objectives are slightly exceeded for the currently permitted discharge of 9.87 MGD (ADWF); however, an evaluation of the impacts of the thermal plume reveals that there are no significant impacts of the plume and a limited exception is being sought for the WQCF. Increasing the effluent flowrate will increase the thermal plume, resulting in exceedance of both the 1 ºF temperature differential over less than 25% of the cross section, and 4 ºF differential anywhere objectives in the Thermal Plan. Because the Thermal Plan objectives are exceeded, the characteristics of the WQCF plume need to be evaluated for the level of impact on aquatic life. If the plume is found to not impact the aquatic life within the San Joaquin River, then an exception to the Thermal Plan will be required. If the plume is determined to impact aquatic life in the San Joaquin River, then the City is prepared to design, construct, install, and operate a cooling tower that cools treated effluent prior to its discharge into the San Joaquin River. The cooling tower would be confirmed to perform at final design specifications prior to operation of the WQCF at the proposed expanded capacity. Implementation of a cooling tower would act to sufficiently reduce the modeled thermal impacts of the WQCF's non-cooled effluent plume resulting in no significant adverse thermal effects on fisheries and aquatic resources as a result of the planned increase in WQCF discharge capacity from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)).

All other near- and far-field constituents considered in this report are expected to exhibit only slight to moderate increases in concentration in the receiving water at well-mixed conditions downstream of the discharge at the proposed 27 MGD (ADWF) discharge capacity. More importantly, none of these constituents are anticipated to exceed relevant water quality objectives, and on average are estimated to be present at concentrations well below objectives.

COSTS AND BENEFITS OF ALTERNATIVES FOR MAINTAINING EXISTING WATER QUALITY

Maintaining existing water quality in the San Joaquin River and the Delta with an increase in WQCF discharge may be approached through effluent-to-land disposal or additional wastewater treatment by microfiltration and reverse osmosis (MF/RO). These alternatives each possess unique abilities to address water quality constituents of concern and each has distinct implementation benefits, liabilities, and costs. In order to maintain existing water quality and

mass loading in the San Joaquin River from the time the WQCF reaches its current permitted capacity of 9.87 MGD (AWDF) through the proposed build-out capacity of 27 MGD (ADWF), it is estimated that a maximum effluent-to-land disposal capacity of 18 MGD or a maximum MF/RO capacity of 21 MGD would be required. The implementation of either alternative would maintain WQCF effluent mass loading to the San Joaquin River at the currently permitted 9.87 MGD (ADWF) level as WQCF discharge capacity increases to 27 MGD (ADWF). The costs of implementing an alternative control measure would be above and beyond the proposed project costs associated with increasing WQCF discharge capacity to 27 MGD (ADWF).

Land application of undisinfected, denitrified, secondary effluent would offset projected reductions in San Joaquin River water quality as a result of the proposed project, and would also provide an additional water supply source to the region. An 18 MGD effluent-to-land disposal operation would cost an estimated $79.2 million to construct and an additional $0.9 million per year to operate. An economic impacts model estimates that these costs would have adverse socio-economic effects, including a loss of 55 jobs per year to the local economy for the 20-year life-cycle of the alternative control measure. Additionally, land application of secondary treated effluent would add salts (as measured by total dissolved solids (TDS)) to the groundwater basin underlying the application site(s). Addition of salts to groundwater at a concentration greater than the Title 22 Secondary MCL *recommended* level of 500 mg/L, or greater than ambient background quality, would produce an unfavorable environmental impact, especially in light of the existing, elevated salinity and boron levels found in Central Valley surface waters and groundwater. Effluent-to-land disposal also carries the risk of causing groundwater mounding in the area(s) of land application. A final unfavorable environmental impact of the effluent-to-land disposal alternative is an increase in energy consumption and air emissions due to the substantial power requirements of pumping effluent to storage ponds and then to land application sites.

Similar to the effluent-to-land disposal alternative, the implementation of MF/RO would offset estimated reductions in San Joaquin River water quality due to an increase in WQCF effluent discharged above the current permitted 9.87 MGD (ADWF) capacity. A 21 MGD MF/RO treatment facility would cost an estimated $134.7 million to construct and an additional $13.1 million per year to operate. An economic impacts model estimates that these costs would have adverse socio-economic effects, including a loss of 177 jobs per year to the local economy for the 20-year life-cycle of the alternative control measure. Moreover, MF/RO treatment would produce adverse environmental impacts resulting from the concentration of toxic compounds, removal and transference of these toxic substances to various other media, brine and crystallized residuals disposal, and the substantial energy requirements of the process with their associated natural resource and air quality impacts.

PROPOSED PROJECT AND ADDITIONAL MEASURES

The proposed project is designed to minimize impacts on water quality while allowing for measured growth in the City and providing overall wastewater treatment system stability. In addition to the proposed project, the City continues to pursue other significant system improvements and source control efforts to ensure the highest discharge water quality and improve receiving water quality. The following project will improve the WQCF's overall discharge water quality:

- Increased use of high quality surface water within the service area. The City's potable water supply is expected to improve in quality, with respect to EC, as compared to pre-

August 2005 conditions due to the blending of surface water from the South County Water Supply Program with the City's groundwater. The blending of surface water with groundwater for the potable water supply has significantly decreased the electrical conductivity (EC) measured in WQCF effluent when comparing pre- and post-August 2005 plant effluent measurements (LWA, 2006b).

CONSISTENCY WITH ANTIDEGRADATION POLICIES

The proposed project, a 17.13[1] MGD (ADWF) increase in WQCF discharge capacity with accompanying nitrification-denitrification, tertiary filtration, and UV disinfection treatment upgrades to treat the increased flow, is determined to comprise best practicable treatment or control and is consistent with Federal and State antidegradation policies for the following reasons:

- The increase in permitted discharge capacity is necessary to accommodate important economic and social development in the City and surrounding communities, and is consistent with the City's General Plan. Failure to approve the increase, or alternatively requiring the City to implement control measures that would maintain existing water quality and mass emissions in the San Joaquin River, would have significant adverse economic and social impacts on the City and surrounding communities and their citizens and businesses.
- The increase will not adversely affect existing or probable beneficial uses of the San Joaquin River, nor will it cause water quality to fall below applicable water quality objectives.
- The increase, while causing slight increases in downstream water quality concentrations for some constituents (ammonia (October through May), dissolved arsenic, dissolved copper, total cyanide, methylene blue active substances (MBAS), nitrate, nitrite, total mercury, and EC (September through March)), will produce slight decreases in downstream concentrations for others (total suspended solids, total aluminum, dissolved iron, and dissolved manganese). The proposed increase in discharge capacity is also projected to cause minor increases in downstream water quality concentrations for biochemical oxygen demand (BOD) and EC (April through August), as well as a moderate increase for ammonia (June through September). Total aluminum currently exceeds its water quality objective in the San Joaquin River upstream of the WQCF outfall.
- The benefits of maintaining existing water quality and mass emissions for the constituents analyzed are not commensurate with the costs of additional treatment. The small decrease in quality with respect to the constituents considered in the analysis is unlikely to affect beneficial uses of the San Joaquin River.
- Based on the above, the requested increase in permitted capacity is consistent with Federal and State antidegradation policies in that the lowering of water quality for several pollutants is necessary to accommodate important economic or social development, will

[1] WQCF requested maximum discharge capacity of 27 MGD (ADWF) less existing NPDES-permitted discharge of 9.87 MGD (ADWF) results in a net requested increase in discharge capacity of 17.13 MGD (ADWF).

not unreasonably affect beneficial uses, will not cause further exceedances of applicable water quality objectives, and is consistent with the maximum benefit to the people of the State.

- Based on the above, the requested increase in permitted capacity is consistent with the Porter-Cologne Act in that the resulting water quality will constitute the highest water quality that is reasonable, considering all demands placed on the waters, economic and social considerations, and other public interest factors.

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Introduction

PROJECT LOCATION AND BACKGROUND

The City of Manteca's Wastewater Quality Control Facility (WQCF) is located at the northern end of the San Joaquin Valley of Central California approximately 75 miles east of San Francisco and 55 miles south of Sacramento. The WQCF is located approximately 1.5 miles west of the City of Manteca (City) in southern San Joaquin County. The WQCF has expanded several times since operations began in 1959. From 1986 – 1988, a major expansion to the plant known as Phase I was constructed. The Phase I expansion project included the construction of secondary treatment facilities, anaerobic sludge digesters, sludge drying beds, a chlorine disinfection system, and an outfall to the San Joaquin River at the point latitude 37°, 46', 45" (deg, min, sec) and longitude 121°, 18', 00" (deg, min, sec). The WQCF outfall is sited approximately one mile upstream of the Mossdale Bridge which is located near the intersection of Interstate 5 and Highway 120. Design capacity of the plant following the Phase I project was 5.45 million gallons per day (MGD) average dry weather flow (ADWF). The Phase II expansion project constructed in 1992 and 1993 added a primary sedimentation basin, a secondary clarifier, and four sludge drying beds, increasing plant capacity to 6.95 MGD (ADWF).

In 1995, the City adopted a Wastewater Quality Control Facility Master Plan that identified Phase III improvements. The Phase III improvements included the construction of nitrification-denitrification facilities (increasing plant capacity from 6.95 MGD to 7.5 MGD (ADWF)), improved primary and secondary treatment facilities (increasing capacity from 7.5 MGD to 9.87 MGD (ADWF)), and solids handling, tertiary filtration and ultraviolet (UV) disinfection facilities (Nolte, 1995). The City has divided Phase III improvements into four schedules: A, B, C, and D.

Schedule A and B improvements have been completed. Schedule A improvements included two new aeration basins, three modified secondary clarifier sludge collection mechanisms, two new centrifugal blowers, and a skid-mounted centrifugal dewatering system. Schedule B improvements included a new influent pump station, two aerated grit tanks, three primary sedimentation basins, five aeration basins, two secondary clarifiers, an odor control biofilter, and an expanded laboratory and administration building.

Schedule C improvements, which are scheduled to begin construction in October 2007, include a sludge control building, a mechanical dewatering facility, and a shop maintenance building. Schedule D improvements are currently being constructed at the WQCF. Schedule D improvements include a secondary effluent equalization pond, a filter feed pump station, coagulation and flocculation facilities, tertiary filters, a chemical storage and handling facility, a UV disinfection system, an effluent pumping station, two odor control biofilters, recycled water pumping stations, a groundwater well, and a construction truck recycled water filling station. Schedule D improvements will allow for the off-line storage and timed discharge of treated effluent to the San Joaquin River. Schedule D improvements are anticipated to be constructed and operational by August 2007, while Schedule C improvements are anticipated to be constructed and operational by October 2008. It is anticipated that Phase III improvements would satisfy the City's wastewater treatment capacity demands for the next 5 – 10 years depending on the build-out rate of proposed development.

Beyond the Phase III expansion, the City has identified the need to plan for future facilities to accommodate growth contained in its General Plan (City of Manteca, 2003), which plans growth out until 2023. As such, the City has prepared its Wastewater Quality Control Facility Master Plan Update (Nolte, 2007). This master plan update considers the necessary treatment facilities to accommodate up to 27 MGD (ADWF), which will accommodate growth out until 2023.

PROJECT DESCRIPTION

The City is proposing to increase the permitted wastewater discharge capacity of the WQCF from 9.87 MGD (ADWF) to 27 MGD (ADWF) and construct new trunk sewers to accommodate growth planned in the City's General Plan (City of Manteca, 2003). The project includes treatment plant improvements for both river and land-based wastewater effluent disposal based on current and future probable water quality discharge requirements and projected flows.

The proposed project would include construction of treatment facilities to achieve compliance with water quality objectives and permit requirements including rapid mixing and flocculation tanks to address turbidity requirements, and a tertiary UV light disinfection treatment system to address water reuse requirements. The proposed project would be initiated no sooner than 2012, and would reach build-out via a two-phase, incremental expansion with capacity increasing from 9.87 MGD (ADWF) to 17.5 MGD (ADWF) in the first phase (Phase IV) and then from 17.5 MGD (ADWF) to 27 MGD (ADWF) in the second phase (Phase V). The City proposes to accommodate the increase in capacity by using the City's long-term effluent disposal strategy that includes land application, urban landscape irrigation, and river discharge. The proposed project would also include the incremental construction of three new trunk sewers and improvements to the existing collection system.

PURPOSE OF REPORT

The purpose of this report is to document the City's antidegradation analysis for a projected discharge increase in permitted discharge capacity to the San Joaquin River from 9.87 MGD (ADWF) to 27 MGD (ADWF). The information contained in this analysis is intended to provide the Regional Water Resources Control Board (Regional Water Board) with the information needed to determine whether to certify that the proposed permitted discharge increase is consistent with State and Federal antidegradation policies.

APPROACH TO ANALYSIS

The antidegradation analysis described in this report follows the guidance provided by the State Water Resources Control Board (State Water Board) regarding the implementation of the antidegradation policy in NPDES permits (APU 90-004). Pursuant to the guidelines, this analysis follows the provisions for a 'complete analysis' and evaluates whether changes in water quality resulting from the proposed capacity increase are 'consistent with maximum benefit to the people of the state, will not unreasonably affect uses and will not cause water quality to be less than water quality objectives and that the discharge provides protection for existing in-stream uses and water quality necessary to protect those uses.

The complete analysis is comprised of two main components: (1) a comparison of the projected receiving water quality to the water quality objectives and/or criteria used to protect designated beneficial uses, and (2) a socio-economic analysis to establish the balance between the proposed action and the public interest.

The following items are addressed in the complete antidegradation analysis:

1. Determine if there are measurable water quality impacts and, if so, whether beneficial uses are impacted. This is accomplished, in part, by comparing estimated resulting receiving water quality to the water quality objectives and/or criteria used to protect designated beneficial uses.
2. Evaluate incremental loading increases and their impacts.
3. Evaluate the costs and benefits of reducing or eliminating the load increase.
4. Balance the proposed project against the public interest.

These items are addressed in the following sections of this report:

- Regulatory requirements
- Applicable water quality objectives and commonly used water quality criteria
- Environmental setting
- Assessment of water quality impacts
- Assessment of socio-economic considerations
- Consistency with antidegradation policies

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Regulatory Requirements

FEDERAL AND STATE ANTIDEGRADATION POLICIES

Antidegradation policies have been adopted at both the federal and state level. These policies are intended to protect existing water quality.

The federal policy, originally adopted in 1975, is expressed as a regulation in 40 CFR 131.12. The federal regulation requires that "water quality shall be maintained and protected". More specifically, the federal regulation requires the states to develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy. The antidegradation policy and implementation methods shall, at a minimum, be consistent with ensuring that existing water uses and the level of water quality necessary to protect these uses shall be maintained and protected. Where the quality of water is better than that necessary to support beneficial uses, measures shall be taken to ensure that water quality is maintained and protected unless the State finds that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the water body is located.

The State policy to maintain high quality waters in California was adopted in 1968 as a resolution of the State Water Board (Resolution No. 68-16). The state policy requires that changes in water quality not unreasonably affect beneficial uses. The state policy sets forth the following requirements:

1. *Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.*
2. *Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.*

STATE GUIDANCE ON NPDES PERMITTING AND ANTIDEGRADATION

In addition to the federal and state policies, the State Water Board issued guidance (APU 90-04) to all Regional Water Boards regarding the implementation of antidegradation policies in NPDES permits. The guidance addresses both the State and federal antidegradation policies in the issuance of NPDES permits. By using this guidance, a Regional Water Board can better determine if the proposed discharge is consistent with the intent and purpose of the state and federal antidegradation policies. APU 90-04 provides the Regional Water Board with guidance on the appropriate level of analysis that may be necessary, distinguishing between the need for a simple antidegradation analysis and a complete antidegradation analysis. It if is determined that a simple analysis is not appropriate, the State Water Board guidance describes a more rigorous level of analysis, called a "complete" analysis. A primary focus of the "complete" analysis is the

determination of whether and the degree to which water quality is lowered. This determination greatly influences the level of analysis required and the level of scrutiny applied to the "balancing" test – i.e. whether the facility is necessary to accommodate important economic and social development, and whether a water quality change is consistent with maximum benefit to the people of the State.

Key requirements of a complete analysis are as follows:

- Determination of whether the project will produce minor effects which will not result in a significant reduction of water quality; and
- Determination of whether proposed load increases are substantial.

Factors to be considered in determining whether a project is necessary to accommodate important economic or social development and is consistent with maximum public benefit are:

- Past, present and probable beneficial uses.
- Economic costs to maintain water quality compared to the benefits.
- Environmental aspects of the proposed discharge.
- Consideration of feasible alternative control measures which might reduce, eliminate or compensate for negative impacts of the project.

The City has followed the procedures outlined in the guidance for conducting a complete antidegradation analysis to provide the Regional Water Board with the maximum amount of information available.

Applicable Water Quality Standards

BENEFICIAL USES

The Water Quality Control Plan for the Sacramento-San Joaquin River Basins (Basin Plan), originally adopted by the Central Valley Regional Water Board in 1975 and amended regularly, contains descriptions of the legal, technical, and programmatic bases for water quality regulation in the region. The Basin Plan describes the beneficial uses of major surface waters and their tributaries and the corresponding water quality objectives put into effect to protect these beneficial uses. In addition to being subject to the provisions contained in the Basin Plan for the Sacramento-San Joaquin River Basins, the discharges from the WQCF occur within the legal boundaries of the Sacramento-San Joaquin Delta (Delta) and are therefore subject to the water quality standards contained in the Water Quality Control Plan for the Sacramento-San Joaquin Bay-Delta, as adopted by the State Water Board.

Table 1 presents the existing beneficial uses for the Delta, the applicable water body for the planned WQCF discharge to the San Joaquin River.

Table 1: Beneficial Uses Designated for the Sacramento-San Joaquin River Delta

Beneficial Uses for Surface Water defined in the Basin Plan	Designated for Sacramento-San Joaquin Delta
Municipal and Domestic Supply (MUN)	Yes
Agricultural Supply: Irrigation (AGR)	Yes
Agricultural Supply: Stock Watering (AGR)	Yes
Industrial Process Supply (PROC)	Yes
Industrial Service Supply (IND)	Yes
Industrial Power Supply (POW)	No
Water Contact Recreation: Contact Recreation (REC 1)	Yes
Water Contact Recreation: Canoeing and Rafting (REC 1)	No
Non-Contact Water Recreation (REC 2)	Yes
Warm Freshwater Habitat (WARM)	Yes
Cold Freshwater Habitat (COLD)	Yes
Migration of Aquatic Organisms: Warm Water (MIGR)	Yes
Migration of Aquatic Organisms: Cold Water (MIGR)	Yes
Fish Spawning, Warm Water (SPWN)	Yes
Fish Spawning, Cold Water (SPWN)	No
Wildlife Habitat (WILD)	Yes
Navigation (NAV)	Yes

Source: Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin, Fourth Edition, Revised August 2006 (CVRWQCB, 2006b)

WATER QUALITY OBJECTIVES/WATER QUALITY CRITERIA

To protect the designated beneficial uses, the Regional Water Board applies water quality objectives contained in the Basin Plan, the California Toxics Rule (CTR), and other sets of water quality criteria to the receiving water; the San Joaquin River, specifically, and the Delta in general. The Regional Water Board uses these objectives and criteria to determine if the City's discharge will cause or contribute to a violation of an applicable water quality standard. **Table 2** presents the most conservative water quality criteria used to protect the most sensitive beneficial uses that apply to the San Joaquin River and Delta for select constituents. Constituents included in **Table 2** are those for which the WQCF has adopted effluent limits, as well as dissolved oxygen (DO), due to the Total Maximum Daily Load (TMDL) for DO in the Stockton Deep Water Ship Channel (DWSC), and temperature (due to the narrative temperature limitations contained in the Thermal Plan that are applicable to WQCF effluent discharged to the San Joaquin River). Water quality objectives for toxic constituents come from the CTR, as promulgated by the U.S. EPA (40 CFR §131.38). The hardness-based objective for total cyanide listed in the CTR was calculated using a hardness value (172 mg/L) measured during the low fall flows of October 2002 in the San Joaquin River at WQCF R-1; 2002 is a water year classified as "dry" by the California Department of Water Resources.

Table 2: Applicable Water Quality Objectives and/or Criteria for the San Joaquin River and Sacramento-San Joaquin Delta

		Most Stringent Water Quality Objective or Criteria		
Classification	**Constituent**	**Value**	**Unit**	**Reference**
Bacteriological	Fecal Coliform	200/100 mL	MPN	Basin Plan
Conventional	Biochemical Oxygen Demand (BOD)	N/A	N/A	N/A
	Chlorine Residual	0.011	mg/L	Draft TRC Policy of CA[(1)]
	Dissolved Oxygen	5	mg/L	Basin Plan
	Electrical Conductivity (April – August)	700	μmhos/cm	Basin Plan
	Electrical Conductivity (September – March)	1000	μmhos/cm	Basin Plan
	Methylene Blue Active Substances (MBAS)	500	μg/L	Title 22 MCL (secondary MCL)[(2)]
	Oil and Grease	Narrative	--	Basin Plan
	pH	6.5 ≤ pH ≤ 8.5	std. units	Basin Plan
	Settleable Solids	Narrative	--	Basin Plan
	Temperature	Narrative	°F	Thermal Plan[(3)]
	Total Suspended Solids (TSS)	Narrative	--	Basin Plan
	Turbidity	20% increase	NTU	Basin Plan

Table 2: Applicable Water Quality Objectives and/or Criteria for the San Joaquin River and Sacramento-San Joaquin Delta (Continued)

Classification	Constituent	Most Stringent Water Quality Objective or Criteria		Reference
		Value	Unit	
Metal	Aluminum, Total	87	µg/L	U.S. EPA National Recommended WQ Criterion (Chronic)(4)
	Arsenic, Dissolved	10	µg/L	Basin Plan, Table III-1
	Copper, Dissolved	10	µg/L	Basin Plan, Table III-1
	Cyanide, Total	5.2	µg/L	California Toxics Rule (Freshwater, Chronic)
	Iron, Dissolved	300	µg/L	Basin Plan, Table III-1
	Manganese, Dissolved	50	µg/L	Basin Plan, Table III-1
	Mercury, Total	0.050	µg/L	California Toxics Rule (Human Health, Water & Organisms)
Nutrient	Ammonia as N (June – September)	0.62	mg/L	U.S. EPA 1999 Update of Ambient Water Quality Criteria for Ammonia (30-day average)(5)
	Ammonia as N (October – May)	5.62	mg/L	U.S. EPA 1999 Update of Ambient Water Quality Criteria for Ammonia (1-hour average)(6)
	Nitrate as N	10	mg/L	Title 22 MCL (Primary)/ Basin Plan(2)
	Nitrite as N	1	mg/L	Title 22 MCL (Primary)/ Basin Plan(2)
Organic	2,4,6-Trichlorophenol	2.1	µg/L	California Toxics Rule (Human Health, Water & Organisms)
	Bis(2-ethylhexyl)phthalate	1.8	µg/L	California Toxics Rule (Human Health, Water & Organisms)
	Bromodichloromethane	0.56	µg/L	California Toxics Rule (Human Health, Water & Organisms)
	Dibromochloromethane	0.41	µg/L	California Toxics Rule (Human Health, Water & Organisms)

(1) Draft Total Residual Chlorine and Chlorine-Produced Oxidants Policy of California, June 2006.
(2) Incorporated into the Basin Plan by reference (CVRWQCB, 2006b).
(3) California Thermal Plan (SWRCB, 1972).
(4) Numeric criterion used to interpret narrative water quality objective.
(5) Numeric criterion used to interpret narrative water quality objective based on a pH of 8.4 std. units and a temperature of 26 °C; cited in NPDES No. CA0081558 (CVRWQCB, 2004).
(6) Numeric criterion used to interpret narrative water quality objective based on a pH of 8 std. units; cited in NPDES No. CA0081558 (CVRWQCB, 2004).

303(D) LISTINGS

Section 303(d) of the Clear Water Act requires States to develop lists of water bodies (or segments of water bodies) that will not attain water quality standards after implementation of minimum required levels of treatment by point-source dischargers (i.e., municipalities and industries). Section 303(d) requires States to develop a TMDL for each of the listed pollutant and water body combinations for which there is impairment. A TMDL is the amount of loading that the water body can receive and still meet water quality standards for that pollutant. The TMDL must include an allocation of allowable loadings for both point and non-point sources, with consideration of background loadings and a margin of safety. NPDES permit limitations for listed pollutants must be consistent with allocations identified in adopted TMDLs.

The U.S. EPA partially approved California's 2006 303(d) list on November 20, 2006. The U.S. EPA is still reviewing the State's proposed delisted and do not list waters, but this review does not affect the current antidegradation analysis. In contrast to the four Delta sub-regions included in the 2002 303(d) list, the 2006 303(d) list divides the Delta into eight sub-regions, each possessing a set of pollutants/stressors that have been identified as preventing the sub-region from meeting water quality standards. Of the eight new sub-regions contained in the Delta, six are likely to receive a minor fraction of WQCF effluent over the course of any given water year depending on flow conditions and hydraulic operations of the Delta. These six sub-regions include the Central Delta, Eastern Delta, Export Area, Southern Delta, Stockton Ship Channel, and the Western Delta. **Table 3** lists the constituents identified in the 2006 303(d) list for the six Delta sub-regions, and **Table 4** presents potential sources and proposed TMDL completion dates for these listed constituents.

Table 3: 2006 Clean Water Act Section 303(d) Listed Constituents as they pertain to Sacramento-San Joaquin Delta Waterways

Pollutant/Stressor	Delta Waterways					
	Central Portion	Eastern Portion	Export Area	Southern Portion	Stockton Ship Channel	Western Portion
Chlorpyrifos	X		X	X		
DDT	X	X	X	X	X	X
Diazinon	X		X	X		
Dioxin					X(1)	
Electrical Conductivity			X	X		X
Exotic Species	X	X	X	X	X	X
Furan Compounds					X(1)	
Group A Pesticides	X	X	X	X	X	X
Mercury	X	X	X	X	X	X
Pathogens					X(1)	
PCBs					X(1)	
Unknown Toxicity	X	X	X	X	X	X

(1) This listing was previously under Stockton Turning Basin, upper (Port Turning Basin). In order to consolidate listings for same areas, all listings for Stockton Turning Basin on the 2002 303(d) list are now included under the Delta Waterways (Stockton Ship Channel) sub-region.

Table 4: Potential Sources and Proposed TMDL Completion Dates of Pollutants/Stressors for Select Delta Waterways contained in 2006 Clean Water Act Section 303(d) List

Pollutant/Stressor	Potential Sources	Proposed TMDL Completion
Chlorpyrifos	Agriculture, Urban Runoff/Storm Sewer	2019
DDT	Agriculture	2011
Diazinon	Agriculture, Urban Runoff/Storm Sewer	2019
Dioxin	Point Source	2019
Electrical Conductivity	Agriculture	2019
Exotic Species	Source Unknown	2019
Furan Compounds	Contaminated Sediments	2019
Group A Pesticides	Agriculture	2011
Mercury	Resource Extraction (abandoned mines)	2006
Pathogens	Urban Runoff/Storm Sewer, Recreational and Tourism Activities (non-boating)	2008
PCBs	Point Source	2019
Unknown Toxicity	Source Unknown	2019

NPDES PERMIT REQUIREMENTS

The WQCF currently operates and discharges treated effluent to the San Joaquin River under the requirements of NPDES permit No. CA0081558 (Order No. R5-2004-0028), issued by the Central Valley Regional Water Quality Control Board in March 2004. The permit includes three sets of effluent limitations for discharge to the San Joaquin River based on the design treatment capacity of the WQCF as it undergoes its scheduled improvements. The permit contains effluent limitations for design treatment capacities of 6.95, 8.11, and 9.87 MGD (ADWF). In April 2005, the City requested that the effluent limitations for bromodichloromethane and dibromochloromethane be modified based upon current treatment plant performance. The WCQF had historically operated in a non-nitrifying or partially nitrifying mode, which typically produced an effluent with elevated levels of ammonia. In November 2003, the treatment process was converted to full nitrification mode to reduce ammonia. Without ammonia in the effluent, organochlorines are formed, which are less effective disinfectants than chloramines. Consequently, more chlorine is required for disinfection, thereby increasing concentrations of disinfection byproducts, including bromodichloromethane and dibromochloromethane. The City is in the process of adding UV disinfection in order to ultimately reduce and/or eliminate the use of chlorine, which should eliminate the presence of disinfection byproducts from the effluent. The addition of UV disinfection is part of the Schedule D WQCF improvements, and is therefore currently under construction. In the meantime, it was necessary for the City's NPDES permit to be amended by Resolution No. R5-2005-0110 (amended WDR Order No. R5-2004-0028) to increase the effluent limitations for bromodichloromethane and dibromochloromethane by re-calculating dilution credits using new effluent data collected while the WQCF was operating in full nitrification mode. Resolution No. R5-2005-0110 also contains effluent limitations for design treatment capacities of 6.95, 8.11, and 9.87 MGD (ADWF). **Table 5** presents the effluent limits (at a 9.87 MGD (ADWF) design treatment capacity) contained in the City's NPDES permit as adopted by the Regional Water Board in Order No. R5-2004-0028 and as amended by

Order No. R5-2005-0110. Only effluent limits at the 9.87 MGD (ADWF) design treatment capacity are presented because the WQCF is currently permitted to operate up to 9.87 MGD (ADWF) and this antidegradation analysis considers water quality impacts of a WQCF permitted wastewater discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). Effluent limitations for ammonia as nitrogen, copper, cyanide, bis(2-ethylhexyl)phthalate, bromodichloromethane, dibromochloromethane, and 2,4,6-trichlorophenol were calculated with applicable dilution credit.

Table 5: Adopted Effluent Limits for WQCF's Discharge to the San Joaquin River at a 9.87 MGD (ADWF) Design Treatment Capacity

Constituent	Units	Monthly Average	Weekly Average	1-Hour Average	Daily Maximum
BOD(1)	mg/L	10(2)	20(2)	---	30(2)
TSS	mg/L	10(2)	20(2)	---	30(2)
Total Coliform	MPN/100 mL	---	2.2(3)	---	23/240(4)
Turbidity	NTU	---	---	2(5)	5/10(6)
Settleable Solids	ml/L	0.1	---	---	0.2
Chlorine Residual	mg/L	---	0.01(7)	0.02	---
Oil and Grease	mg/L	10	---	---	15
Aluminum(8)	µg/L	71	---	---	140
Electrical Conductivity(9)	µmhos/cm	1000	---	---	---
pH	pH units	---	---	---	6.5 to 8
Ammonia as N (June – September)	mg/L	2.1	---	---	4.4
Ammonia as N (October – May)	mg/L	2.8	---	---	5.6
Arsenic	µg/L	10	---	---	---
Copper	µg/L	7.9	---	---	10.4
Cyanide	µg/L	3.7	---	---	10
Iron	µg/L	300	---	---	---
Manganese	µg/L	50	---	---	---
MBAS	µg/L	500	---	---	---
Nitrate as N	mg/L	10	---	---	---
Nitrite as N	mg/L	1	---	---	---
Bis(2-ethylhexyl)-phthalate	µg/L	22	---	---	44
Bromodichloromethane(10)	µg/L	30	---	---	47
Dibromochloromethane(10)	µg/L	7	---	---	16
Mercury	lbs/year	0.69	---	---	---
2,4,6-Trichlorophenol	µg/L	34	---	---	69

(1) 5-day, 20°C biochemical oxygen demand (BOD).
(2)To be ascertained by a 24-hour composite sample.
(3) Weekly median.
(4) Does not exceed 23 in more than one sample in any 30-day period. No sample shall exceed 240.
(5) Does not exceed an average of 2 NTU within a 24-hour period.
(6) Does not exceed 5 NTU more than 5 percent of the time within a 24-hour period and 10 NTU at any time.
(7) Expressed as 4-day average.
(8) Compliance with effluent limitations for aluminum specified in Order No. R5-2004-0028 shall be determined using acid soluble methods of measurement. The Discharger may conduct a water effect ratio study to develop a site-specific objective, and upon adoption and approval of a Basin Plan amendment, the permit may be reopened and the aluminum limitation reconsidered.
(9) Effluent limitation adopted by State Water Resources Control Board in Order WQ 2005-0005.
(10) Effluent limitation adopted by Regional Water Board in Resolution No. R5-20050110.

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Environmental Setting

SACRAMENTO-SAN JOAQUIN DELTA AND SAN JOAQUIN RIVER BASIN

The Delta forms the lowest part of the Central Valley, lying between the Sacramento and San Joaquin rivers and extending inland from the confluence of the two rivers to Sacramento and Stockton. The Delta is roughly bordered by the cities of Sacramento, Stockton, Tracy, and Pittsburg. Other cities within the Delta include Manteca, Lathrop, Antioch, Brentwood, Rio Vista, and Isleton. There are also about 14-unincorporated towns and communities in the Delta. The area receives runoff from over 45 percent of the State's land area including flows from 19 tributaries: the Sacramento, McCloud, Butte, Feather, Yuba, Bear, American, Merced, San Joaquin, Mokelumne, Cosumnes, Stanislaus, Tuolumne, Chowchilla, Fresno, Kings, Cache, Putah, and Calaveras rivers. The Delta is within the jurisdiction of six counties (Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo) and covers approximately 1,500 square miles interlaced with hundreds of miles of waterways (DWR, 1993). The Delta is delineated by a legal boundary that includes the areas that historically were intertidal, along with supratidal portions of the floodplains of the Sacramento and San Joaquin rivers. Today's legal Delta extends between the upper extent of tidal effect (near the City of Sacramento on the Sacramento River and Vernalis on the San Joaquin River) and Chipps Island on the west (CALFED, 1999).

The 290-mile-long San Joaquin Valley occupies the southern half of the Central Valley and has an average width of 130 miles. It covers approximately 32,000 square miles, or one-fifth of the surface area of California. The San Joaquin River Basin is bounded on the west by the Coast Ranges and on the east by the Sierra Nevada mountain range. The Tulare Lake Basin to the south is normally considered a separate drainage basin, but has contributed occasional flood flows and subsurface flows to the San Joaquin River during wet years (DWR, 1995). The San Joaquin River itself is 330 miles in length and drains a watershed area of 13,540 square miles (CSLC, 1993). It flows west from the Sierra Nevada, turns sharply north at the center of the valley floor, and flows north through the valley into the Delta. San Joaquin River monthly average flow ranges from 400 to 1,500 cubic feet per second (cfs) in dry years, 1,500 to 3,500 cfs in normal years, and up to 20,000 cfs to 40,000 cfs in wet years (CALFED, 1999). Major tributaries draining the Sierra Nevada and flowing into the San Joaquin River include the Stanislaus, Tuolumne, Merced, and Fresno rivers (see **Figure 1**). The San Joaquin River flows through portions of Fresno, Madera, Merced, Stanislaus, San Joaquin, Contra Costa, and Sacramento counties. The WQCF is currently permitted to discharge secondary treated effluent to the San Joaquin River approximately one mile upstream of the Mossdale Bridge which is located near the intersection of Interstate 5 and Highway 120.

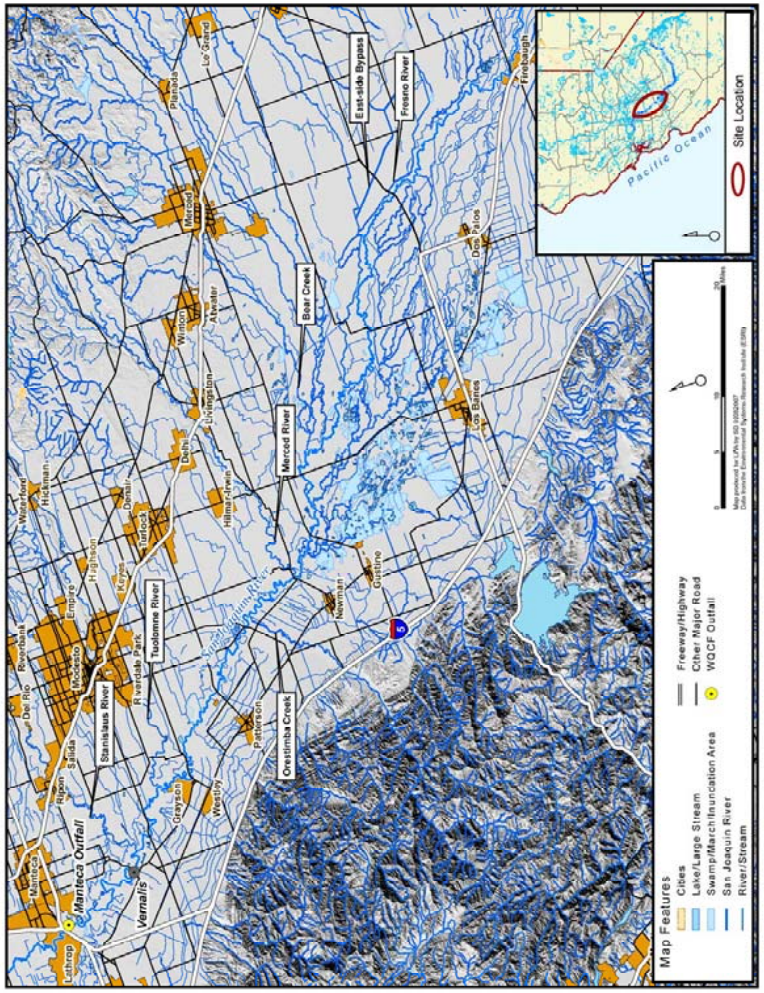


Figure 1: Lower San Joaquin River and Eastside Tributaries

SAN JOAQUIN RIVER BASIN HYDROLOGY

San Joaquin River Basin hydrology is predominantly influenced by tributary inflows, agricultural diversions and return flows, and tidal flows. For the purpose of this antidegradation analysis, the Lower San Joaquin River can be divided into two main sections based on the presence or absence of tidal flows. The Lower San Joaquin River from Mendota Pool to Vernalis receives inflow from a variety of sources including east-side tributaries, dominated by reservoir releases; west-side tributaries, dominated by agricultural return flows; groundwater recharge; and discharges from wetlands and publicly owned wastewater treatment facilities. Diversions can remove a significant amount of San Joaquin River flow, especially during periods of below normal rainfall. The Lower San Joaquin River is not typically affected by tidal flows, being sufficiently upstream of the Pacific Ocean's tidal influence.

The second main section of the Lower San Joaquin River is the tidally influenced reach from Vernalis to its confluence with the Sacramento River near Collinsville. Major tributary inputs to this section are provided by the Cosumnes and Mokelumne rivers where their commingled flows enter the central Delta near Webb Tract. Significant non-tributary inflows are provided from irrigation return flows that are pumped from adjacent agricultural lands into the San Joaquin River. The major diversion of San Joaquin River water occurs at the junction of Old River, where, depending on Delta hydraulics, up to 50% of San Joaquin flows may be diverted to the south Delta (Quinn and Tulloch, 2002).

An understanding of the hydrology and hydrochemistry of the San Joaquin River can be gained through a review of the relative flow contributions made by east-side tributaries, west-side tributaries, and other inflows. As shown in **Figure 1**, the major east-side tributaries are the Merced, Tuolumne, and Stanislaus rivers which join the Lower San Joaquin River upstream of Vernalis. There are also three minor east-side tributaries in the Basin, including Bear Creek, the east-side Bypass, and the Mariposa Bypass. There are nine significant streams and conveyances that drain the west-side of the San Joaquin Basin and are tributary to the San Joaquin River. These tributaries include Panoche-Silver Creek, San Luis Drain, Salt Slough, Mud Slough, Spanish Grant Drain, Orestimba Creek, Hospital Creek, Ingram Creek, and Del Puerto Creek. Many of these streams are ephemeral, conveying rainfall runoff during the winter season and agricultural return flows during the summer months. The San Luis Drain is a concrete-lined conveyance that once formed part of a Valley Master Drain system providing drainage for the entire west-side of the Basin. The Drain presently serves five agricultural water districts and conveys subsurface drainage water into Mud Slough, six miles upstream of the confluence with the San Joaquin River. Due to the Drain's importance to the hydrology of the San Joaquin River, it is considered a west-side tributary (Quinn and Tulloch, 2002).

A comparison of flow and TDS (salts) inputs into the San Joaquin River by a variety of sources is provided in **Table 6**. During the period 1985 – 1994, annual average flows from all east-side tributaries collectively accounted for 70% of the flow measured in the San Joaquin River at Vernalis. In contrast, west-side tributaries contributed 4% of the flow measured at Vernalis. While east-side tributaries contributed approximately 17.5 times the flow of west-side tributaries, the estimated TDS loading of the east-side tributaries was about three quarters of that provided by west-side tributaries. This difference in TDS loading can be attributed to the fact that snow-melt comprises a large proportion of east-side flow volume, while return flows from agriculture and wetlands dominate west-side hydrology. Tributary contributions not withstanding, all other

sources collectively contributed 26% of total flow and 63% of estimated TDS loading in the San Joaquin River at Vernalis. The largest non-tributary TDS loadings were made by groundwater (191,000 tons) and surface water return flows (150,000 tons). Municipal and industrial sources contributed minor discharge volumes (1%) and TDS loads (2-3%), similar in magnitude to contributions from subsurface return flows (Quinn and Tulloch, 2002).

Table 6: Sources and Percent Contributions of Flow and TDS in the San Joaquin River at Vernalis (1985 – 1994)

Source	Discharge(1) (acre-feet x 1000)	Percent Contribution	TDS Load(2) (tons x 1000)	Percent Contribution
East-side tributaries	1,323	70	148	16
Groundwater	90	5	191	20
West-side tributaries	68	4	201	21
Grassland wetlands	60	3	74	8
Groundwater inflow	11	1	77	8
West-side surface returns	70	4	57	6
Subsurface return flows (main stem SJR)	11	1	25	3
Surface return flows (main stem SJR)	250	13	150	16
Municipal and Industrial	15	1	14	2
Total	1,899	100%	938	100%

Source: Quinn and Tulloch, 2002.
(1) 10-year mean annual flow calculated from 1985 – 1994.
(2) 10-year mean annual load calculated from 1985 – 1994.

LAND USE

Land use in the Delta is dominated by agriculture (about 538,000 acres). Open water covers approximately 60,000 acres, while urban and commercial property account for about 64,000 acres of developed land (DWR, 2005). The remainder of the region currently consists of undeveloped public lands and open space. Of the portions of six counties that encompass the legal Delta, San Joaquin County comprises the majority of land included within the legal Delta boundary. Within San Joaquin County, approximately 77% of the total county acreage is used for agriculture and grazing, followed by medium-density residential (7%), low-density residential (4%), and industrial land uses (3%) (U.S. Fish and Wildlife Service et al., 2006).

The valley portion of the San Joaquin River Basin shows a similar land use pattern as the Delta, with the area predominantly comprised of farmland. Growing urban centers exist in Stockton, Tracy, Modesto, Manteca, Lathrop, and Merced. Agriculture is the major economic and land use activity in the San Joaquin River Basin. The San Joaquin Valley is recognized as one of the most important agricultural regions in California, with approximately 2 million acres of irrigated cropland and an annual agricultural output valued at more than $4.9 billion in the year 2000. Non-agricultural commerce in the region is generated by a variety of industries including food processing, chemical production, lumber and wood products, glass, textiles, paper, machinery, fabricated metal products, and various other commodities (DWR, 2005).

Assessment of Water Quality Impacts

The WQCF and collection system serves commercial and residential uses within the City of Manteca, a portion of the City of Lathrop, and one frozen food packager (Eckert Cold Storage). The WQCF is permitted for treatment and discharge of 9.87 MGD (ADWF) of wastewater, with 8.42 MGD (or 85.3 percent) capacity allocated to the City of Manteca and 1.45 MGD (or 14.7 percent) allocated to the City of Lathrop. The City leases 150 acres of land from Dutra Farms (Assessor's parcel Nos. 241-320-01 and 241-320-02) for land application of treated wastewater. Land disposal of treated effluent is maximized by discharging effluent at agronomic rates seasonally to these leased parcels as well as to existing City-owned property (210 acres). Excess flow of treated municipal wastewater is discharged via a side-bank outfall to the San Joaquin River approximately one mile upstream of the Interstate 5 Mossdale Bridge at the point latitude 37°, 46', 45" (deg, min, sec) and longitude 121°, 18', 00" (deg, min, sec).

Current WQCF capacity will increase from 6.95 MGD (ADWF) to 9.87 MGD (ADWF) following completion of the Phase III – Schedule D expansion project in August 2007. The accommodation of such flows will require that WQCF effluent be discharged to the San Joaquin River only when downstream flows meet specific instantaneous flowrate criteria to avoid discharging during incoming or flood times. This capacity is anticipated to support the City's wastewater needs for approximately 5 – 10 years. Beyond the Phase III expansion, the City has identified the need to program future facilities to accommodate effluent flows (ADWF) up to 27 MGD (Nolte, 2007). The existing WQCF outfall to the San Joaquin River will reach capacity following completion of the Phase III expansion project. Any expansion beyond a capacity of 9.87 MGD (ADWF) will require the construction of a second outfall pipeline. Additionally, replacing the side bank discharge with an in-stream diffuser outfall is currently under evaluation as a means of ameliorating the thermal plume caused by the side bank discharge.

The near-field water quality impacts assessment evaluates the effects of increasing WQCF discharge, from the permitted 9.87 MGD (ADWF) to a proposed 27 MGD (ADWF) effluent flowrate. Near-field effects on San Joaquin River water quality will occur between the point of discharge and WQCF monitoring location R-3 (approximately 1-mile downstream of the City's discharge) where advanced treatment effluent and ambient river water are well-mixed. Near-field water quality impacts are estimated using (1) projected WQCF effluent quality after the Phase III expansion; (2) ambient river concentrations calculated from dry/below normal water years, where possible; (3) current permitted and proposed future WQCF effluent flowrates; and (4) average late summer/early fall San Joaquin River flows observed during historic critical and dry water years. Estimated water quality conditions are then compared to existing water quality objectives or often used criteria to assess the impact of the proposed WQCF increased discharge on San Joaquin River water quality. San Joaquin River monitoring locations providing data used in the near-field water quality impacts analysis are presented in **Figure 2**.

The far-field water quality impacts assessment evaluates the effects of increasing WQCF discharge, from the permitted 9.87 MGD (ADWF) to a proposed 27 MGD (ADWF) effluent flowrate, on specific Delta locations where surface water is diverted for eventual use as drinking water and in the DWSC. Far-field water quality impacts are estimated using (1) historic WQCF effluent quality, (2) projected WQCF effluent quality after Phase III expansion, (3) current permitted and proposed future WQCF effluent flowrates; and (4) modeled percent contribution of WQCF effluent at select Delta locations under representative critical and dry/below normal

water years. Estimated far-field water quality impacts are then evaluated as the change in concentration of a parameter at a Delta location of interest due to an increase in WQCF effluent flowrate from the permitted 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). The Delta monitoring locations for which far-field water quality impacts were modeled are shown in **Figure 3**.

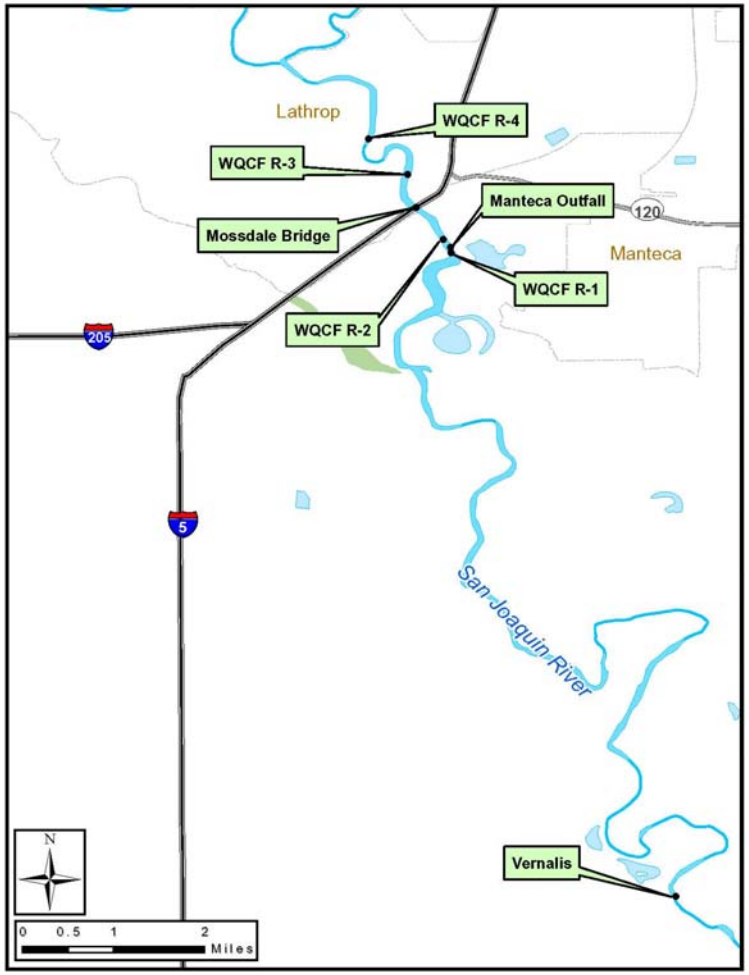


Figure 2: City of Manteca WQCF Outfall and San Joaquin River Monitoring Locations providing data for Near-Field Water Quality Impacts Analysis

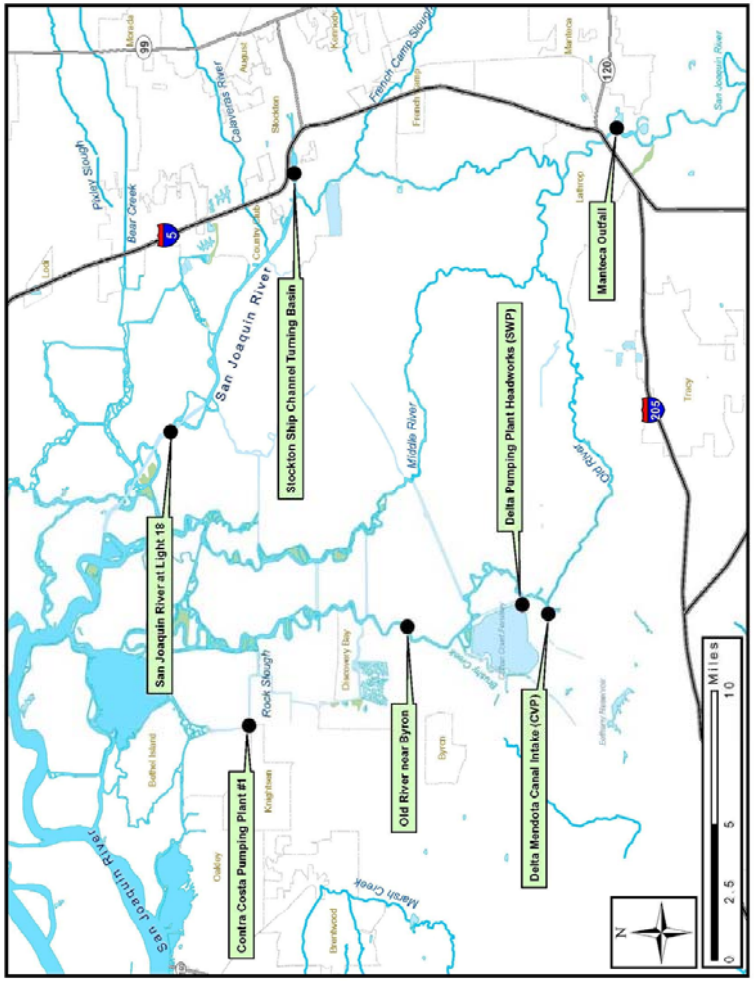


Figure 3: Sacramento-San Joaquin Delta Monitoring Locations evaluated for Far-Field Water Quality Impacts Analysis

SELECTION OF WATER QUALITY CONSTITUENTS

Water quality constituents were selected for quantitative near- and far-field analyses based on availability of adequate detected data in effluent and one or more of the following conditions:

1. WQCF received an effluent limitation for a particular constituent in Order No. R5-2004-0028,
2. Constituent was identified as a pollutant/stressor on the proposed 2006 Clean Water Act Section 303(d) list for select Delta waterways,
3. Constituent for which an adopted TMDL exists downstream of WQCF discharge, and
4. Constituent is an historic pollutant of concern in the Delta

Thirty-three water quality parameters were initially identified for evaluation based on the four criteria listed above. Eighteen parameters were ultimately selected for near-field and/or far-field analysis (see constituents in bold typeface presented in **Table 7**) based on availability of data and detection of constituent in WQCF effluent.

Table 7: Water Quality Constituents Identified for Near-Field and Far-Field Analyses

Constituent	Monitoring Location	Data Source(s)	Selected for Analysis
Biochemical Oxygen Demand (BOD)	SJR at Mossdale Bridge	DWR-MWQI	**Near-Field**
Total Suspended Solids (TSS)	WQCF R-1	Special studies monitoring data	**Near-Field**
Total Coliform	WQCF R-1	WQCF self-monitoring	No, non-conservative parameter(1)
Turbidity	WQCF R-1	WQCF self-monitoring	No, non-conservative parameter(1)
Settleable Solids	---	No data available	No
Chlorine Residual	WQCF R-1	WQCF self-monitoring	No, non-conservative parameter(1)
Oil and Grease	---	No data available	No
Aluminum, Total	WQCF R-1	13267 monitoring data, Self-monitoring data	**Near-Field**
Electrical Conductivity (EC)	WQCF R-1	13267 monitoring data, Self-monitoring data	**Near-Field**
	Multiple Delta locations	DWR-MWQI, DO Study-Stockton, DO Study-UOP, Stockton RWCF self-monitoring	**Far-Field**
Dissolved Organic Carbon (DOC)	Multiple Delta locations	DWR-MWQI, DO Study-Stockton, DO Study-DWR	**Far-Field**

Table 7: Water Quality Constituents Identified for Near-Field and Far-Field Analyses (Continued)

Constituent	Monitoring Location	Data Source(s)	Selected for Analysis
Dissolved Oxygen (DO)	Stockton Ship Channel	Regression model(2)	**Far-Field**
Ammonia as Nitrogen	WQCF R-1	13267 monitoring data, Self-monitoring data	**Near-Field**
Arsenic, Dissolved	WQCF R-1	13267 monitoring data	**Near-Field**
Copper, Dissolved	WQCF R-1	13267 monitoring data	**Near-Field**
Cyanide, Total	WQCF R-1	13267 monitoring data	**Near-Field**
Iron, Dissolved	WQCF R-1	Special studies monitoring data	**Near-Field**
Manganese, Dissolved	WQCF R-1	Special studies monitoring data	**Near-Field**
Methylene Blue Active Substances (MBAS)	WQCF R-1	13267 monitoring data	**Near-Field**
Nitrate as Nitrogen	WQCF R-1	13267 monitoring data	**Near-Field**
	Multiple Delta locations	DWR-MWQI	**Far-Field**
Nitrite as Nitrogen	WQCF R-1	13267 monitoring data	**Near-Field**
Bis(2-ethylhexyl)phthalate	WQCF R-1	Self-monitoring data	No, constituent non-detect in effluent; detection limit > WQO for some data points.
Bromodichloromethane	WQCF R-1	13267 monitoring data, Self-monitoring data	No, new UV disinfection process will bring effluent concentration of parameter below the level of detection
Dibromochloromethane	WQCF R-1	13267 monitoring data, Self-monitoring data	No, new UV disinfection process will bring effluent concentration of parameter below the level of detection
Mercury	WQCF R-1	13267 monitoring data, Self-monitoring data	**Near-Field**
2,4,6-Trichlorophenol	WQCF R-1	Self-monitoring data	No, constituent non-detect in effluent; detection limit < WQO
Temperature	SJR transects between WQCF R-1 and WQCF R-2, inclusive	Self-monitoring data, Thermal Plan Exception Study data	**Near-Field**
Chlorpyrifos	---	13267 monitoring data	No, constituent non-detect in effluent

Table 7: Water Quality Constituents Identified for Near-Field and Far-Field Analyses (Continued)

Constituent	Monitoring Location	Data Source(s)	Selected for Analysis
DDT	---	13267 monitoring data	No, constituent non-detect in effluent
Diazinon	---	13267 monitoring data	No, constituent non-detect in effluent
Dioxin	---	No data available	No
Furan Compounds	---	No data available	No
Group A Pesticides	---	13267 monitoring data	No, constituent non-detect in effluent
PCBs	---	13267 monitoring data	No, constituent non-detect in effluent

(1) Constituent is considered a non-conservative parameter and inappropriate for the calculation of blended effluent-river concentrations in the near-field.
(2) Regression model for change in Stockton Ship Channel DO is extended version of model utilized in Draft EIR for Manteca WQCF Phase III/IV Expansion (EDAW, 2000)

Data Sources

The near- and far-field analyses conducted for the current water quality impacts assessment require a great deal of high quality data collected by the WQCF and various monitoring programs that collect ambient surface water quality data in the Delta. The various monitoring programs and monitoring locations providing the surface water quality data that were used in the near- and far-field analyses, as well as the time periods covered by these data are presented in **Table 8**.

Table 8: Sources of Surface Water Quality Data used in Near-Field and Far-Field Analyses

Data Source and Monitoring Program	Monitoring Location(s)	Monitoring Date Range(s)
Self-monitoring data: City of Manteca WQCF NPDES self-monitoring program	WQCF R-1	Apr. 2004 – Sept. 2004 (dry) Oct. 2005 – June 2006 (wet)
13267 monitoring data: City of Manteca WQCF monitoring data collected pursuant to California Water Code §12367	WQCF R-1	Jan. 2002 – Jan. 2003 (dry)
Special studies monitoring data: City of Manteca WQCF monitoring data collected to determine reasonable potential for exceedance of dissolved metals objectives	WQCF R-1	Nov. 2005 – July 2006 (wet)
Thermal Plan Exception Study: City of Manteca WQCF monitoring data collected in support of the City's Thermal Plan Exception Analysis	SJR at Mossdale Bridge	Apr., Sept., Dec. 2002 (dry)

Table 8: Sources of Surface Water Quality Data used in Near-Field and Far-Field Analyses (Continued)

Data Source and Monitoring Program	Monitoring Location(s)	Monitoring Date Range(s)
DWR-MWQI: California Department of Water Resource Municipal Water Quality Investigations Program	SJR at Mossdale Bridge, Contra Costa Pumping Plant #1(1), Old River near Byron, Delta Pumping Plant Headworks, Delta Mendota Canal Intake at Lindemann Road	Oct. 1989 – Sept. 1994 (crit) Oct. 2000 – Sept. 2004 (dry)
DO Study-DWR: California Department of Water Resources data collected as part of San Joaquin River Dissolved Oxygen Study	Stockton Ship Channel Turning Basin	Oct. 2000 – Oct. 2001(dry)
DO Study-Stockton: City of Stockton data collected as part of San Joaquin River Dissolved Oxygen Study	Stockton Ship Channel Turning Basin, SJR at RWCF-R8(2)	Oct. 2000 – Sept. 2001(dry)
DO Study-UOP: University of the Pacific data collected as part of San Joaquin River Dissolved Oxygen Study	Stockton Ship Channel Turning Basin	June 2001 – Oct. 2001 (dry)
Stockton RWCF self-monitoring: City of Stockton Regional Wastewater Control Facility NPDES self-monitoring program	SJR at RWCF-R8(2)	Jan. 2004 – Sept. 2004 (dry)

"crit" – Data were collected during a critical water year; "dry" – Data were collected during a dry/below normal water year; "wet" – Data were collected during a wet water year.
(1) Contra Costa Pumping Plant #1 is also known as Contra Costa Water District Intake at Rock Slough.
(2) SJR at RWCF-R8 is also known as San Joaquin River at Navigation Light 18.

Data Quality Screening

Data from the water quality monitoring programs/studies shown in **Table 8** were selected for the present analysis because they meet the qualitative objectives of comparability and representativeness. Comparability of data can be defined as the similarity of data generated by different monitoring programs. This objective is evaluated primarily by comparing the sampling methods and analytical procedures used among various monitoring programs. Comparisons of data sets collected by the above-listed monitoring programs for a certain parameter at or near a particular location during a specific time period reveal a considerable degree of comparability. Representativeness of data can be defined as the degree to which the environmental data generated by a monitoring program accurately and precisely represent actual environmental conditions. This objective is addressed by the overall design of the monitoring program. Specifically, representativeness is evaluated by the selection of appropriate locations, times, frequencies of sampling, methods, and detection limits for each environmental parameter measured by a monitoring program, as well as the maintenance of the integrity of a sample after its collection and its overall evaluation by a rigorous QA/QC program. Finally, data were selected for near- and far-field water quality impacts assessments that possess detection limits that are sufficiently low to allow for comparison to relevant water quality objectives.

Depending on the monitoring site under consideration, data from a particular monitoring program typically acted as the primary data source for that monitoring site. The monitoring

program defined as the primary data source for a site was the program possessing the longest monitoring history at the particular location. If data from the primary data source were not available for a particular parameter at a particular site, then data from a secondary and/or tertiary data source were used. In an effort to compile as large a data set as possible for a particular parameter at a particular monitoring site, data from more than one monitoring program were often combined when appropriate to provide an extended data set. These secondary and tertiary data sources acted to "fill in" data gaps that exist in the primary program's monitoring record at a particular location. So as not to unfairly weight certain sample collection dates by including more than one data point (coming from multiple monitoring programs) for any single calendar date, data from non-primary monitoring programs were omitted from the data set used for statistical analysis. For example, on the occasion that a particular monitoring location possessed three DO measurements taken on the same date, only a single DO measurement was included in the final data set. The single DO measurement chosen for analysis was taken from the monitoring program acting as the primary data source for the site. Excluding the other two DO measurements avoided the skewing of the statistical analysis since most monitoring dates were only represented by a single environmental measurement from a single monitoring program. Data were also excluded from use where analyte detection, analytical method, and detection limit were not documented sufficiently in a monitoring program's original raw data set.

Water Year Hydrologic Classification

Data for the 18 water quality parameters measured at selected sites in the project area (see **Table 7**) were compiled and summary statistics calculated to provide historic surface water quality information for two different water year types: critical years and dry/below normal years. Even though dry and below normal water years are distinct hydrologic classifications under the California Department of Water Resources hydrologic classification scheme (see **Figure 4**), they are grouped together in the current analysis as a "dry/below normal" water year type due to the grouping of data required to produce as large a water quality data set as possible. The analysis of water quality data for two distinct water year hydrologic classifications – critical and dry/below normal – provides information upon which to estimate future water quality conditions in the project area under the widely variable hydrologic conditions experienced in California's Central Valley. Critical and dry/below normal water years represent worse case conditions for most parameters as they relate to the impact of WQCF discharge on Delta water quality as compared to impacts measured during a wet or above normal water year. The current near- and far-field water quality impacts assessments were designed to estimate the incremental change in water quality within the project area with an increase in WQCF effluent flowrate from the current permitted 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). The greatest incremental change in surface water quality conditions in the San Joaquin River and Delta would likely occur when WQCF effluent is discharged to a system with comparatively lower ambient pollutant concentrations and diminished flows such as those observed during critical and dry/below normal water years.

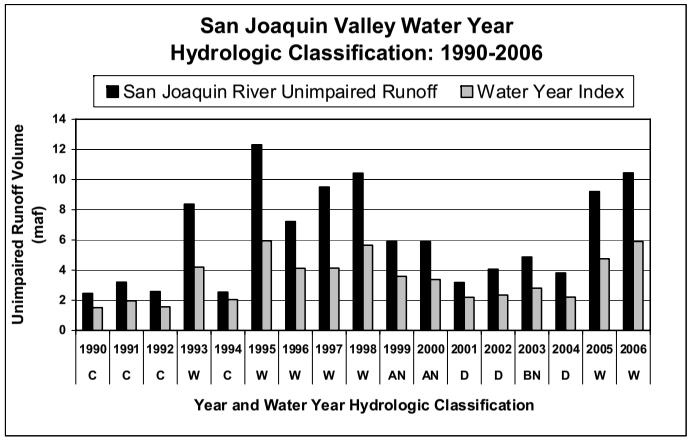
Using California Department of Water Resources water year hydrologic classifications for the San Joaquin Valley (see **Figure 4**), water quality data collected during specific water years were selected to determine baseline surface water quality in the project area during critical and dry/below normal water years. **Table 9** lists the water year designations and relevant time periods for the years 1990 through 2006. With regard to the constituents selected for near-field impact assessments in the project area (see **Table 7**), only San Joaquin River water quality data

from dry/below normal water years were available for analysis. Data from dry/below normal water years reflect different water quality conditions in the Delta relative to conditions observed during wet or above normal water years. San Joaquin River water quality and flow conditions characteristic of dry/below normal water years are expected to reflect future San Joaquin River conditions during rainfall-limited time periods due to the actions set forth in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (1995 Bay-Delta Plan; SWRCB, 1995) and the Revised Water Right Decision 1641 (SWRCB, 2000).

The 1995 Bay-Delta Plan sets forth flow objectives to control declines in aquatic resources – namely, fisheries – experienced in the Bay-Delta Estuary in recent decades, in addition to providing upstream- and within-Delta management strategies for the protection of beneficial uses that involve salinity, water project operations, and DO. San Joaquin River at Vernalis flow objectives contained in the 1995 Bay-Delta Plan require spring and fall flows in the river to support spring out-migration and fall spawning of salmonids, respectively. Information gathered by parties during the limited-term Revised Water Rights Decision 1641 (in effect through 2010) will allow the State Water Board to further review Vernalis flow objectives in terms of timing and magnitude during a future review of the 1995 Bay-Delta Plan. Irrespective of final numeric flow objectives for the San Joaquin River at Vernalis that may be set forth in a future Bay-Delta Plan, future flow objectives will provide flows similar to or greater than those observed during dry water years, and not typical of those historically experienced during critical water years, as a means of protecting the aquatic life and water supply beneficial uses of the Bay-Delta Estuary.

Table 9: Hydrologic Classification of Years 1990 through 2006 by Water Year Type

Water Year Type	Water Year (Oct. 1 – Sept. 30)
Critical	1990
	1991
	1992
	1994
Dry	2001
	2002
	2004
Below Normal	2003
Above Normal	1999
	2000
Wet	1993
	1995
	1996
	1997
	1998
	2005
	2006



Notes:

1. The data presented above were generated by the California Department of Water Resources (see http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST). These indices have been used operationally by DWR for planning and managing of water supplies since 1995, and are defined in SWRCB Decision 1641 (see http://www.waterrights.ca.gov/baydelta/d1641.htm).
2. A water year extends from Oct 1 - Sep 30.
3. Unimpaired runoff represents the natural water production of a river basin, unaltered by upstream diversions, storage, or export of water to or import of water from other basins.
4. San Joaquin River Runoff is the sum of Stanislaus River inflow to New Melones Lake, Tuolumne River inflow to New Don Pedro Reservoir, Merced River inflow to Lake McClure, and San Joaquin River inflow to Millerton Lake.
5. San Joaquin Valley Water Year Index = 0.6 * Current Apr-Jul Runoff in (maf) + 0.2 * Current Oct-Mar Runoff in (maf) + 0.2 * Previous Water Year's Index [if the Previous Water Year's Index exceeds 4.5, then 4.5 is used).
6. San Joaquin Valley Water Year Hydrologic Classification:

Year Type:	Water Year Index:
W = Wet Year	Equal to or greater than 3.8
AN = Above Normal	Greater than 3.1, and less than 3.8
BN = Below Normal	Greater than 2.5, and equal to or less than 3.1
D = Dry	Greater than 2.1, and equal to or less than 2.5
C = Critical	Equal to or less than 2.1

Figure 4: San Joaquin Valley Unimpaired Runoff and Water Year Classification: 1990 – 2006

Data collected during both critical and dry/below normal water years at far-field Delta monitoring locations were available for use in the far-field impacts assessment. However, these ambient Delta water quality data sets are often limited and inconsistent or patchy in terms of the suite of constituents evaluated at any given monitoring site, and thus collectively produce a geographical and chronological mosaic of Delta water quality conditions that provides an incomplete picture of far-field water quality impacts due to an increase in WQCF discharge. The only parameters with sufficient data to produce a reasonable depiction of far-field impacts during critical and dry/below normal water years due to an increase in WQCF discharge are electrical conductivity (EC), dissolved organic carbon (DOC), and nitrate (as nitrogen). EC, DOC, and nitrate (as nitrogen) are general indicators of water quality and are important parameters used by water purveyors to assess treatment requirements of raw water.

NEAR-FIELD METHODOLOGY

The near-field effects on water quality of the current permitted WQCF design capacity (9.87 MGD (ADWF)) and the proposed WQCF design capacity (27 MGD (ADWF)) are compared using a mass balance equation. Using projected effluent quality and available ambient San Joaquin River water quality (measured at R-1 and the Interstate 5 Mossdale Bridge) and flow data (measured at Vernalis), a mass balance was performed to assess the effect of WQCF discharge on downstream concentrations of pollutants with an increase in effluent flowrate. Based on recent hydrodynamic modeling (RMA, 2006), WQCF effluent and San Joaquin River water are considered well-mixed approximately 1-mile downstream of the WQCF outfall, near the WQCF R-3 self-monitoring site. The instantaneous effluent flowrates from timed discharge operation are not evaluated in the analysis because impacts on receiving water are being evaluated sufficiently far downstream of the discharge, effectively evaluating the average daily effluent flowrate on the receiving water conditions (RMA, 2006). The three near-field WQCF discharge scenarios for which ambient San Joaquin River concentrations downstream of the WQCF discharge are estimated include:

- 9.87 MGD (ADWF) – treatment capacity at completion of Phase III – Schedule D improvements, August 2007
- 17.5 MGD (ADWF) – proposed intermediate design flow at end of first phase (Phase IV) of WQCF expansion
- 27 MGD (ADWF) – proposed final build-out design flow at end of second phase (Phase V) of WQCF expansion

Near-field analyses were conducted for the 15 parameters specified in **Table 7**. Data used in the near-field analysis came from the various monitoring programs presented in **Table 8**. It should be noted that limited receiving water data were available for all parameters considered for near-field impact assessments. Projected WQCF effluent quality to be achieved at the completion of Schedule D WQCF improvements (expected August 2007, when the facility is expected to realize its current permitted design capacity of 9.87 MGD (ADWF)), and used in the near-field water quality impacts assessment is presented in **Table 10** (Nolte, 2007).

Table 10: Projected WQCF Effluent Quality after Phase III Expansion

Constituent	Units	Projected Effluent Quality(1)
Biochemical Oxygen Demand (BOD)	mg/L	7
Total Suspended Solids (TSS)	mg/L	<10
Total Coliform	MPN/100 mL	<2.2
Turbidity	NTU	<2
Settleable Solids	mg/L	0.1
Chlorine Residual	mg/L	0.01
Oil and Grease	mg/L	2.1
Aluminum	μg/L	150
Electrical Conductivity (EC)	μmhos/cm	825
Ammonia (as N)	mg/L	1.5
Arsenic	μg/L	8
Copper	μg/L	7
Cyanide	μg/L	1
Iron	μg/L	50
Manganese	μg/L	10
Methylene Blue Active Substances (MBAS)	μg/L	160
Nitrate (as N)	mg/L	5
Nitrite (as N)	mg/L	1
Bis(2-ethylhexyl)phthalate	μg/L	3.48
Bromodichloromethane	μg/L	Non-detect in effluent (< 0.2 μg/L)
Dibromochloromethane	μg/L	Non-detect in effluent (< 0.3 μg/L)
Mercury	μg/L	0.010
2,4,6-Trichlorophenol	μg/L	3.28

(1) All concentrations represent projected mean values taken from City of Manteca WQCF Master Plan Update (Nolte, 2007).

Near-Field Impacts Calculations

The near-field water quality impacts assessment evaluates the effects of increasing WQCF discharge from the permitted 9.87 MGD (ADWF) to a proposed 27 MGD (ADWF) effluent flowrate. Because the construction of WQCF improvements is scheduled to occur in two phases, with the completion of the first phase resulting in a discharge capacity of 17.5 MGD (ADWF), water quality impacts were also estimated for this incremental discharge stage. Near-field effects on San Joaquin River water quality will occur between the point of discharge and WQCF monitoring location R-3 (approximately 1-mile downstream of the WQCF outfall; see **Figure 2**) where advanced treatment effluent and ambient river water are well-mixed as determined by recent hydrodynamic modeling conducted by the City (RMA, 2006). Near-field water quality impacts are estimated using the following four parameters which characterize WQCF effluent and San Joaquin River water quality:

1. Projected WQCF effluent quality after Phase III expansion (see **Table 10**);
2. Median (50th percentile) ambient San Joaquin River concentrations calculated from data sets comprised of water quality measurements collected during dry and above normal water years;
3. Current permitted and proposed future WQCF effluent flowrates: 9.87, 17.5, and 27 MGD (ADWF); and
4. Average late summer/early fall San Joaquin River flows observed during historic critical (1992) and dry (2002) water years.

The estimated near-field water quality impacts were calculated using the following mass balance equation:

$$C_{downstream} = \frac{\left((C_{upstream})(Q_{upstream})\right) + \left((C_{eff})(Q_{eff} \times 1.55)\right)}{\left(Q_{upstream} + (Q_{eff} \times 1.55)\right)}$$

Where $C_{downstream}$ = San Joaquin River concentration, downstream of discharge at R-3

$C_{upstream}$ = San Joaquin River concentration, upstream of discharge at R-1

C_{eff} = WQCF effluent concentration

$Q_{upstream}$ = San Joaquin River flow (cfs), upstream of discharge at Vernalis

Q_{eff} = WQCF effluent flow (MGD)

Projected average effluent concentrations resulting from proposed improvements to the WQCF treatment process were used to estimate future impacts of the WQCF discharge on San Joaquin River water quality. Median (50th percentile) receiving water concentrations were calculated using data collected at WQCF R-1, where possible. The median concentration is used for the receiving water because the analysis is strictly based on evaluating the change in receiving water quality. Ambient R-1 concentrations serve as a basis for comparing the magnitude of future change in receiving water quality due to the project.

Constituents were evaluated under both critical and dry/below normal flow conditions corresponding to critical and dry/below normal water years, respectively. For the critical water year, a San Joaquin River flowrate of 600 cfs was chosen as representative of extremely low flow conditions based on historic monthly average flows calculated for the San Joaquin River at Vernalis during Fall of 1991 and 1992; both years classified as critical by the DWR hydrologic classification scheme (LWA, 2006a). Similarly, a flow of 1,250 cfs was chosen as representative of dry/below normal water year flow conditions based on San Joaquin River at Vernalis flows measured during the Fall of 2002; a year classified as a dry water year (LWA, 2006a). Due to agreements currently in place to provide water for migration of anadromous fish species in the Delta (1995 Bay-Delta Plan; SWRCB, 1995; and the Revised Water Right Decision 1641; SWRCB, 2000), as well as future San Joaquin River flow objectives that may be set forth in a future Bay-Delta Plan, future San Joaquin River flows should be similar to or greater than those observed during historic dry water years during future rainfall-limited years. Evaluating changes in San Joaquin River water quality due to an increase in WQCF effluent discharge under critical

water year flow conditions therefore represents a conservative approach to the assessment of potential impacts of the proposed project on the receiving water quality.

Near-Field Analysis and Results

The analysis and results for each constituent specified in **Table 7** selected for near-field analysis are summarized on individual fact sheets in the remainder of this section. Each fact sheet contains information for the following items: data availability, the results of increasing WQCF discharge from the current permitted 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF), a graphical representation of the estimated change in San Joaquin River concentrations at WQCF R-3 due to a increase in WQCF discharge, a comparison to applicable water quality objectives or criteria, a summary evaluation of the findings of the analysis, and tabularized calculated results of estimated water quality conditions.

Biochemical Oxygen Demand (BOD)

Data Availability: DWR-MWQI monitoring data from the San Joaquin River at Mossdale (just downstream of the WQCF discharge) corresponding to a dry water year were used to calculate an estimated impact of WQCF effluent biochemical oxygen demand (BOD) in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average BOD concentration of 7 mg/L.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will produce a minor increase in BOD concentrations in the San Joaquin River downstream of the discharge as shown in **Figure 5** and **Table 11**. A minor increase in BOD mass loading to the river is also projected.

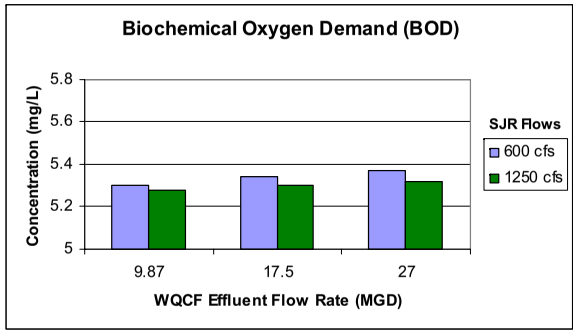


Figure 5: Projected Change in San Joaquin River Biochemical Oxygen Demand Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: Currently, there is no adopted water quality objective for BOD in the San Joaquin River. However, the consumptive oxygen demand of BOD will reduce ambient DO levels in the river, and therefore a nexus exists between BOD and DO concentrations. The influence of the WQCF BOD input is most strongly expressed as an oxygen demand downstream of the City's wastewater outfall, and therefore the impact of WQCF effluent BOD levels in the San Joaquin River is addressed in the Far-Field Analysis and Results section of this report in a discussion of far-field DO impacts. This near-field BOD impact analysis serves as the starting point for the far-field DO impact analysis. Estimated concentrations of BOD in the San Joaquin River under critical and dry/below normal flow conditions show a minor increase with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). The incremental change in BOD concentration in the river is

minor when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF).

Evaluation: The incremental change in BOD concentration and mass loading in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is minor. Additionally, treatment process upgrades including a high-rate activated sludge process and tertiary filtration in accordance with Title 22 standards and UV disinfection conforming to National Water Research Institute (NWRI) guidelines will produce effluent concentrations of BOD less than 10 mg/L. The associated consumptive oxygen demand downstream of the WQCF discharge due to BOD inputs is addressed in the Far-Field Analysis and Results section of this report in a discussion of far-field DO impacts.

Table 11: Estimated Impact of Biochemical Oxygen Demand from WQCF Discharge in the San Joaquin River at WQCF R-3

Biochemical Oxygen Demand (BOD)		*San Joaquin River Flowrate (cfs)*		*Manteca WQCF Effluent Flowrate (MGD ADWF)*		
Mossdale 50th % concen. (mg/L)*	**5.26**					
Projected effluent concen. (mg/L)	**7**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		17,011	35,439	576	1,022	1,576
Est. downstream R-3 river concentration (mg/L) at 600 cfs				5.30	5.34	5.37
Est. downstream R-3 river concentration (mg/L) at 1250 cfs				5.28	5.30	5.32

* 50th percentile statistic calculated using the following data set:
Data Period: October 2000 – October 2001; Sample Size, n = 10; Percent Detected Data = 100%

Total Suspended Solids (TSS)

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to a wet water year were used to calculate an estimated impact of WQCF effluent total suspended solids (TSS) in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Ideally, an R-1 TSS data set corresponding to dry/below normal water years would be used for the present analysis, but such a data set was not available. Improved WQCF treatment processes are projected to produce treated effluent having an average TSS concentration of less than 10 mg/L. For the purpose of the current analysis, and to be conservative, future TSS effluent concentration was considered to be 10 mg/L.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly decrease TSS concentrations in the San Joaquin River downstream of the discharge as shown in **Figure 6** and **Table 12**. A slight increase in TSS mass loading to the river is also projected. The use of wet water year TSS data may have imparted a slightly high bias to the calculation of downstream, estimated TSS concentrations in the San Joaquin River, indicating that actual future TSS concentrations measured during dry/below normal water years in the San Joaquin River might show slightly lower, relative concentrations than presently estimated.

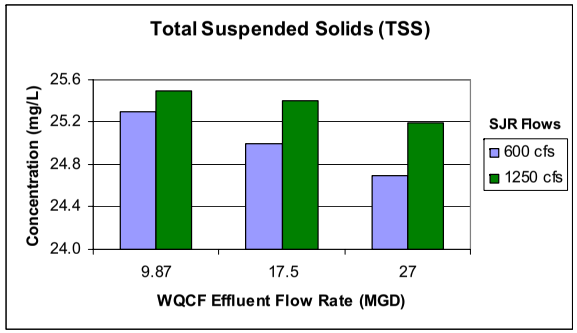


Figure 6: Projected Change in San Joaquin River Total Suspended Solids Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The Basin Plan's narrative objective for *suspended material* states:

> "Waters shall not contain suspended material in concentrations that cause or adversely affect beneficial uses."

The results of the present analysis indicate that TSS concentration in the San Joaquin River will slightly decrease with increasing WQCF effluent discharge, thus lessoning the concentration of suspended material in the river and complying with the narrative water quality objective. Furthermore, NPDES permit effluent limitations will be sufficiently stringent to provide the intended level of protection to the beneficial uses of the San Joaquin River.

Evaluation: Because WQCF effluent TSS concentration is lower than the ambient TSS concentration in the San Joaquin River, increasing WQCF effluent discharge will decrease receiving water concentrations. TSS mass loading to the river is projected to be slight relative to existing in-stream loads. Additionally, with a high-rate activated sludge process, an easily filterable secondary effluent will be produced. Following tertiary filtration in accordance with Title 22 standards and UV disinfection conforming to National Water Research Institute (NWRI) guidelines, effluent concentrations of suspended solids will be less than 10 mg/L.

Table 12: Estimated Impact of Total Suspended Solids from WQCF Discharge in the San Joaquin River at WQCF R-3

Total Suspended Solids (TSS)		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (mg/L)*	**25.7**					
Projected effluent concen. (mg/L)	**10**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		83,114	173,154	823	1,460	2,252
Est. downstream R-3 river concentration (mg/L) at 600 cfs				25.3	25.0	24.7
Est. downstream R-3 river concentration (mg/L) at 1250 cfs				25.5	25.4	25.2

* 50th percentile statistic calculated using the following data set:
Data Period: November 2005 – July 2006; Sample Size, n = 16; Percent Detected Data = 100%

Aluminum

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent total aluminum in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average total aluminum concentration of 150 µg/L.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly decrease total aluminum concentration in the San Joaquin River downstream of the discharge as shown in **Figure 7** and **Table 13**. The column chart also indicates that estimated concentrations of total aluminum in the river far exceed the U.S. EPA chronic ambient water quality criterion (87 µg/L) for the metal (USEPA, 2002), which is often used by the Regional Water Board to interpret the narrative toxicity objective contained in the Basin Plan. Current permitted WQCF effluent limitations for total aluminum include a monthly average of 71 µg/L and a daily maximum of 140 µg/L. Past water quality data collected by the WQCF indicate that aluminum concentrations in the effluent – and the San Joaquin River – exceed these limitations. Therefore, the City is exploring various compliance options to meet these effluent limits. The City has been granted the opportunity by the Regional Water Board to assess compliance with the aluminum effluent limits using the acid soluble method for aluminum analysis and/or by conducting a Water Effects Ratio (WER) to develop a site specific objective (SSO). Based on the data collected to date, the acid-soluble measurement does not appear to be useful or applicable to compliance measurement because the analysis of the acid-soluble portion of a total metal commonly does not result in significantly lower values of the total metal when compared to the analysis of the metal without acidification. In contrast, the City's aluminum WER study (City of Manteca, 2007) recommended a WER of 22.7 for direct adjustment of the chronic objective. This WER would also be applicable to the corresponding acute objective. The 87 µg/L U.S. EPA chronic criterion is based on toxicity tests using striped bass and brook trout in water with pH between 6.5 and 6.6 and hardness concentrations (as $CaCO_3$) of less than 10 mg/L (striped bass) and 12.3 mg/L (brook trout). WER studies conducted since this time and anecdotal evidence support the conclusion that aluminum is substantially less toxic at the higher pH and hardness values that are typical in the San Joaquin River. This conclusion is supported by the City's WER study, which noted only one case when there was a negative response to an aluminum-dosed environmental sample (effluent, upstream, or simulated downstream). Additionally, studies completed by other San Joaquin River dischargers have indicated that WERs exceeding 20 are scientifically defendable. A slight increase in total aluminum mass loading to the river is also projected.

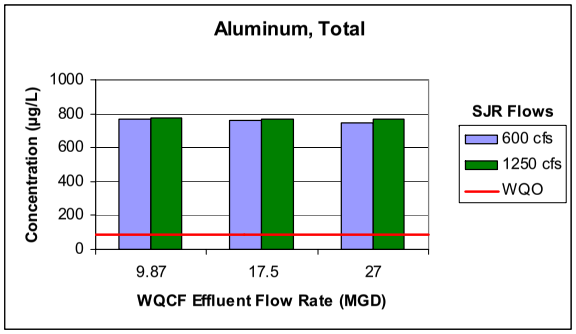


Figure 7: Projected Change in San Joaquin River Total Aluminum Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The U.S. EPA chronic ambient water quality criterion for total aluminum, which is often used by the Regional Water Board to interpret the narrative toxicity objective contained in the Basin Plan, is 87 µg/L. The WER study (City of Manteca, 2007) recently completed by the City for the purpose of identifying an appropriate SSO for total aluminum in the San Joaquin River indicates that a WER of 22.7 in scientifically defendable. To this end, the next lowest water quality standard for aluminum (Title 22 Secondary Maximum Contaminant Level (MCL) of 200 µg/L) may be applicable to WQCF effluent. Title 22 Secondary MCLs are set to evaluate potable water that has received treatment, including filtration that generally removes the particulate materials from the water, leaving essentially only the dissolved fraction. However, Title 22 standards do not directly specify whether the total or dissolved phase should be considered. Applying Secondary MCLs directly to surface water warrants consideration in that only the dissolved fraction would ultimately pass through a drinking water treatment plant. The Regional Water Board has requested an opinion from the California Department of Health Services (DHS) as to whether Secondary MCLs should be applied to the total or dissolved fraction in receiving waters. DHS responded[2] stating that application of Secondary MCLs as dissolved is sufficient to protect municipal and drinking water users. The Regional Water Board has indicated that only the numbers from the Tables of Title 22 Secondary MCLs are incorporated into the Basin Plan by reference, and will continue to apply the value of the Secondary MCL standard to the total concentration of the constituent in the receiving water to provide protection for persons directly using the river as their water source.

Evaluation: The current U.S. EPA chronic water quality criterion for total aluminum as applied to the San Joaquin River is believed to be over restrictive and over protective of beneficial uses because the criterion does not take into account the local water quality characteristics (high pH

[2] Letter from Carl Lischeske, DHS Region Chief, to Kenneth Landau, Region 5 Assistant Executive Officer, regarding Yuba City Wastewater Treatment Plant, dated April 10, 2007.

and high hardness) that mitigate toxicity of aluminum to aquatic life. The criterion was developed based on a study conducted for striped bass and brook trout that was low in pH and hardness. The City has recently completed a WER study as a means of identifying an appropriate water quality objective for aluminum in the San Joaquin River that is both sufficiently protective of aquatic life and identifies available assimilative capacity for aluminum in the river under which the WQCF can discharge its effluent. Regardless, an increase in permitted discharge capacity from 9.87 MGD (ADWF) to 27 MGD (ADWF) does not negatively impact the San Joaquin River, and in fact will decrease total aluminum concentrations in the receiving water.

Table 13: Estimated Impact of Total Aluminum from WQCF Discharge in the San Joaquin River at WQCF R-3

Aluminum, Total		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (µg/L)*	**785.1**					
Projected effluent concen. (µg/L)	**150**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		2,539	5,290	12.3	21.9	33.8
Est. downstream R-3 river concentration (µg/L) at 600 cfs				769.3	757.6	743.7
Est. downstream R-3 river concentration (µg/L) at 1250 cfs				777.4	771.6	764.5

* 50th percentile statistic calculated using the following data set:
Data Period: January 2002 – September 2004; Sample Size, n = 14; Percent Detected Data = 100%

Electrical Conductivity

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent EC in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average EC of 825 µmhos/cm.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. Due to the seasonal EC objectives contained in the Basin Plan, available ambient EC data were divided into two groups for the purpose of the present near-field analysis: an April through August data set, and a September through March data set. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will produce a minor increase in EC in the San Joaquin River downstream of the discharge during April through August relative to its seasonal objective of 700 µmhos/cm, and will produce a slight increase in EC in the river during September through March relative to its seasonal objective of 1000 µmhos/cm. These incremental increases in river EC observed when evaluating the April through August (agricultural season) and September through March (non-agricultural season) time periods are shown in **Figure 8** and **Table 14**, and **Figure 9** and **Table 15**, respectively.

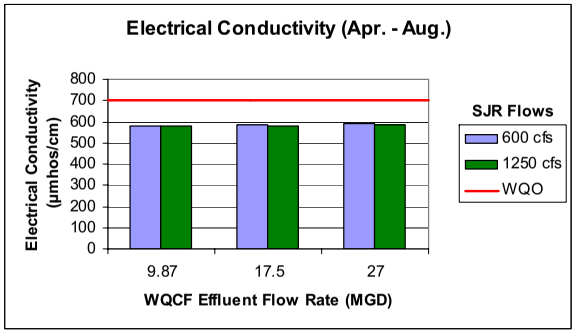


Figure 8: Projected Change in San Joaquin River Electrical Conductivity at WQCF R-3 during April through August with increasing WQCF Effluent Flowrate

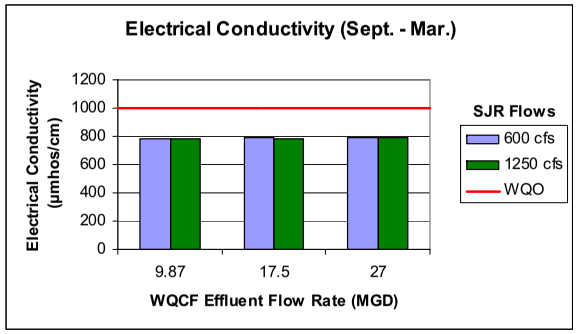


Figure 9: Projected Change in San Joaquin River Electrical Conductivity at WQCF R-3 during September through March with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The Basin Plan for the Delta establishes seasonal EC objectives in the San Joaquin River and southern Delta of 700 µmhos/cm (April – August) and 1000 µmhos/cm (September – March). Estimated EC in the San Joaquin River under critical and dry/below normal flow conditions shows a minor increase during April through August relative to the 700 µmhos/cm objective, and a slight increase during September through March relative to the 1000 µmhos/cm objective, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). Under both seasonal EC objective scenarios (see **Figure 8** and **Figure 9**) the projected median EC in the San Joaquin River is well below the seasonally-relevant Basin Plan EC objective.

Evaluation: Salinity control issues in the Delta have been reviewed and addressed by the State Water Board as far back as 1991, as described in the 1991 Delta Plan (SWRCB, 1991). Subsequent State Water Board analyses of elevated salinity in the southern Delta presented in the 1995 Bay-Delta Plan (SWRCB, 1995) and Revised Water Right Decision 1641 (SWRCB, 2000) conclude that salinity problems in the southern Delta are the result of many inter-related conditions, including water diversions upstream of the Delta, water diversions within the Delta for export and local use, high levels of salinity in irrigation return flows discharged to the Delta waterways and tributaries, groundwater inflow, seasonal flow variation, and tidal conditions. Although discharge of treated wastewater to the Delta or its tributaries under an NPDES permit can marginally affect EC in the southern Delta, previous State Water Board decisions and water quality control plans do not mention or consider treated effluent discharges as a source of salinity in the southern Delta (SWRCB, 2005).

In regard to the present analysis, the incremental change in EC in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is minor during the months of April through August (agricultural season) relative to the 700 µmhos/cm objective, and slight during the months of September through March (non-agricultural season) relative to the 1000 µmhos/cm objective.

Most importantly, the present analysis shows that projected, median EC in the San Joaquin River is below both seasonally-relevant water quality objectives. The City's potable water supply is expected to improve in quality, with respect to EC, as compared to pre-August 2005 conditions due to the blending of surface water from the South County Water Supply Program with the City's groundwater. The blending of surface water with groundwater for the potable water supply has significantly decreased the EC measured in WQCF effluent when comparing pre- and post-August 2005 plant effluent measurements (LWA, 2006b).

Table 14: Estimated Impact of Electrical Conductivity during April through August from WQCF Discharge in the San Joaquin River at WQCF R-3

Electrical Conductivity (April – August)		*San Joaquin River Flowrate (cfs)*		*Manteca WQCF Effluent Flowrate (MGD ADWF)*		
R-1 50th % EC (μmhos/cm)*	**574.9**					
Projected effluent EC (μmhos/cm)	**825**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. downstream R-3 river electrical conductivity (μmhos/cm) at 600 cfs				581.1	585.7	591.2
Est. downstream R-3 river electrical conductivity (μmhos/cm) at 1250 cfs				577.9	580.2	583.0

* 50th percentile statistic calculated using the following data set:
Data Period: April – August 2002, April – May 2004; Sample Size, n = 8; Percent Detected Data = 100%

Table 15: Estimated Impact of Electrical Conductivity during September through March from WQCF Discharge in the San Joaquin River at WQCF R-3

Electrical Conductivity (September - March)		*San Joaquin River Flowrate (cfs)*		*Manteca WQCF Effluent Flowrate (MGD ADWF)*		
R-1 50th % EC (μmhos/cm)*	**785.9**					
Projected effluent EC (μmhos/cm)	**825**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. downstream R-3 river electrical conductivity (μmhos/cm) at 600 cfs				786.9	787.6	788.4
Est. downstream R-3 river electrical conductivity (μmhos/cm) at 1250 cfs				786.4	786.7	787.2

* 50th percentile statistic calculated using the following data set:
Data Period: Jan. – Mar. 2002, Sept. – Dec. 2002, Sept. 2004; Sample Size, n = 8; Percent Detected Data = 100%

Ammonia

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent ammonia (as nitrogen) in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average ammonia (as nitrogen) concentration of 1.5 mg/L.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. Due to the seasonal nexus of U.S. EPA ambient water quality criteria for ammonia (as nitrogen), available ammonia data were divided into two groups for the purpose of the present near-field analysis: a June through September data set, and an October through May data set. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will produce a moderate increase in ammonia (as nitrogen) levels in the San Joaquin River downstream of the discharge during June through September relative to its seasonal objective of 0.62 mg/L, and will produce a slight increase in ammonia (as nitrogen) levels in the river during October through May relative to its seasonal objective of 5.62 mg/L. The more distinct increase in ammonia levels in the river during the June through September time period is due to the higher ambient levels of ammonia (as nitrogen) measured in the San Joaquin River at R-1 during this time period in conjunction with the more stringent chronic ammonia objective in effect from June through September. These incremental increases in river ammonia (as nitrogen) concentrations and mass loadings observed when evaluating the June through September (associated with the EPA chronic ammonia criterion) and October through May (associated with the EPA acute ammonia criterion) time periods are shown in **Figure 10** and **Table 16**, and **Figure 11**and **Table 17**, respectively.

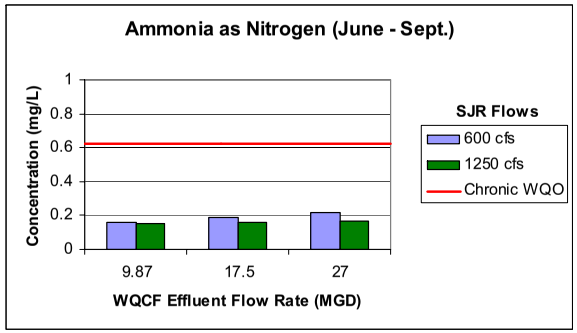


Figure 10: Projected Change in San Joaquin River Ammonia (as Nitrogen) Concentration at WQCF R-3 during June through September with increasing WCQF Effluent Flowrate

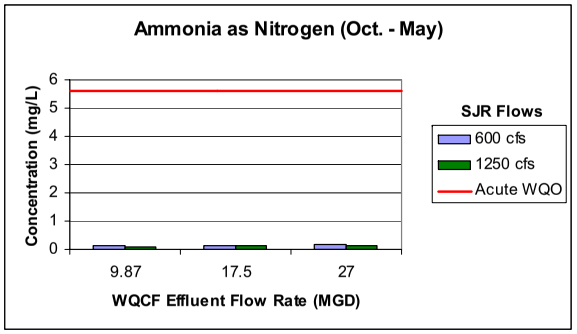


Figure 11: Projected Change in San Joaquin River Ammonia (as Nitrogen) Concentration at WQCF R-3 during October through May with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The U.S. EPA ambient water quality criteria that are applied to ammonia concentrations in the San Joaquin River are pH and temperature dependent. The acute and chronic criteria for ammonia as promulgated by U.S. EPA 1999 Update of Ambient Water Quality Criteria for Ammonia are used by the Regional Water Board to interpret the Basin Plan's narrative toxicity objective. Using pH and temperature values previously used by the Regional Water Board in WDR Order No. R5-2004-0028, a chronic criterion of 0.62 mg/L ammonia (as nitrogen) can be calculated and applied to the San Joaquin River during June through September based on an ambient pH of 8.4 standard units and an ambient temperature of 26 °C. Similarly, an acute criterion of 5.62 mg/L ammonia (as nitrogen) can be calculated and applied to the San Joaquin River during October through May based on an ambient pH of 8.0 standard units. The acute ammonia criterion is not temperature dependent. Estimated concentrations of ammonia (as nitrogen) in the San Joaquin River under critical and dry/below normal flow conditions show a more pronounced increase relative to the chronic EPA criterion during June through September, than the slight increase relative to the acute EPA criterion during October through May, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). In an analysis of compliance with chronic and acute seasonal objectives (**Figure 10** and **Figure 11**), projected median ammonia (as nitrogen) concentrations in the San Joaquin River remain below the more stringent chronic ammonia objective (0.62 mg/L) calculated for the river on a year round basis.

Evaluation: A high level of nitrogen removal will be accomplished through the activated sludge nitrification-denitrification process implemented as one of several treatment process improvements associated with the WQCF upgrade. Most importantly, the present analysis shows that projected, median ammonia (as nitrogen) concentrations in the San Joaquin River are below the more stringent chronic criterion of 0.62 mg/L during the June through September time period, and substantially lower than the acute criterion of 5.62 mg/L during the October through May time period. The consumptive oxygen demands of ammonia nitrification are most strongly expressed downstream of the City's wastewater outfall, and therefore the impact of WQCF

effluent ammonia levels on DO levels in the San Joaquin River is addressed in the Far-Field Analysis and Results section of this report in a discussion of far-field DO impacts. Additionally, it should be noted that ammonia levels will decline over time and distance downstream of R-3 as ammonia is utilized by phytoplankton and other primary producers.

Table 16: Estimated Impact of Ammonia (as Nitrogen) from WQCF Discharge during June through September in the San Joaquin River at WQCF R-3

Ammonia as Nitrogen (June – Sept.)		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (mg/L)*	**0.13**					
Projected effluent concen. (mg/L)	**1.5**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		420	876	123	219	338
Est. downstream R-3 river concentration (mg/L) at 600 cfs				0.16	0.19	0.22
Est. downstream R-3 river concentration (mg/L) at 1250 cfs				0.15	0.16	0.17

* 50th percentile statistic calculated using the following data set:
Data Period: June 2002 – September 2002, September 2004; Sample Size, n = 5; Percent Detected Data = 80%

Table 17: Estimated Impact of Ammonia (as Nitrogen) from WQCF Discharge during October through May in the San Joaquin River at WQCF R-3

Ammonia as Nitrogen (Oct. – May)		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (mg/L)*	**0.08**					
Projected effluent concen. (mg/L)	**1.5**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		259	539	123	219	338
Est. downstream R-3 river concentration (mg/L) at 600 cfs				0.12	0.14	0.17
Est. downstream R-3 river concentration (mg/L) at 1250 cfs				0.10	0.11	0.13

* 50th percentile statistic calculated using the following data set:
Data Period: January 2002 – May 2002, October 2002 – May 2004; Sample Size, n = 11; Percent Detected Data = 72.7%

Arsenic

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent dissolved arsenic in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average total arsenic concentration of 8 µg/L. For the purpose of the current analysis, and to be conservative, all arsenic present in WQCF treated effluent is assumed to be in the dissolved form.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly increase dissolved arsenic concentration in the San Joaquin River, relative to its Basin Plan objective, downstream of the discharge as shown in **Figure 12** and **Table 18**. A slight increase in dissolved arsenic mass loading to the river is also projected.

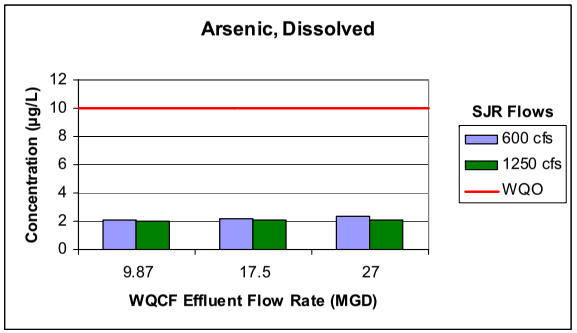


Figure 12: Projected Change in San Joaquin River Dissolved Arsenic Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The Basin Plan objective for dissolved arsenic in the Delta is 10 µg/L, expressed as the dissolved fraction (Basin Plan, Table III-1). Estimated concentrations of dissolved arsenic in the San Joaquin River under critical and dry/below normal flow conditions show a slight increase, relative to the Basin Plan objective, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). The incremental change in dissolved arsenic concentration in the river is slight when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). Projected, median dissolved arsenic concentrations in the San Joaquin River are well below the Basin Plan objective.

Evaluation: The incremental change in dissolved arsenic concentration in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is slight and below the magnitude of change that could be reliably measured in the field. Similarly, the projected increase in dissolved arsenic mass loading to the river is also slight. A reduction in historic effluent arsenic levels should occur as groundwater treatment is implemented at City wells as part of the WQCF upgrade. Source water improvements should produce an average total arsenic effluent concentration of 8 µg/L when the water treatment target is met. Additionally, projected, median dissolved arsenic concentrations in the San Joaquin River are well below the Basin Plan objective of 10 µg/L.

Table 18: Estimated Impact of Dissolved Arsenic from WQCF Discharge in the San Joaquin River at WQCF R-3

Arsenic, Dissolved		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (µg/L)*	**1.92**					
Projected effluent concen. (µg/L)	**8(1)**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		8	18	0.7	1.2	1.8
Est. downstream R-3 river concentration (µg/L) at 600 cfs				2.07	2.18	2.32
Est. downstream R-3 river concentration (µg/L) at 1250 cfs				1.99	2.05	2.12

* 50th percentile statistic calculated using the following data set:
Data Period: February 2002 – December 2002; Sample Size, n = 11; Percent Detected Data = 91%
(1) The projected effluent concentration is provided as total arsenic; however, it is assumed that all arsenic present in WQCF treated effluent exists in the dissolved form.

Copper

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent dissolved copper in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average total copper concentration of 7 µg/L. For the purpose of the current analysis, and to be conservative, all copper present in WQCF treated effluent is assumed to be in the dissolved form.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly increase dissolved copper concentration in the San Joaquin River, relative to its Basin Plan objective, downstream of the discharge as shown in **Figure 13** and **Table 19**. A slight increase in dissolved copper mass loading to the river is also projected.

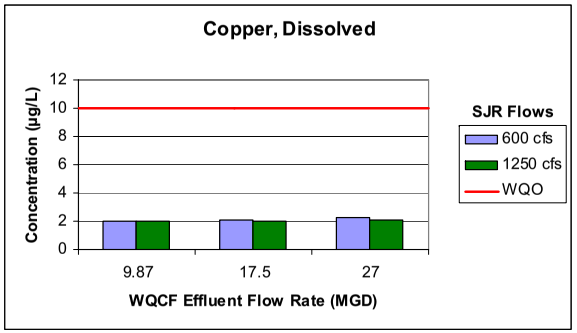


Figure 13: Projected Change in San Joaquin River Dissolved Copper Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The CTR freshwater chronic objective calculated for dissolved copper in the San Joaquin River is 14.24 µg/L when using a river hardness value of 172 mg/L measured during the low fall flows of October 2002 in the San Joaquin River at WQCF R-1. To that end, the more stringent Basin Plan dissolved copper objective of 10 µg/L (Basin Plan, Table III-1) is used for assessing the impact of increased WQCF discharge on dissolved copper levels in the San Joaquin River. Estimated concentrations of dissolved copper in the San Joaquin River under critical and dry/below normal flow conditions show a slight increase with an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF).

The incremental change in dissolved copper concentration in the river is slight when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). Projected, median dissolved copper concentrations in the San Joaquin River are below the Basin Plan objective.

Evaluation: The incremental change in dissolved copper concentration in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is slight and below the magnitude of change that could be reliably measured in the field. Similarly, the projected increase in dissolved copper mass loading to the river is also slight. A significant level of copper removal will be accomplished through advanced wastewater treatment (filtration) implemented as one of several treatment process improvements associated with the WQCF upgrade. Historical removal efficiencies at similar advanced treatment plants are on the order of 25 percent (Nolte, 2007). Considering 25 percent removal through filtration, mean and maximum effluent concentrations of 7 µg/L and 10 µg/L are anticipated for copper. Additionally, projected, median dissolved copper concentrations in the San Joaquin River are substantially below the Basin Plan objective of 10 µg/L.

Table 19: Estimated Impact of Dissolved Copper from WQCF Discharge in the San Joaquin River at WQCF R-3

Copper, Dissolved		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (µg/L)*	**1.91**					
Projected effluent concen. (µg/L)	**7(1)**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		11	22	0.6	1.0	1.6
Est. downstream R-3 river concentration (µg/L) at 600 cfs				2.04	2.13	2.24
Est. downstream R-3 river concentration (µg/L) at 1250 cfs				1.97	2.02	2.07

* 50th percentile statistic calculated using the following data set:
Data Period: February 2002 – December 2002; Sample Size, n = 11; Percent Detected Data = 91%
(1) The projected effluent concentration is provided as total copper; however, it is assumed that all copper present in WQCF treated effluent exists in the dissolved form.

Cyanide

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent total cyanide in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). The treatment plant's new UV disinfection process is projected to produce treated effluent having an average total cyanide concentration of 1 µg/L.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly increase total cyanide concentration in the San Joaquin River, relative to its CTR objective, downstream of the discharge as shown in **Figure 14** and **Table 20**. A slight increase in total cyanide mass loading to the river is also projected.

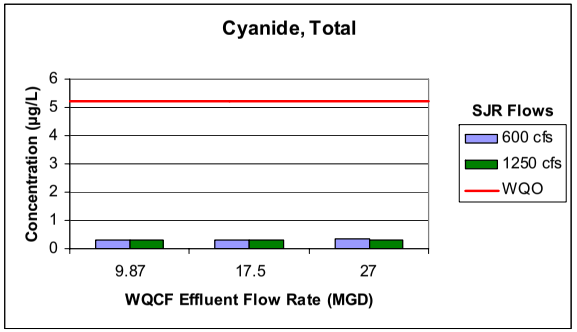


Figure 14: Projected Change in San Joaquin River Total Cyanide Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The CTR freshwater chronic objective for total cyanide as it applies to the San Joaquin River is 5.2 µg/L. The CTR total cyanide objective is not hardness dependent as are some other CTR metals objectives. Estimated concentrations of total cyanide in the San Joaquin River under critical and dry/below normal flow conditions show a slight increase, relative to the CTR objective, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). The incremental change in total cyanide concentration in the river is slight when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). Projected, median total cyanide concentrations in the San Joaquin River are well below the CTR freshwater chronic objective.

Evaluation: The incremental change in total cyanide concentration in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is slight and below the magnitude of change that could be reliably measured in the field. Similarly, the projected increase in total cyanide mass loading to the river is also slight. Additionally, projected, median total cyanide concentrations in the San Joaquin River are well below the CTR freshwater chronic objective of 5.2 µg/L.

Table 20: Estimated Impact of Total Cyanide from WQCF Discharge in the San Joaquin River at WQCF R-3

Cyanide, Total		*San Joaquin River Flowrate (cfs)*		*Manteca WQCF Effluent Flowrate (MGD ADWF)*		
R-1 50th % concen. (µg/L)*	**0.28**					
Projected effluent concen. (µg/L)	**1**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		1	2	0.08	0.15	0.23
Est. downstream R-3 river concentration (µg/L) at 600 cfs				0.30	0.31	0.33
Est. downstream R-3 river concentration (µg/L) at 1250 cfs				0.29	0.30	0.30

* 50th percentile statistic calculated using the following data set:
Data Period: January 2002 – December 2002; Sample Size, n = 12; Percent Detected Data = 25%

Iron

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to a wet water year were used to calculate an estimated impact of WQCF effluent dissolved iron in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Ideally, an R-1 dissolved iron data set corresponding to dry/below normal water years would be used for the present analysis, but such a data set was not available. Improved WQCF treatment processes are projected to produce treated effluent having an average total iron concentration of 50 µg/L. For the purpose of the current analysis, and to be conservative, all iron present in WQCF treated effluent is assumed to be in the dissolved form.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly decrease dissolved iron concentration in the San Joaquin River, relative to the Basin Plan objective, downstream of the discharge as shown in **Figure 15** and **Table 21**. A slight increase in dissolved iron mass loading to the river is also projected.

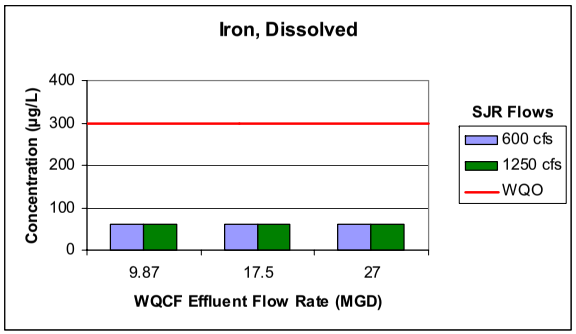


Figure 15: Projected Change in San Joaquin River Dissolved Iron Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The Basin Plan objective for dissolved iron for the Delta is 300 µg/L, expressed as the dissolved fraction (Basin Plan, Table III-1). This Title 22 Secondary MCL is the appropriate and most stringent water quality objective to apply to iron in the San Joaquin River. Estimated concentrations of dissolved iron in the San Joaquin River under critical and dry/below normal flow conditions show a slight decrease, relative to the Basin Plan objective, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). The incremental change in dissolved iron concentration in the river is slight when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD

(ADWF) to the proposed 27 MGD (ADWF). Projected, median dissolved iron concentrations in the San Joaquin River are well below the Basin Plan objective.

Evaluation: The incremental change in dissolved iron concentration in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) manifests itself as a slight decrease under critical and dry/below normal flow conditions due to the lower effluent concentration of the dissolved metal relative to the river. Dissolved iron mass loading to the river is projected to be slight relative to existing in-stream loads. Additionally, projected dissolved iron concentrations in the San Joaquin River are well below the Basin Plan objective of 300 µg/L.

Table 21: Estimated Impact of Dissolved Iron from WQCF Discharge in the San Joaquin River at WQCF R-3

Iron, Dissolved		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (µg/L)*	**61.5**					
Projected effluent concen. (µg/L)	**50**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		199	414	4.1	7.3	11.3
Est. downstream R-3 river concentration (µg/L) at 600 cfs				61.2	61.0	60.8
Est. downstream R-3 river concentration (µg/L) at 1250 cfs				61.4	61.3	61.1

* 50th percentile statistic calculated using the following data set:
Data Period: November 2005 – July 2006; Sample Size, n = 10; Percent Detected Data = 60%

Manganese

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to a wet water year were used to calculate an estimated impact of WQCF effluent dissolved manganese in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Ideally, an R-1 dissolved manganese data set corresponding to dry/below normal water years would be used for the present analysis, but such a data set was not available. Improved WQCF treatment processes are projected to produce treated effluent having an average total manganese concentration of 10 µg/L. For the purpose of the current analysis, and to be conservative, all manganese present in WQCF treated effluent is assumed to be in the dissolved form.

Results: The effect on an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical San Joaquin River flow conditions (600 cfs), an increase in WQCF effluent discharge will slightly decrease dissolved manganese concentration in the San Joaquin River, relative to its Basin Plan objective, downstream of the discharge as shown in **Figure 16** and **Table 22**. Estimated river concentrations associated with dry/below normal flow conditions (1250 cfs) show no measurable change in dissolved manganese concentrations in the San Joaquin River with increasing WQCF effluent discharge. A slight increase in dissolved manganese mass loading to the river is also projected.

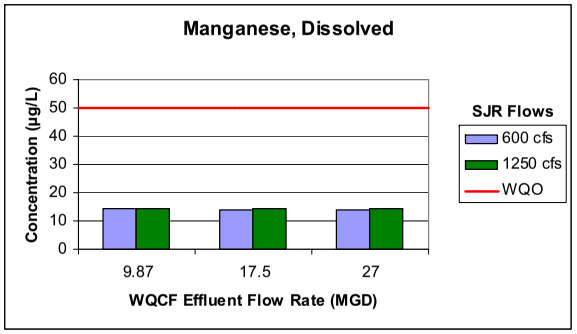


Figure 16: Projected Change in San Joaquin River Dissolved Manganese Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The Basin Plan objective for dissolved manganese for the Delta is 50 µg/L, expressed as the dissolved fraction (Basin Plan, Table III-1). Estimated concentrations of dissolved manganese in the San Joaquin River under critical flow conditions (600 cfs) show a slight decrease, relative to the Basin Plan objective, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). No measurable change in dissolved manganese river concentration is projected under dry/below normal flow conditions

(1250 cfs) with increasing WQCF discharge. The incremental change in dissolved manganese concentration in the river is slight when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF) under the critical flow condition. Projected, median dissolved manganese concentrations in the San Joaquin River are well below the Basin Plan objective.

Evaluation: The incremental change in dissolved manganese concentration in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) manifests as a very slight decrease under critical flow conditions (600 cfs) due to the lower effluent concentration of the dissolved metal relative to the river. No measurable change in the river's dissolved manganese concentrations are projected during flow conditions representative of dry/below normal water years (1250 cfs) as WQCF effluent discharge increases from 9.87 MGD (ADWF) to 27 MGD (ADWF). Dissolved manganese mass loading to the river is projected to be slight relative to existing in-stream loads. Additionally, projected, median dissolved manganese concentrations in the San Joaquin River are well below the Basin Plan objective.

Table 22: Estimated Impact of Dissolved Manganese from WQCF Discharge in the San Joaquin River at WQCF R-3

Manganese, Dissolved		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (µg/L)*	**14.3**					
Projected effluent concen. (µg/L)	**10**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		46	96	0.8	1.5	2.3
Est. downstream R-3 river concentration (µg/L) at 600 cfs				14.2	14.1	14.0
Est. downstream R-3 river concentration (µg/L) at 1250 cfs				14.2	14.2	14.2

* 50th percentile statistic calculated using the following data set:
Data Period: November 2005 – July 2006; Sample Size, n = 10; Percent Detected Data = 90%

Methylene Blue Active Substances (MBAS)

Data Availability: A limited methylene blue active substances (MBAS) receiving water data set featuring all non-detected R-1 data was available for this analysis. To that end, an estimated MBAS concentration in the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years was used to calculate a projected impact of WQCF effluent MBAS in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average MBAS concentration of 160 µg/L.

Results: The effect on an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly increase MBAS concentration in the San Joaquin River, relative to its Title 22 Secondary MCL criterion, downstream of the discharge as shown in **Figure 17** and **Table 23**. The R-1 ambient MBAS concentration employed in the present analysis was estimated using the median method detection limit (MDL) associated with the non-detected data. The median MDL for MBAS from the City's NPDES self-monitoring data is 20 µg/L. A slight increase in MBAS mass loading to the river is also projected.

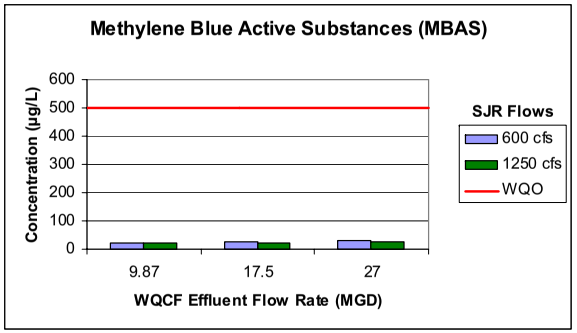


Figure 17: Projected Change in San Joaquin River Methylene Blue Active Substances Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The California Code of Regulation, Title 22 Secondary MCL criterion for MBAS, incorporated into the Basin Plan by reference, is 500 µg/L. Estimated concentrations of MBAS in the San Joaquin River under critical and dry/below normal flow conditions show a slight increase, relative to the Title 22 Secondary MCL, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). The incremental change in MBAS concentration in the river is slight when increasing the WQCF discharge from

the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). Projected, median MBAS concentrations in the San Joaquin River are well below the Title 22 Secondary MCL standard.

Evaluation: The incremental change in MBAS concentration and mass loading in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is slight. Additionally, projected MBAS concentrations in the San Joaquin River are well below the Title 22 Secondary MCL of 500 µg/L.

Table 23: Estimated Impact of Methylene Blue Active Substances from WQCF Discharge in the San Joaquin River at WQCF R-3

Methylene Blue Active Substances (MBAS)		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 estimated concen. (µg/L)*	**20**					
Projected effluent concen. (µg/L)	**160**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		65	135	13.2	23.4	36.0
Est. downstream R-3 river concentration (µg/L) at 600 cfs				23.5	26.1	29.1
Est. downstream R-3 river concentration (µg/L) at 1250 cfs				21.7	23.0	24.5

* Statistic derived from the following data set:
Data Period: January 2002 – December 2002; Sample Size, n = 12; Percent Detected Data = 0%

Nitrate

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent nitrate (as nitrogen) in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average nitrate (as nitrogen) concentration of 5 mg/L.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly increase nitrate (as nitrogen) concentration in the San Joaquin River, relative to its Title 22 Primary MCL criterion, downstream of the discharge as shown in **Figure 18** and **Table 24**. A slight increase in nitrate (as nitrogen) mass loading to the river is also projected.

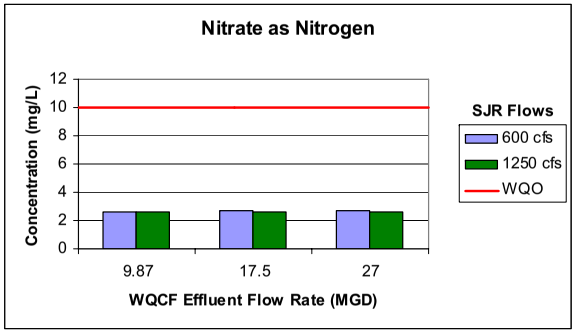


Figure 18: Projected Change in San Joaquin River Nitrate (as Nitrogen) Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The California Code of Regulation, Title 22 Primary MCL criterion for nitrate + nitrite (sum as nitrogen), incorporated into the Basin Plan by reference, is 10 mg/L. This Title 22 Primary MCL is the appropriate and most stringent water quality objective to apply to nitrate (as nitrogen) in the San Joaquin River. Estimated concentrations of nitrate (as nitrogen) in the San Joaquin River under critical and dry/below normal flow conditions show a slight increase, relative to the Title 22 Primary MCL, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). The incremental change in nitrate (as nitrogen) concentration in the river is slight when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). Projected, median nitrate (as nitrogen) concentrations in the San Joaquin River are well below the Title 22 Primary MCL standard.

Evaluation: The incremental change in nitrate (as nitrogen) concentration in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is slight and below the magnitude of change that could be reliably measured in the field. Similarly, the projected increase in nitrate (as nitrogen) mass loading to the river is also slight. A high level of nitrogen removal will be accomplished through the activated sludge nitrification-denitrification process implemented as one of several treatment process improvements associated with the WQCF upgrade. Additionally, projected, median nitrate (as nitrogen) concentrations in the San Joaquin River are well below the Title 22 Primary MCL standard of 10 mg/L.

Table 24: Estimated Impact of Nitrate (as Nitrogen) from WQCF Discharge in the San Joaquin River at WQCF R-3

Nitrate as Nitrogen		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (mg/L)*	**2.55**					
Projected effluent concen. (mg/L)	**5**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		8,247	17,181	412	730	1,126
Est. downstream R-3 river concentration (mg/L) at 600 cfs				2.61	2.66	2.71
Est. downstream R-3 river concentration (mg/L) at 1250 cfs				2.58	2.60	2.63

* 50th percentile statistic calculated using the following data set:
Data Period: January 2002 – December 2002; Sample Size, n = 12; Percent Detected Data = 100%

Nitrite

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent nitrite (as nitrogen) in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average nitrite (as nitrogen) concentration of 1 mg/L.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly increase nitrite (as nitrogen) in the San Joaquin River, relative to its Title 22 Primary MCL criterion, downstream of the discharge as shown in **Figure 19** and **Table 25**. The data set used in the present analysis included 83.3% non-detected data, therefore requiring the estimation of an ambient river concentration. The R-1 ambient nitrite (as nitrogen) concentration employed in the present analysis was estimated by setting the ambient level at the method detection limit (MDL) associated with the City's non-detected data. The MDL for nitrite (as nitrogen) from the City's NPDES self-monitoring data is 0.002 mg/L. A slight increase in nitrite (as nitrogen) mass loading to the river is also projected.

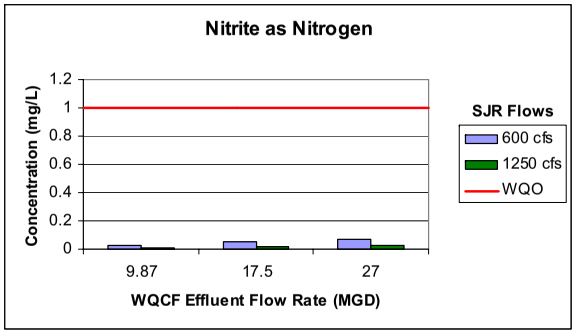


Figure 19: Projected Change in San Joaquin River Nitrite (as Nitrogen) Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The California Code of Regulation, Title 22 Primary MCL criterion for nitrite (as nitrogen), incorporated into the Basin Plan by reference, is 1 mg/L. This Title 22 Primary MCL is the appropriate and most stringent water quality objective to apply to nitrite (as nitrogen) in the San Joaquin River. Estimated concentrations of nitrite (as nitrogen) in the San Joaquin River under critical and dry/below normal flow conditions show a slight increase, relative to the Title 22 Primary MCL, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). The incremental change in nitrite (as

nitrogen) concentration in the river is slight when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). Projected, median nitrite (as nitrogen) concentrations in the San Joaquin River are well below the Title 22 Primary MCL standard.

Evaluation: The incremental change in nitrite (as nitrogen) concentration and mass loading in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is slight. A high level of nitrogen removal will be accomplished through the activated sludge nitrification-denitrification process implemented as one of several treatment process improvements associated with the WQCF upgrade. Additionally, projected, median nitrite (as nitrogen) concentrations in the San Joaquin River are well below the Title 22 Primary MCL standard of 1 mg/L.

Table 25: Estimated Impact of Nitrite (as Nitrogen) from WQCF Discharge in the San Joaquin River at WQCF R-3

Nitrite as Nitrogen		*San Joaquin River Flowrate (cfs)*		*Manteca WQCF Effluent Flowrate (MGD ADWF)*		
R-1 estimated concen. (mg/L)*	**0.002**					
Projected effluent concen. (mg/L)	**1**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/day)		6	13	82.3	146	225
Est. downstream R-3 river concentration (mg/L) at 600 cfs				0.03	0.05	0.07
Est. downstream R-3 river concentration (mg/L) at 1250 cfs				0.01	0.02	0.03

* Statistic derived from the following data set:
Data Period: January 2002 – December 2002; Sample Size, n = 12; Percent Detected Data = 16.7%

Mercury

Data Availability: Manteca WQCF NPDES self-monitoring data from the San Joaquin River at R-1 (just upstream of the WQCF discharge) corresponding to dry/below normal water years were used to calculate an estimated impact of WQCF effluent total mercury in the San Joaquin River under critical (600 cfs) and dry/below normal (1250 cfs) river flows at a permitted discharge of 9.87 MGD (ADWF) and at proposed discharges of 17.5 MGD (ADWF) and 27 MGD (ADWF). Improved WQCF treatment processes are projected to produce treated effluent having an average total mercury concentration of 0.01 µg/L.

Results: The effect of an increase in WQCF discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF) is appropriately addressed in the receiving water at well-mixed conditions downstream of the discharge. During critical and dry/below normal San Joaquin River flow conditions, an increase in WQCF effluent discharge will slightly increase total mercury concentration in the San Joaquin River, relative to its CTR objective, downstream of the discharge as shown in **Figure 20** and **Table 26**. A slight increase in total mercury mass loading to the river is also projected.

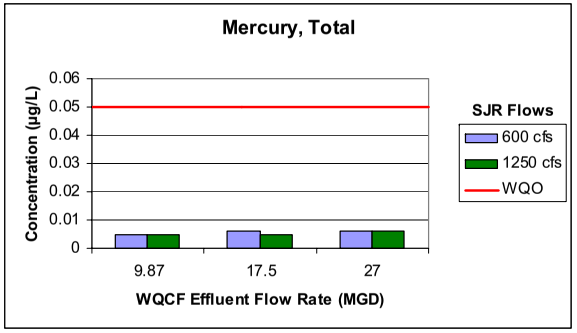


Figure 20: Projected Change in San Joaquin River Total Mercury Concentration at WQCF R-3 with increasing WQCF Effluent Flowrate

Comparison to Water Quality Objective: The CTR Human Health (water and organisms) objective for total mercury as it applies to the San Joaquin River is 0.05 µg/L. Estimated concentrations of total mercury in the San Joaquin River under critical and dry/below normal flow conditions show a slight increase, relative to the CTR Human Health objective, with an increase in WQCF effluent discharge from 9.87 MGD (ADWF) to 27 MGD (ADWF). The incremental change in total mercury concentration in the river is slight when increasing the WQCF discharge from the current permitted discharge of 9.87 MGD (ADWF) to the proposed 27 MGD (ADWF). Projected, median total mercury in the San Joaquin River are well below the CTR Human Health (water and organisms) objective.

Evaluation: The incremental change in total mercury concentration in the San Joaquin River due to an increase in WQCF effluent discharged from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)) is slight and below the magnitude of change that could be reliably measured in the field. Additionally, projected, median total mercury concentrations in the San Joaquin River are well below the CTR Human Health (water and organisms) criterion of 0.05 µg/L. It should be recognized that the estimated mass loading (lbs/day) of total mercury in the San Joaquin River at a WQCF effluent flowrate of 27 MGD (ADWF) does produce a load (0.82 lbs/year) greater than the currently permitted 0.69 lbs/year based on a WQCF treatment design capacity of 8.11 MGD (ADWF). With respect to the Sacramento-San Joaquin Delta Mercury TMDL, the establishment of a future waste load allocation (WLA) and future mass limit for the WQCF will need to consider all existing mercury inputs in the watershed in order to develop an appropriate WLA that provides the intended level of protection to the beneficial uses of the San Joaquin River. Upon review of the methylmercury data generated from the 2004-2005 Central Valley Clean Water Agency Mercury Study (Pirondini, 2006), it is anticipated that future methylmercury levels in WQCF tertiary treated effluent should not exceed, on average, the 0.06 ng/L methylmercury implementation goal set forth in the draft Sacramento-San Joaquin Delta Methylmercury TMDL (CVRWQCB, 2006a).

Table 26: Estimated Impact of Total Mercury from WQCF Discharge in the San Joaquin River at WQCF R-3

Mercury, Total		***San Joaquin River Flowrate (cfs)***		***Manteca WQCF Effluent Flowrate (MGD ADWF)***		
R-1 50th % concen. (µg/L)*	**0.005**					
Projected effluent concen. (µg/L)	**0.01**	***600***	***1250***	***9.87***	***17.5***	***27***
Est. mass loading (lbs/year)		6.35	13.23	0.30	0.53	0.82
Est. downstream R-3 river concentration (µg/L) at 600 cfs				0.005	0.006	0.006
Est. downstream R-3 river concentration (µg/L) at 1250 cfs				0.005	0.005	0.006

* 50th percentile statistic calculated using the following data set:
Data Period: January 2002 – September 2004; Sample Size, n = 14; Percent Detected Data = 100%

Temperature

Preparation of the 2000 Draft Environmental Impact Report for the WQCF Phase III/IV Expansion Project (EDAW, 2000), revealed that the WQCF effluent would not comply with all objectives of the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan; SWRCB, 1972) under some conditions. Because the WQCF outfall is an existing discharge in the tidally influenced reach of the San Joaquin River, Section 5.A of the Thermal Plan applies to the discharge and stipulates the following:

(1) Elevated temperature waste discharges shall comply with the following:
   a. The maximum temperature shall not exceed the natural receiving water temperature by more than 20 °F.
   b. Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.
   c. No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.

In general, the WQCF effluent is warmer than the San Joaquin River, and if evaluated on a monthly average, objective a. of the Thermal Plan is met for the WQCF discharge. Because the effluent is warmer than the receiving water, objectives b. and c. of the Thermal Plan are not necessarily met within the WQCF plume. By operating under a timed discharge during periods of low river flow to discharge only on the outgoing tide, the thermal plume will meet objective b. of the Thermal Plan. However, the temperature difference between the discharge and the river may exceed objective c. of the Thermal Plan. Pursuant to General Water Quality Provision 4 of the Thermal Plan, the City is pursuing a limited exception to specific Thermal Plan water quality objectives for the permitted discharge rate of 9.87 MGD (ADWF) (LWA, 2006a). The current thermal analysis is expanded to evaluate the thermal impacts of 17.5 MGD (ADWF) and 27 MGD (ADWF) WQCF discharges on the San Joaquin River. Additionally, the case of a diffuser discharge is modeled as a means of evaluating the impact of modifying the treatment plant's outfall.

Modeling Approach: A three-dimensional, hydrodynamic RMA-10 model of the river run in the vicinity of the WQCF discharge is used as the basis for the evaluation. The model simulates atmospheric heat exchange using the meteorological data from nearby monitoring sites as inputs, and has been calibrated and validated using historic data and recent field measurements. The hydrodynamic simulation is influenced by density gradients produced by differences in water temperature and other parameters (e.g., EC, suspended sediment), and incorporates a heat budget algorithm to simulate heat transfer across the air-water interface. The three-dimensional RMA-10 analysis provides a detailed description of the effluent plume based on the complex geometry of the San Joaquin River in the vicinity of the Manteca discharge (including, sharp bend 100 ft upstream of discharge, Railroad Bridge, Mossdale Bridge, and variable bathymetry and varying water surface elevation), and the fundamental physics that effect hydrodynamic behavior.

The finite element representation of the San Joaquin River used for the Manteca thermal modeling extends from the gage at Vernalis to the bifurcation at the head of Old River. The model includes a one-dimensional cross-sectionally averaged section from the upstream boundary near Vernalis to above the river bend upstream of the WQCF outfall, a three-dimensional section extending from just upstream of the outfall to below Mossdale Bridge, and two-dimensional depth-averaged sections downstream of Mossdale Bridge to Old River. A short 2-D section also transitions between the upstream 1-D section and the 3-D section.

The model was used to evaluate three critical seasonal scenarios: Fall, Winter, and Spring for the critical dry and below normal river flowrates. During these periods anadromous fish are in the river, either migrating upstream as adults or emigrating downstream as juveniles. Because there is no clear most critical condition for evaluating the thermal impact of the WQCF plume, all three of the conditions identified above have been evaluated. The heat budget component of the model was calibrated separately for each of the periods as each season has significantly different meteorological conditions. (LWA 2006b)

Results: The winter condition resulted in the plume with the largest area of elevated temperatures. The modeled thermal plume from the side bank outfall for the winter critical condition corresponding to the currently permitted capacity (9.87 MGD (ADWF)) and the ultimate project capacity (27 MGD (ADWF)) are shown in plan view in **Figure 21** and for transects downstream of the discharge in **Figure 22**. Because of the increased discharge flows associated with the project, the thermal plume will be larger and in addition will not comply with objectives a., b., or c. of the Thermal Plan. A summary comparison between the thermal plumes from the 9.87 MGD (ADWF) and 27 MGD (ADWF) conditions is listed in **Table 27**.

Table 27: Summary of Percent Cross Section Elevated 1ºF or more during Winter Dry Water Year Flowrates (RMA 2006)

Distance downstream of discharge (ft)	% cross-sectional area elevated more than 1º F	
	9.87 MGD (ADWF)	27 MGD (ADWF)
25	7	15
125	8	35
250	9	41
450	16	47
1,000	22	48
1,500	0(1)	51

(1) Worst case plume resulting from timed discharge release, at maximum cross sectional area, plume has yet to reach 1,500 m.

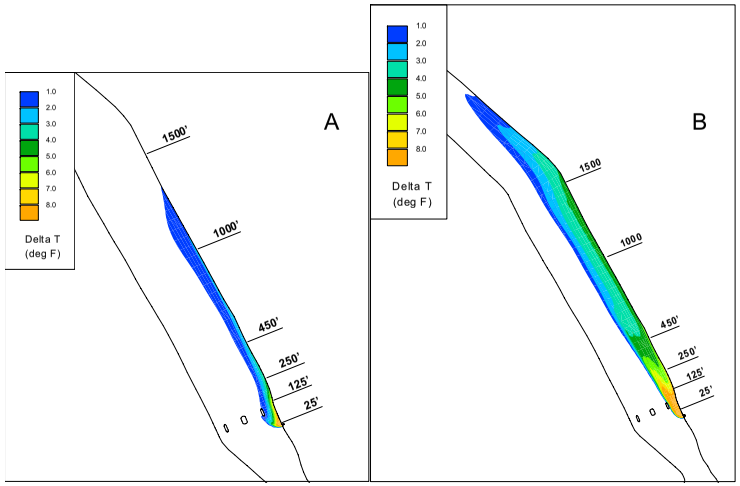


Figure 21: Comparison of Winter Surface Water Temperatures for Dry Water Year Flowrates at (A) 9.87 MGD (ADWF) and (B) 27 MGD (ADWF). Discharge is located at 0' on the Figures.

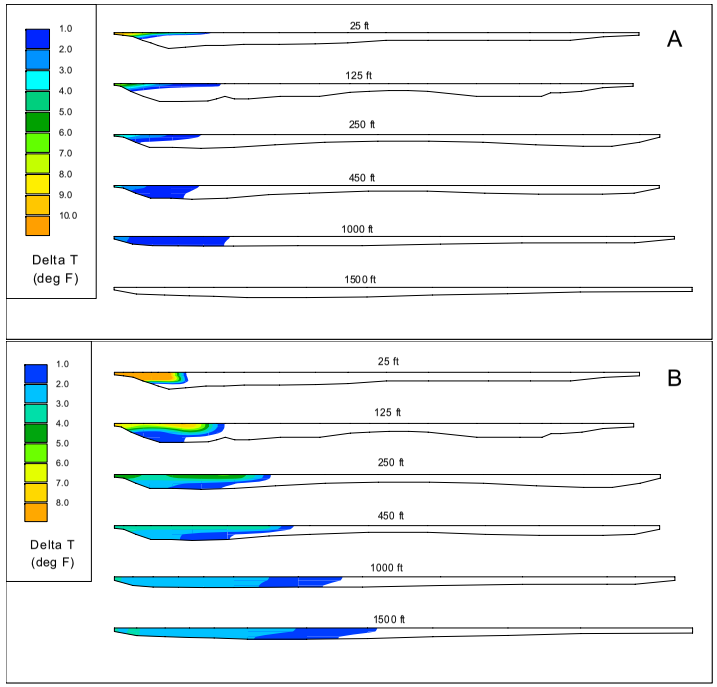


Figure 22: Winter Cross Sectional Temperature Differential for Dry Water Year Flowrates at (A) 9.87 MGD (ADWF) and (B) 27 MGD WQCF (ADWF)

The largest cooling effort to achieve the Thermal Plan requirements occurs during the Fall critical condition. Model runs were performed successively decreasing the effluent temperature for the project build-out case to determine the required cooling to comply with the 1°F temperature differential over less than 25% of the receiving water cross section. Results from the analysis are presented in **Table 28**. From the modeling results, the effluent temperature must be within 3-4 °F of the ambient river temperature to comply with the cross sectional requirement. Due to the low dilution available from the critical flows, if the effluent meets the cross sectional requirement of the Thermal Plan, then all objectives of the Thermal Plan will be met as well.

Table 28: Summary of Peak Percent Cross Section with greater than 1ºF Temperature Differential for Fall Critical Water Year Flowrates for Side Bank Discharge at 27 MGD (ADWF) (RMA 2006)

Background San Joaquin River temperature (ºF)	Discharge temperature (ºF)	Reduction from effluent temperature(1) (ºF)	Peak cross-sectional area impacted by 1ºF or more
62	65	11	19.0%
62	66	10	28.2%
62	67	9	35.1%
62	68	8	39.7%

(1) WQCF Effluent Temperature 76 ºF

For the case of a diffuser, the differential between the ambient river and centerline of the fully developed plume can be calculated from the differential between the discharge and ambient river temperatures and the in-plume dilution (RMA, 2006). The procedure is detailed in Appendix A. The required effluent temperature differentials above the ambient river temperature to meet the 1 °F temperature above ambient over less than 25% of the cross section objective in the Thermal Plan for the WQCF project flowrates are listed in **Table 29**.

Table 29: Maximum Increment between Effluent Discharged via Diffuser and Ambient River Temperature for a 1 ºF Differential between Thermal Plume and the Ambient River (RMA 2006)

Flowrate (MGD ADWF)	Minimum Initial Dilution (parts river water per 1 part wastewater)	Maximum Temperature Increment ($T_{eff} - T_{upstream}$) (° F) for 1° F increase over < 25% cross-section
9.87	11	12
17.5	6	7
27	4	5

While the assumption of a fully developed plume will not affect the analysis for the 1 °F temperature differential between the centerline of the plume and the ambient river for a cross section, the 4 °F temperature differential would have to be met at the diffuser to comply with the Thermal Plan. As the analysis reveals, to meet the 1 °F temperature differential over 25% of any transect, the effluent would need to be cooled to within 5 °F of the ambient river; to ensure the temperature in the plume drops to within 1 °F of the ambient over the short distance required to fully develop the plume. If it can be shown that a maximum 5 °F difference between the discharge and ambient river does not impact aquatic life, a Thermal Plan Exception to objective c. would be required. Either a Thermal Plan Exception could be sought, or the effluent could be cooled to within 4 °F of ambient river temperature, resulting in compliance with all objectives of the Thermal Plan.

Comparison to Water Quality Objectives: The thermal plume from the 9.87 MGD (ADWF) discharge does not comply with all objectives of the Thermal Plan. The analysis of the thermal plume reveals that the temperature differential between the effluent and the river may slightly exceed 20 ºF for brief periods, but utilizing timed discharge during periods of low river flow a 1 ºF differential is limited to less than 25% of the river's cross section. Additionally, there is a limited zone where the temperature differential exceeds 4 ºF. However, the fisheries analysis of the thermal plume revealed that there would be no significant impact on sensitive fish species and the impact would be limited to avoidance behavior of migrating salmonids (LWA, 2006a). A request to evaluate objective 5.A.1.a as monthly average, and an exception limited to objective 5.A.1.c is being sought to provide relief and allow compliance with the Thermal Plan.

For the side bank discharge, increasing the WQCF discharge rate above 9.87 MGD (ADWF) will result in the 1 ºF temperature differential over less than 25% of the cross section provision of the thermal plan to be exceeded. As the discharge rate is increased the zone of water greater than 4 ºF above ambient river temperature grows laterally and vertically; and extends further downstream. To meet the Thermal Plan objectives, the WQCF effluent would need to be cooled to within 3-4 ºF of the ambient river.

Potential diffuser designs likely would extend greater than 25% of the channel width. Without additional cooling of the WQCF effluent, utilizing a diffuser will cause exceedance of both the 1 ºF temperature differential over less than 25% of the cross section, and the 4 ºF differential anywhere in the river. If the WQCF effluent is cooled to within 5 ºF of the ambient, the 1 ºF temperature differential over less than 25% of the cross section will be met, but a small footprint where the plume is developing will exceed the 4 ºF temperature differential objective. By cooling the effluent to within 4 ºF of the ambient river, the discharge would meet all objectives of the Thermal Plan.

Evaluation: The Thermal Plan objectives are slightly exceeded for the currently permitted discharge of 9.87 MGD (ADWF); however, an evaluation of the impacts of the thermal plume reveals that there are no significant impacts of the plume and a limited exception is being sought for the WQCF. Increasing the effluent flowrate will increase the thermal plume, resulting in exceedance of both the 1 ºF temperature differential over less than 25% of the cross section, and 4 ºF differential anywhere objectives in the Thermal Plan. Because the Thermal Plan objectives are exceeded, the characteristics of the WQCF plume need to be evaluated for the level of impact on aquatic life. If the plume is found to not impact the aquatic life within the San Joaquin River, then an exception to the Thermal Plan will be required. If the plume is determined to impact aquatic life in the San Joaquin River, then the City is prepared to design, construct, install, and operate a cooling tower that cools treated effluent prior to its discharge into the San Joaquin River. The cooling tower would be confirmed to perform at final design specifications prior to operation of the WQCF at the proposed expanded capacity. Implementation of a cooling tower would act to sufficiently reduce the modeled thermal impacts of the WQCF's non-cooled effluent plume resulting in no significant adverse thermal effects on fisheries and aquatic resources as a result of the planned increase in WQCF discharge capacity from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)).

FAR-FIELD METHODOLOGY

The far-field water quality effects of the currently permitted WQCF design capacity (9.87 MGD (ADWF)) and the proposed WQCF design capacity phased increases of 17.5 (ADWF) and 27 MGD (ADWF) are calculated using a mass balance model in conjunction with a hydrologic model of water movement through the Sacramento-San Joaquin River Delta (RMA, 2006).

Far-Field Analysis and Results

The fraction or percentage of WQCF effluent present at various locations within the Delta was modeled in order to provide an indication of the far-field impacts of the proposed project on Delta water quality. Six locations within the Delta (see **Figure 3** and **Figure 27**) were chosen as far-field sites for the evaluation of water quality impacts due to increased WQCF discharge. Sites were selected to provide pre- and post-project water quality estimates at several drinking water export locations and the DWSC. Due to the limited availability of concurrent water quality data sets at the various Delta locations of interest, only EC, nitrate, DOC, and DO were selected for far-field analysis. EC is a useful water quality parameter because it serves as a surrogate for salts, while nitrate and DOC are constituents of concern for the treatment of drinking water. To estimate far-field EC, nitrate, and DOC concentrations, the Delta hydrologic model is used to calculate the percent contribution of WQCF effluent at the various Delta locations. DO is treated separately from the other constituents in the current analysis because the physical transfer of oxygen from the atmosphere and the biological consumption of oxygen during respiration greatly affect the concentration of DO. DO can not be considered conservative, and the area of greatest concern for this parameter is the DWSC. The calculated effluent fractions facilitate the use of a mass balance model to estimate changes in the selected water quality parameters due to an increase in WQCF discharge. Historic Delta water quality data and historic Manteca effluent data are then used to estimate water quality in the Delta under two WQCF discharge scenarios: 17.5 MGD (ADWF) and 27 MGD (ADWF).

Dissolved Oxygen

Two important aspects of DO in the San Joaquin River should be analyzed as WQCF discharge to the river increases: (1) the change in DO at the DWSC, and (2) the minimum DO concentration downstream of the outfall, considering the ambient conditions above the outfall and the characteristics of the WQCF effluent (i.e. an oxygen sag analysis).

DO concentrations in the DWSC are historically subject to severe depression under low river flow conditions that may result in a DO concentration below the minimum objective of 5 mg/L. In January 2005, the Central Valley Regional Water Quality Board (Regional Water Board) adopted a Total Daily Maximum Load (TMDL) for DO in the Stockton DWSC. Because of sufficiently large data gaps leading to an unresolved linkage analysis, the TMDL was adopted with a phased implementation allowing the needed field and modeling studies to be performed by December 2009 before revisiting the waste load and load allocations for specific sources.

The minimum DO concentration downstream of the WQCF outfall is important to investigate because the full expression of oxygen demand, with the deepest sag in DO concentrations, is potentially far downstream from the WQCF.

Modeling Approach DWSC DO: To evaluate the DO concentrations in the DWSC due to the proposed project, the modeling approach of the 2000 Draft Environmental Impact Report for the WQCF Phase III/IV Expansion Project (2000 DEIR; EDAW 2000) was extended to consider the increased discharge of the current proposed project. The DO simulations performed for the 2000 DEIR were designed to determine the expected change in conditions in the ship channel and turning basin. To investigate DO, a dynamic link-node modeling system was used to calculate the impact of increasing WQCF plant capacities and level of treatment on DO in the DWSC. In the analysis, the base case effluent condition for the modeling was 6.0 MGD (ADWF) with 20 mg/L for BOD_5 and 22 mg/L as N ammonia. Two phases were considered for the Manteca expansion: 8.11 MGD (ADWF) plant capacity and 9.87 MGD (ADWF). Both cases included advanced treatment resulting in effluent concentrations of 20 mg/L for BOD_5 and 2.0 mg/L as N for ammonia. The incremental change in DO was calculated by sequentially running the model for the base case and the two phases; and subtracting the DO results for the DWSC. To recreate the regression model the concentrations and flows used in the 2000 DEIR are represented here. The differences in loading between the 2000 DEIR and the discharge scenarios are used to calculate the expected difference in DWSC DO.

In the analysis, the predicted differences in DWSC DO concentrations were due to the differences in loading of oxygen-affecting compounds from the two effluent flowrates. For the model, investigators assumed a BOD_5 to BOD_{ult} factor of 2.5. The investigation did not model the nitrogen cycle explicitly. Instead, an assumed ammonia-to-BOD_{ult} factor of 4.57 was applied in the model.

In the 2000 DEIR, the difference in DWSC DO was calculated in response to increasing Manteca effluent discharge rates from 6.0 to 8.11 MGD (ADWF), and from 6.0 to 9.87 MGD (ADWF). The 6.0 MGD (ADWF) baseline case corresponds to conditions before nitrification-denitrification was operational at the WQCF. For the 6.0 MGD (ADWF) case, the concentration of BOD_{ult} was 151 mg/L due to the ammonia concentration of 22 mg/L as N typical of the discharge. For the 8.11 and 9.87 MGD (ADWF) cases, the conversion factors allowed the total Manteca effluent BOD_{ult} concentration to be calculated as BOD_{ult} = 20 mg/L (2.5) + 2.0 mg/L (4.57) = 59.1 mg/L. Under the present analysis, current and projected WQCF effluent will have average BOD_5 of 7 mg/L and ammonia of 1.5 mg/L as N, allowing the total ultimate oxygen demand to be calculated as BOD_{ult} = 7 mg/L (2.5) + 1.5 mg/L (4.57) = 24 mg/L. Combining the BOD_{ult} concentration with the effluent flowrate yields the load of total ultimate oxygen demand discharged to the San Joaquin River. The effluent load of total ultimate oxygen demand discharged by the WQCF is presented graphically as a function of ADWF in **Figure 23**. As seen in the figure, WQCF treatment improvements have drastically reduced the load of total ultimate oxygen demand to the river, with the load discharged under the projected build-out flowrate of 27 MGD (ADWF) being less than the load discharged prior to nitrification-denitrification of the effluent when the discharge flowrate was 6.0 MGD (ADWF).

From the near-field analysis, the San Joaquin River at R1 BOD_5 is 5.26 mg/L and the summer and winter ammonia concentrations are 0.13 and 0.08 mg/L as N, respectively. The corresponding total ultimate load carried by the San Joaquin River upstream of the WQCF is 92,600 lb/d in the summer and 91,100 lb/d in the winter for the dry/below normal river flowrate of 1,250 cfs.

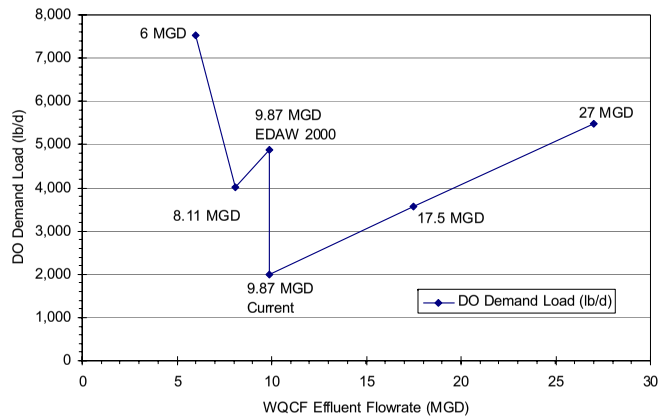


Figure 23: Ultimate Load of Dissolved Oxygen Demand from the WQCF for increasing ADWF (San Joaquin River DO Demand Load at R1 is 92,600 lbs/b at 1,250 cfs)

Because the link between WQCF discharge and the water quality in the DWSC is not direct and is influenced by natural (tides) and anthropogenic (barrier operation, dam releases) mechanisms, the model was run for 6.0, 8.11, and 9.87 MGD (ADWF) discharge conditions and the paired outputs were used to form a regression between the modeled change in DWSC DO corresponding to the change in WQCF load of total ultimate oxygen demand. The regression equation is used to evaluate the future change in DWSC DO due to the proposed project. A multivariate regression equation was developed to relate the initial DWSC DO and the change in total ultimate oxygen demand to the change in DWSC DO. The regression model has essentially an $r^2 = 1.0$ and a corresponding p-value less than 0.0001, which allows the conclusion to be drawn that the model used here is equivalent to the model used in the 2000 DEIR. The original model results from EDAW 2000 are plotted along with the new regression model in **Figure 24**.

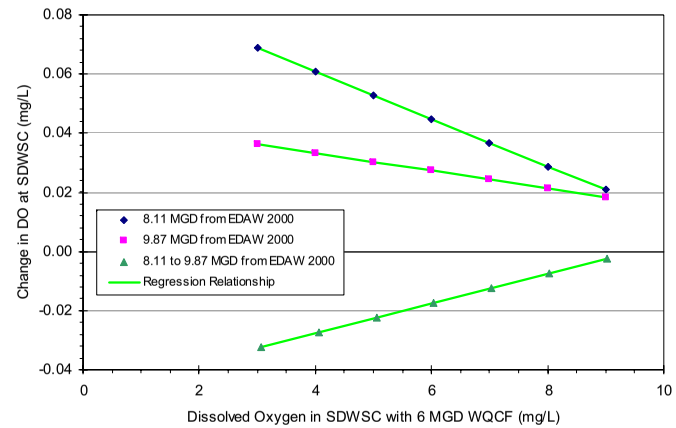


Figure 24: EDAW 2000 Calculated Change in DWSC DO and Corresponding Regression Model

The regression model is as follows:

$$\Delta DO_{DWSC} = 6.43 \times 10^{-9} \cdot (\Delta TUOD)^2 - 1.5 \times 10^{-5} \cdot \Delta TUOD + 1.45 \times 10^{-6} \cdot \Delta TUOD \cdot DO_{DWSC_i}$$
$$+ 1.48 \times 10^{-13} \cdot (\Delta TUOD)^2 \cdot DO_{DWSC_i} + 3.682 \cdot \times 10^{-3} DO_{DWSC_i} - 0.03994$$

Where:

$\Delta TUOD$ = calculated change in total ultimate oxygen demand load from the WQCF (lb/d),

DO_{DWSC_i} = Deep water ship channel dissolved oxygen (DWSC DO) before the TUOD load is changed in the WQCF effluent (mg/L),

ΔDO_{DWSC} = modeled change in DWSC DO due to the change in TUOD load from the WQCF (mg/L).

The biologically oxidizable constituents in the WQCF effluent and the load of total ultimate oxygen demand for various phases of expansion are listed in **Table 30**. Also included in the table is the change in TUOD load from the 6.0 MGD (ADWF) case providing one of the inputs to the regression model. The second input to the model is the original DWSC DO, and for the values listed in **Table 30**, the model is used to calculate the change in DWSC DO from what the DO would have been in the DWSC under the conditions that existed when the WQCF discharged at an ADWF of 6.0 MGD (ADWF).

Table 30: Oxygen Demanding Substances and Loads from the WQCF for Increasing ADWF

Flowrate (MGD ADWF)	BOD5 (mg/L)	Ammonia (mg/L as N)	TUOD (lb/d)	ΔTUOD(1) (lb/d)
6.0	20	22	7,537	---
8.11	20	2	4,002	-3,535
9.87 EDAW 2000	20	2	4,871	-2,666
9.87 Current	7	1.5	2,006	-5,531
17.5	7	1.5	3,557	-3,981
27	7	1.5	5,487	-2,050

(1) ΔTUOD is the difference between loading at listed WQCF flowrate and TUOD load for 6.0 MGD (ADWF) case for use in the regression model.

Results for DWSC DO: The regression model is used to estimate future DWSC DO concentrations for projected ADWF discharge rates in relation to DWSC DO that would have occurred when the WQCF permitted capacity was 6.0 MGD (ADWF). For example, if a certain set of conditions upstream in the San Joaquin River (e.g. temperature, BOD load, etc), and flows and conditions in the delta (e.g. tides, export rates, etc.), combined with a WQCF discharge for the 6.0 MGD (ADWF) case result in a DWSC DO of 6.0 mg/L, then under the same conditions, but with the WQCF discharging under the currently permitted conditions and flowrate of 9.87 MGD (ADWF), the DWSC DO would be 6.21 mg/L. The complete suite of DWSC DO and the calculated concentration for the future projected WQCF flowrates are listed in **Table 31**. Additionally, the difference between DWSC DO for the projected WQCF flowrates and the current permitted capacity of 9.87 MGD (ADWF) are included in the table. For both Phase IV and V, the DO concentration in the Stockton DWSC will be greater than when the WQCF capacity was 6.0 MGD (ADWF).

Table 31: Modeled SDWSC DO and Change from Currently Permitted Levels

6.0 MGD (ADWF)	9.87 MGD (ADWF)	17.5 MGD (ADWF) – Phase IV		27 MGD (ADWF) – Phase V	
DO in SDWSC	DO in SDWSC	DO in SDWSC	Difference from 9.87 MGD	DO in SDWSC	Difference from 9.87 MGD
4.00	4.22	4.11	-0.11	4.02	-0.20
5.00	5.22	5.11	-0.11	5.02	-0.20
6.00	6.21	6.11	-0.10	6.02	-0.19
7.00	7.21	7.11	-0.10	7.02	-0.19
8.00	8.20	8.10	-0.10	8.02	-0.18
9.00	9.20	9.10	-0.10	9.02	-0.18

Modeling Approach Minimum Dissolved Oxygen: The Streeter-Phelps model is used to estimate the DO sag downstream of the WQCF discharge. Only the minimum DO downstream of the discharge is calculated for the present analysis in order to evaluate the impact of the project above the currently permitted discharge. The model is a function of the BOD_{ult} and DO concentrations, flowrates, temperature, and the BOD decay and reaeration rates. The R-1 and effluent information are available from the near-field analysis. The rate of BOD decay can be selected from previous modeling efforts. The reaeration can be estimated as a function of river depth and velocity. The detailed Streeter-Phelps analysis is presented in Appendix B.

Monthly values used to perform the Streeter-Phelps analysis are listed in **Table 32**. The near field analyses R-1 concentrations of 5.26 mg/L BOD_5 and 0.13 mg/L as N ammonia are utilized in the DO analyses. Note that considering the seasonality of ammonia does not affect the results appreciably and therefore the higher summer value is used as a conservative number for the minimum DO analysis. During the summer, the San Joaquin River is supersaturated with oxygen during the day, presumably due to algal photosynthesis.

Table 32: Monthly Input Values for Parameters in the Streeter-Phelps Dissolved Oxygen Model

Month	Temp. (ºF)	Flowrate (cfs)	Depth (m)	Velocity (m/s)	DOsat (mg/L)	DOR-1 (mg/L)
Jan	50	2,662	2.9	0.26	11.3	9.3
Feb	53	1,897	2.4	0.22	11.0	8.8
Mar	58	2,137	2.6	0.24	10.3	8.4
Apr	63	2,666	2.9	0.26	9.7	9.1
May	67	2,684	2.9	0.26	9.3	9.1
Jun	72	1,394	2.0	0.20	8.7	10.1
Jul	76	1,220	1.8	0.19	8.4	9.1
Aug	76	1,118	1.7	0.18	8.4	7.2
Sep	71	1,182	1.8	0.19	8.9	8.0
Oct	65	2,003	2.5	0.23	9.5	7.3
Nov	56	2,091	2.5	0.23	10.5	7.8
Dec	49	2,064	2.5	0.23	11.6	8.7

The resulting total ultimate oxygen demand concentration for R-1 is 13.7 mg/L. As noted above, the future effluent total ultimate oxygen demand concentration is 24 mg/L which represents a 7 mg/L BOD_5 and 1.5 mg/L as N ammonia. The initial concentrations of total ultimate oxygen demand where WQCF effluent is well-mixed with the San Joaquin River for each case considered in the project are listed in **Table 33**.

Table 33: Initial Total Ultimate Oxygen Demand, L_i, for Streeter-Phelps Analysis

Case (MGD ADWF)	Initial TUOD (mg/L)
R-1	13.7
9.87	13.9
17.5	14.0
27	14.1

Results Dissolved Oxygen: The results generated from the Streeter-Phelps model can only be utilized to evaluate the relative impact of increasing the WQCF discharge rate. The model does not account for tidal cycles, inputs to the river downstream of the WQCF, sediment oxygen demand, daylight oxygen generation, etc. and should not be used to estimate future absolute DO concentrations. The model does account for the consumption of oxygen as organic matter and ammonia are oxidized; and replenishment of oxygen from the atmosphere. The Streeter-Phelps model should only used to evaluate the incremental impact on DO concentrations in the San Joaquin River as the WQCF discharge rate is increased.

Monthly results of the Streeter-Phelps analysis are listed in **Table 34**. The location of the critical oxygen condition will vary from immediately at the point of discharge to several days float time downstream of the discharge. Because the analysis does not included any additional inputs to the river downstream of the discharge, as the critical position moves further downstream the value of the absolute minimum DO concentration will be less precise. However, the incremental change in DO with implementation of the project can be well estimated by the model.

Table 34: Streeter-Phelps Analysis Results for Project WQCF Flowrates (ADWF)

			9.87 MGD	17.5 MGD		27 MGD	
Month	Time Θ_H^* (d)(1)	Distance (miles)	DO min. (mg/L)	DO min. (mg/L)	Δ (mg/L)(2)	DO min. (mg/L)	Δ (mg/L)(2)
Jan	2.9	40.7	8.95	8.93	-0.02	8.91	-0.04
Feb	0.5	5.9	8.78	8.76	-0.02	8.74	-0.04
Mar	2.4	30.8	8.09	8.07	-0.02	8.05	-0.04
Apr	4.5	62.5	7.44	7.42	-0.02	7.40	-0.04
May	4.6	63.8	7.04	7.02	-0.02	7.00	-0.04
Jun	4.0	43.0	7.22	7.21	-0.01	7.19	-0.03
Jul	3.3	33.5	6.90	6.88	-0.02	6.87	-0.03
Aug	1.8	17.9	6.71	6.70	-0.01	6.69	-0.02
Sep	2.3	23.3	7.30	7.28	-0.02	7.27	-0.03
Oct	1.7	21.5	7.09	7.08	-0.01	7.07	-0.02
Nov	0.0	0.0	7.80	7.79	-0.01	7.78	-0.02
Dec	0.0	0.0	8.68	8.66	-0.02	8.64	-0.04

(1) Critical flow time corresponding to the 9.87 MGD case. The float time for the 17.5 MGD and 27 MGD cases is nearly identical.
(2) Difference between DO_{min} for case and DO_{min} for 9.87 MGD case.

The calculated, minimum DO concentration for no discharge, 9.87 MGD (ADWF), 17.5 MGD (ADWF), and 27 MGD (ADWF) are plotted in **Figure 25**. The incremental change in minimum river DO concentrations is limited to less than 0.1 mg/L between the currently permitted discharge rate of 9.87 MGD (ADWF) and projected build-out of 27 MGD (ADWF). It would be unlikely to be able to measure the difference in San Joaquin River DO as the WQCF effluent rate is increased from 9.87 MGD (ADWF) to 27 MGD (ADWF).

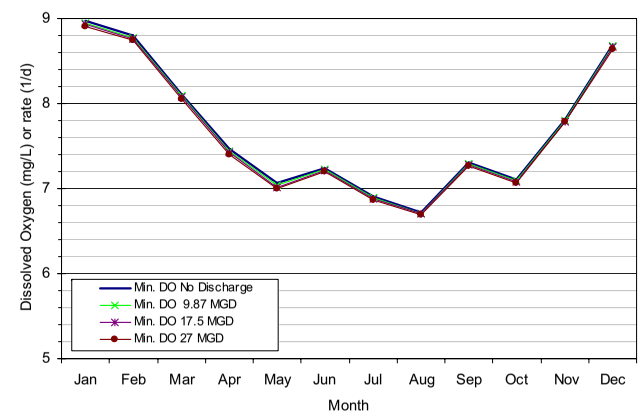


Figure 25: Monthly Minimum Dissolved Oxygen from Streeter-Phelps Analysis of San Joaquin River and WQCF Discharge

Comparison to Water Quality Objectives: The DO objective in the San Joaquin River between Turner Cut and Stockton during September through November is 6 mg/L; otherwise, the objective is 5 mg/L for the river within the boundaries of the Delta. For both the DWSC DO and minimum DO downstream from the WQCF discharge, the proposed project does not effect DO concentrations by more than 0.2 mg/L.

Evaluation: Because the load of biologically oxidizable material carried by the San Joaquin River at R-1 far overshadows the load from the WQCF at project build-out, the incremental change in DO due to the project is minor both in the river downstream of the WQCF or in the DWSC. As part of the phased approach to the adopted Total Daily Maximum Load (TMDL) for DO in the DWSC (CVRWQCB, 2005), studies are currently being performed to allow calculation of waste load and load allocations to achieve the DO targets in the DWSC. Load from the WQCF has little effect on the DWSC DO concentrations and WLAs scheduled for the December 2009 revisitation of the TMDL should not be required for the WQCF discharge. Because of the small impact on DO, the WQCF discharge should fall into the margin of safety or

the reserve portion of the TMDL allocations. The reasonable potential for the DO objectives to be exceeded is not significantly affected by the project.

Manteca WQCF Effluent Contribution to Far-Field Delta Locations

The percent contribution (by volume) of WQCF effluent is calculated for several points of interest within the Sacramento-San Joaquin River Delta for both critical and dry/below normal water years as a measure of the potential effect that increasing WQCF discharge capacity might have in the far-field. Furthermore, the percent WQCF effluent contributions are used in conjunction with historic Delta water quality data and historic Manteca effluent data to estimate the incremental change in Delta water quality with increases in WQCF discharge.

Modeling Approach: A two-dimensional, depth averaged, finite element model of the Delta extending from Martinez at the downstream end, up the Sacramento River to the American River confluence, and up the San Joaquin River to Vernalis (RMA 2006) is used to perform far-field dilution analysis simulations. The boundary conditions of the model include 15-minute tidal inputs at Martinez; historical daily inflows for the Sacramento River, San Joaquin River, Cosumnes River, Mokelumne River, Yolo Bypass, and other inflows (e.g. Calaveras River, French Camp Slough, etc.); historical exports at Delta Mendota Canal (DMC), Contra Costa at Old River, Contra Costa at Rock Slough, the North Bay Aqueduct, Clifton Court used by the State Water Project (SWP); and inflows and withdrawals by Delta Islands. Additionally, historical operations of the operable gates and temporary barriers are included in the far-field delta model. The model domain is presented in **Figure 26**, and detailed in "Near and Far Field Dilution Analysis of the Manteca Wastewater Discharge" (RMA 2006).

Model simulations evaluating the WQCF operating under the timed discharge schedule with daily average discharge rates of 9.87, 17.5, and 27 MGD (ADWF) are used to determine the incremental impacts of the project within the Delta. Model results are tracked at six locations within the Delta as indicated in **Figure 27**. Simulations for nominal San Joaquin River flowrates of 600 cfs and 1,250 cfs were performed to evaluate critical and dry/below normal water years, respectively.

Results: The minimum and maximum calculated WQCF effluent contributions for six selected locations within the Delta are listed in **Tables 35** and **36** corresponding to critical and dry/below normal water years, respectively. In general, the further away from the WQCF the far-field site is located, the lower the percent contribution of WQCF effluent, and as WQCF discharge increases, so does its percent contribution at far-field locations. The calculated WQCF percent contribution exceedance plots are presented for six selected Delta locations in **Figures 28** through **33**. For example, from **Figure 28**, less than 0.5% of the water at the State Water Project Clifton Court intake will be of WQCF origin for 70% of a critical water year; and for 85% of a dry/below normal water year at a WQCF discharge rate of 27 MGD (ADWF). Lower WQCF discharge results in lower percent contributions of WQCF effluent at far-field locations.

Comparison to Water Quality Objectives: There are no established objectives for the percent contribution a wastewater treatment facility's effluent can make within waters of the Delta.

Evaluation: Even under critical water year conditions and a WQCF discharge rate of 27 MGD (ADWF), the percentage of water of Manteca origin is less than 1% most of the time (greater than 70% of the time) at selected Delta locations, with the sole exception of the Stockton Turning Basin.

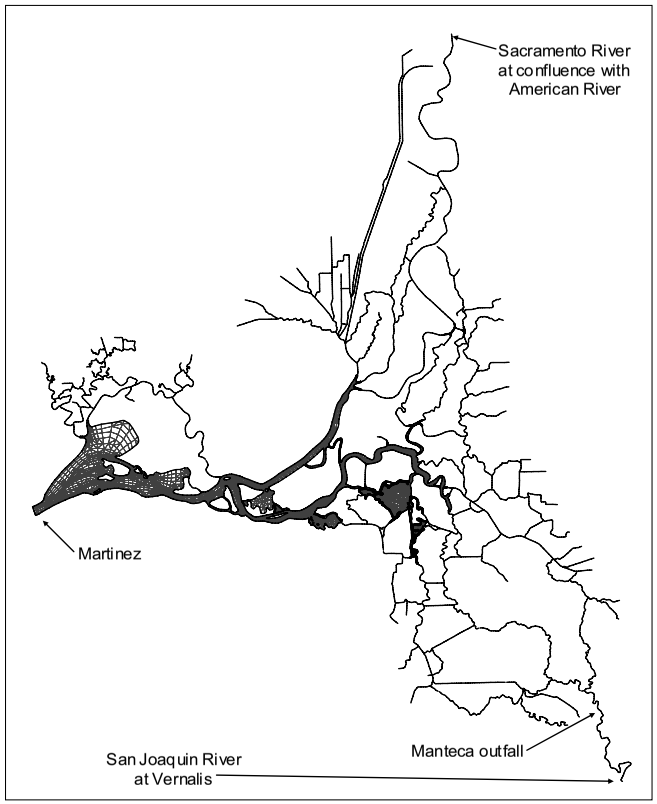


Figure 26: Finite Element Mesh of Simulated Waterways for Far-Field Simulations (RMA 2006)

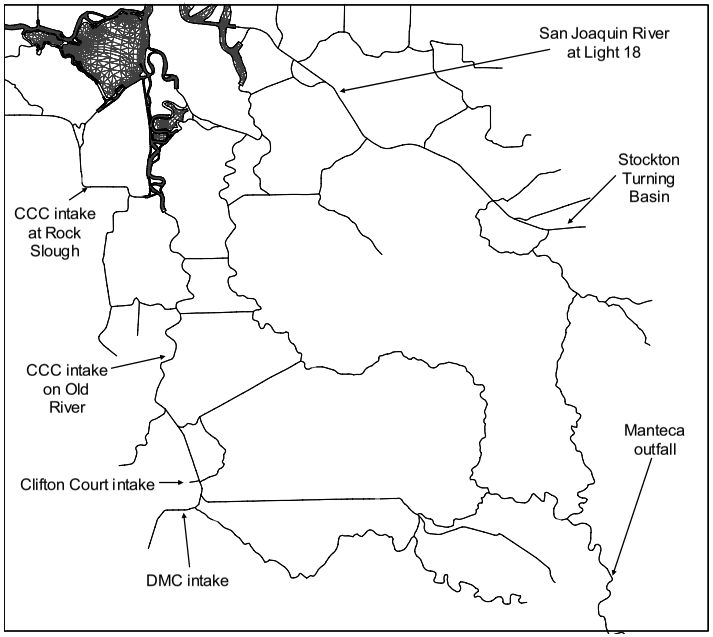


Figure 27: Select Locations within the Delta Considered in the Far Field Analysis (RMA 2006)

Table 35: Summary of Minimum and Maximum Effluent Concentrations for Critical Water Year Flowrates of 600 cfs at Vernalis (RMA 2006)

	Minimum Effluent Contribution			Maximum Effluent Contribution		
Location	**9.87 MGD (ADWF)**	**17.5 MGD (ADWF)**	**27 MGD (ADWF)**	**9.87 MGD (ADWF)**	**17.5 MGD (ADWF)**	**27 MGD (ADWF)**
SWP Clifton Court intake	<0.1%	<0.1%	0.1%	1.0%	1.7%	2.7%
CVP DMC intake	<0.1%	0.1%	0.1%	1.1%	1.9%	3.0%
CCWD intake at Rock Slough	<0.1%	<0.1%	<0.1%	0.2%	0.3%	0.5%
CCWD intake at Old River	<0.1%	<0.1%	<0.1%	0.3%	0.5%	0.8%
San Joaquin River at Light 18	<0.1%	<0.1%	<0.1%	0.9%	1.6%	2.4%
Stockton Turning Basin	0.2%	0.3%	0.5%	2.1%	3.7%	5.7%

Table 36: Summary of Minimum and Maximum Effluent Concentrations for Dry/Below Normal Water Year Flowrates of 1,250 cfs at Vernalis (RMA 2006)

	Minimum Effluent Contribution			Maximum Effluent Contribution		
Location	**9.87 MGD (ADWF)**	**17.5 MGD (ADWF)**	**27 MGD (ADWF)**	**9.87 MGD (ADWF)**	**17.5 MGD (ADWF)**	**27 MGD (ADWF)**
SWP Clifton Court intake	<0.1%	<0.1%	0.1%	0.6%	1.0%	1.5%
CVP DMC intake	0.1%	0.2%	0.3%	0.6%	1.0%	1.5%
CCWD intake at Rock Slough	<0.1%	<0.1%	<0.1%	0.1%	0.3%	0.4%
CCWD intake at Old River	<0.1%	<0.1%	<0.1%	0.2%	0.4%	0.6%
San Joaquin River at Light 18	<0.1%	0.1%	0.1%	0.5%	1.0%	1.5%
Stockton Turning Basin	0.5%	0.8%	1.3%	1.2%	2.1%	3.3%

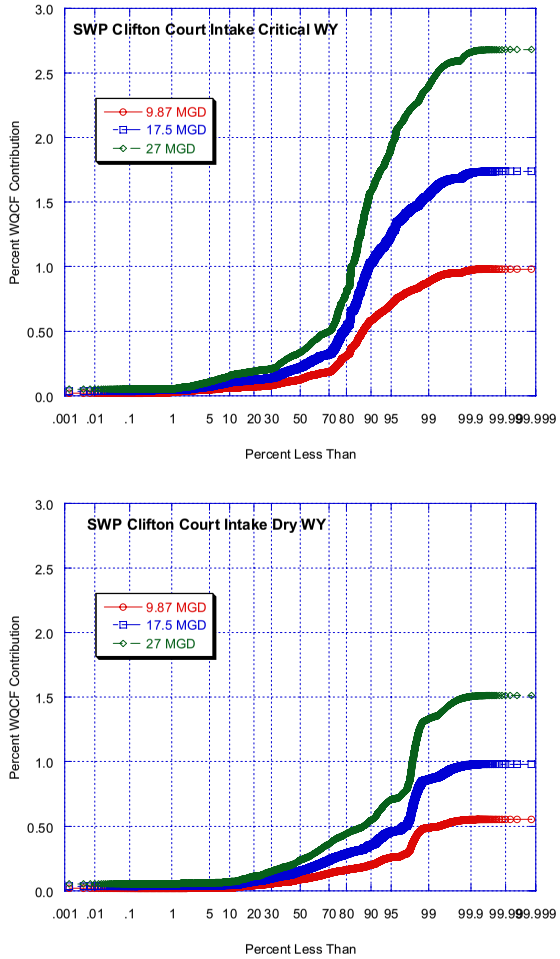


Figure 28: Frequency Plots of WQCF Contribution at the State Water Project (SWP) Intake at Clifton Court for Critical and Dry/Below Normal Water Years

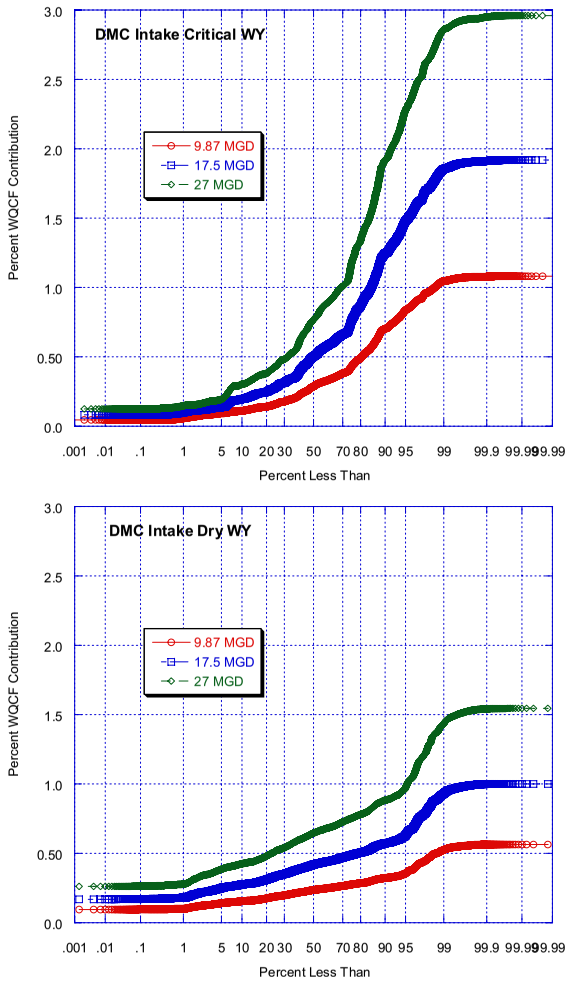


Figure 29: Frequency Plots of WQCF Contribution at the Central Valley Project (CVP) Delta Mendota Canal Intake for Critical and Dry/Below Normal Water Years

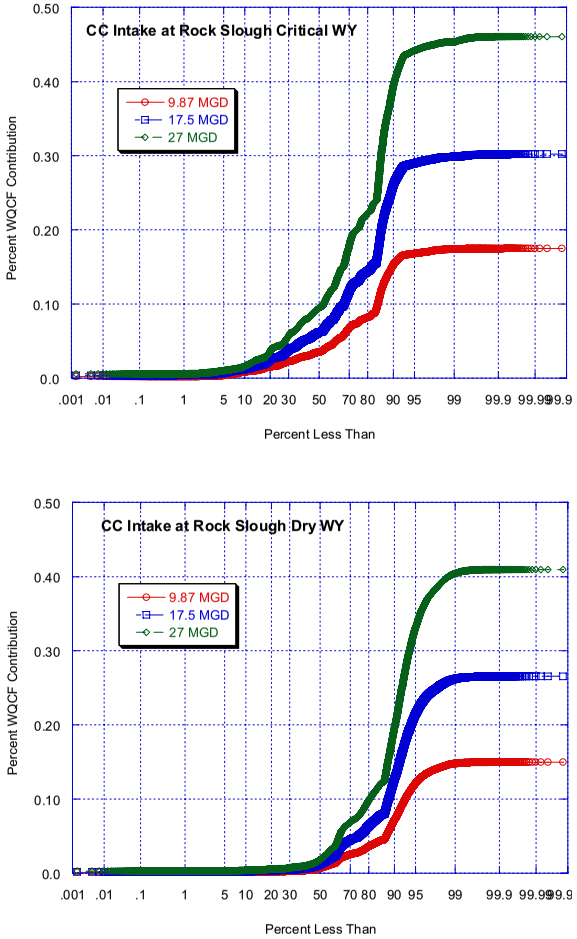


Figure 30: Frequency Plots of WQCF Contribution at the Contra Costa Water District Intake at Rock Slough for Critical and Dry/Below Normal Water Years

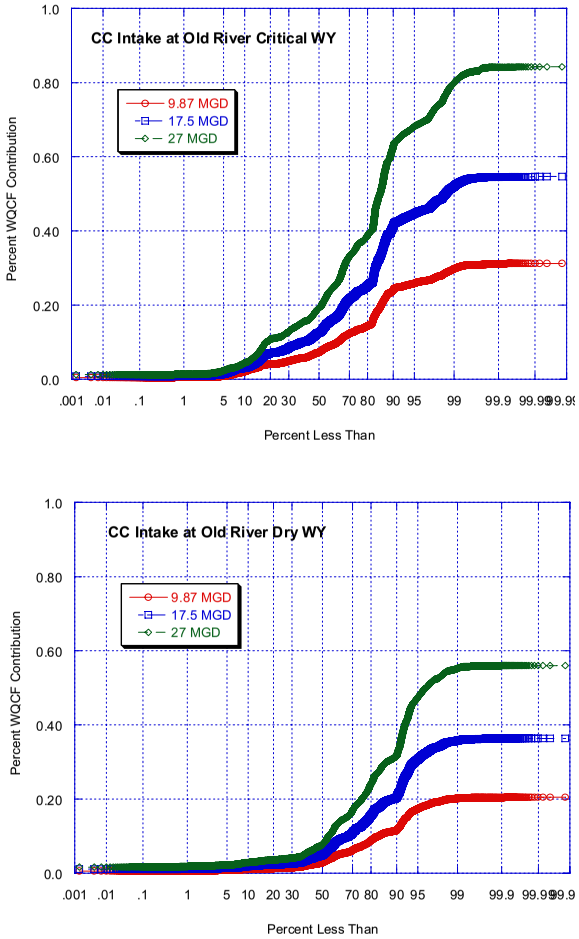


Figure 31: Frequency Plots of WQCF Contribution at the Contra Costa Water District Intake at Old River for Critical and Dry/Below Normal Water Years

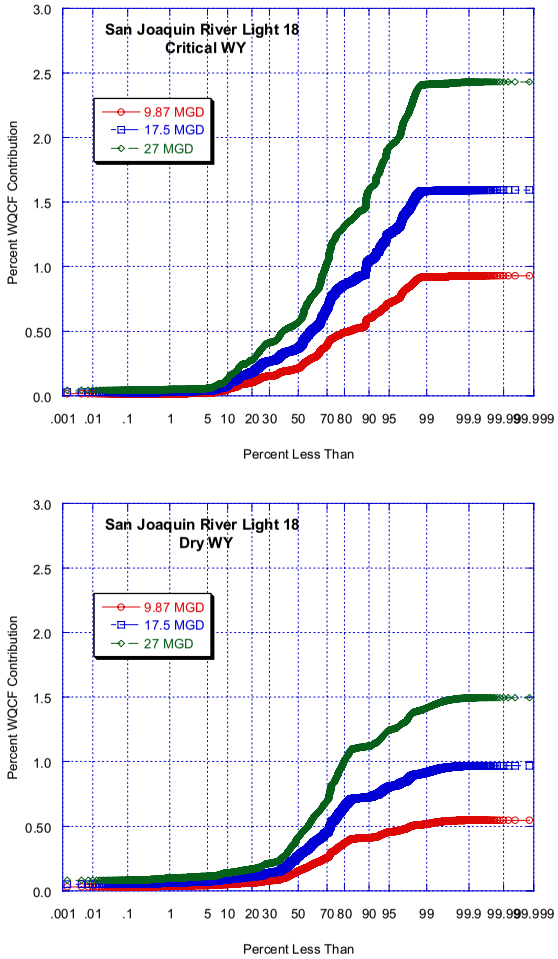


Figure 32: Frequency Plots of WQCF Contribution in the San Joaquin River at Navigation Light 18 for Critical and Dry/Below Normal Water Years

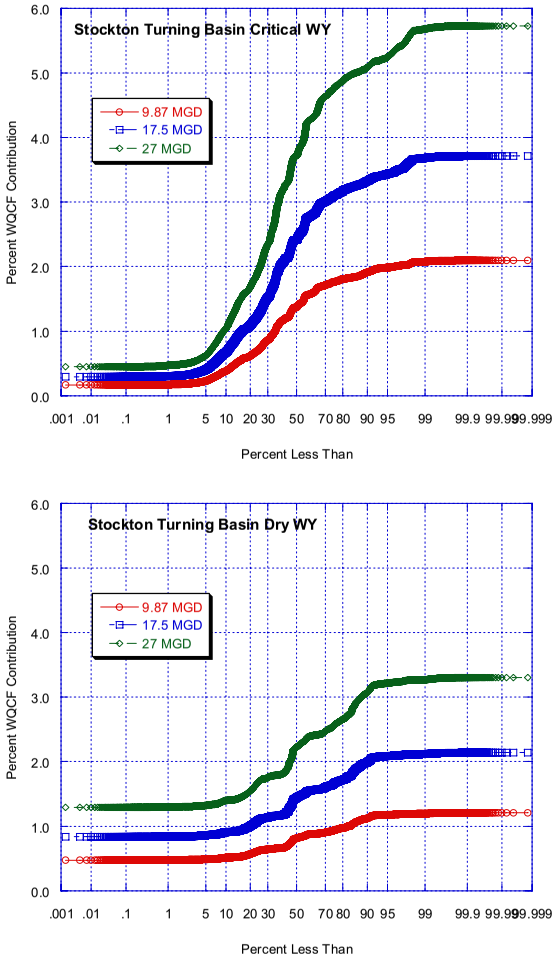


Figure 33: Frequency Plots of WQCF Contribution in the San Joaquin River at the Stockton Ship Channel Turning Basin for Critical and Dry/Below Normal Water Years

Far-Field Water Quality Parameters

Combining available surface water quality data with the percent contribution of WQCF effluent in the Sacramento-San Joaquin River Delta allows an estimation of the incremental change in water quality in response to the proposed project. The analysis is clearly appropriate for conservative parameters such as EC. However, due to the lack of a well-defined model for DOC or nitrate transformations, all potential sources and sinks of these two parameters are ignored, and they are treated as conservative.

Modeling Approach: The percent contribution results from the Delta hydrologic model (RMA 2006) allow the use of a mass balance model to estimate incremental changes in water quality at six far-field Delta locations. Calculation of far-field water quality estimates requires the following multi-step process:

1. Use the percent contributions of WQCF effluent for flowrates of 9.87, 17.5, and 27 MGD (ADWF) at each site within the Delta to estimate the percent contribution of WQCF effluent at historic flowrates corresponding to the modeled water years.
2. Determine the WQCF effluent quality corresponding to the modeled water years.
3. Determine the WQCF effluent quality corresponding to the proposed project scenarios.
4. Determine the observed water quality in the Delta corresponding to the modeled water years.
5. Use the historic WQCF effluent quality and percent contribution to estimate the Delta water quality *sans* WQCF discharge.
6. Calculate the projected water quality in the Delta for the proposed project scenarios using projected effluent quality and percent contribution in conjunction with the Delta water quality *sans* WQCF discharge.

The WQCF percent effluent contribution to the water column within the Delta (RMA 2006) is used to project the WQCF contribution for the historic WQCF flowrates corresponding to the modeled water years. During the critical water year (1991/1992) the WQCF had a flowrate of 2.1 MGD (ADWF), and during the dry/below normal water year (2001/2002) the flowrate was 3.5 MGD (ADWF). Because the percent contribution of WQCF effluent to the selected locations is low, the response in relation to changes in the ADWF is approximately linear. The process for the critical water year projection at the DWSC is presented in **Figure 34**. By repeating the process for the other locations in the Delta, the percent contributions of WQCF effluent at the other selected locations can be calculated for both the critical and dry/below normal water years (1991/1992 and 2001/2002, respectively). The percent contributions of WQCF effluent at the selected locations in the Delta for critical and dry/below normal water years are listed in **Tables 37** and **38**, respectively.

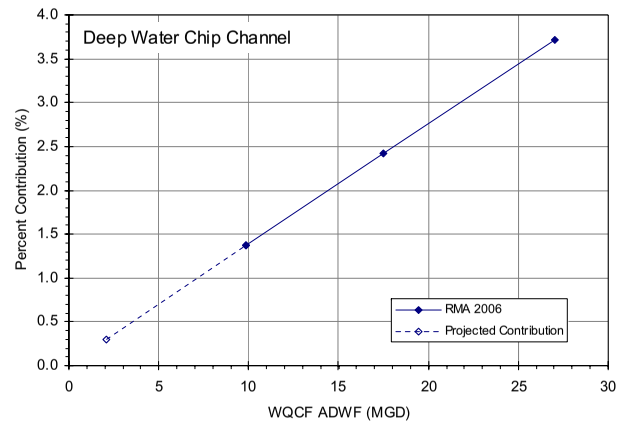


Figure 34: Projection of Percent Contributions Back to Conditions of Modeled Critical Water Year (1991/1992)

Table 37: Median Percent Contribution of WQCF Effluent at Select Locations within the Delta for Critical Water Years (adapted from RMA 2006)

	Percent Contribution for WQCF ADWF (%)			
Location	**2.1[(1)] MGD**	**9.87 MGD**	**17.5 MGD**	**27 MGD**
SWP Clifton Court Intake	0.0307	0.1252	0.2209	0.3354
CVP DMC Intake	0.0703	0.2878	0.5034	0.7685
CCWD Intake at Rock Slough	0.0083	0.0352	0.0620	0.0947
CCWD Intake at Old River	0.0181	0.0725	0.1254	0.1921
San Joaquin River at Light 18	0.0523	0.2132	0.3717	0.5681
Stockton Turning Basin	0.3003	1.3676	2.4157	3.7206

(1) For the modeled critical water year (1991/1992) the WQCF ADWF was 2.1 MGD (ADWF).

Table 38: Median Percent Contribution of WQCF Effluent at Select Locations within the Delta for Dry/Below Normal Water Years

Location	Percent Contribution for WQCF ADWF (%)			
	3.5[1] MGD	9.87 MGD	17.5 MGD	27 MGD
SWP Clifton Court Intake	0.0311	0.0867	0.1534	0.2365
CVP DMC Intake	0.0839	0.2365	0.4193	0.6469
CCWD Intake at Rock Slough	0.0025	0.0068	0.0119	0.0184
CCWD Intake at Old River	0.0102	0.0281	0.0495	0.0762
San Joaquin River at Light 18	0.0540	0.1514	0.2681	0.4133
Stockton Turning Basin	0.2891	0.8152	1.4454	2.2300

(1) For the modeled dry/below normal water year (2001/2002) the WQCF ADWF was 3.5 MGD (ADWF).

Historic WQCF effluent quality is listed in **Table 39**. Only total dissolved solids (TDS) data are available for the 1991/1992 historic WQCF effluent quality. To estimate the EC values, the historic TDS values are scaled by the EC/TDS ratio measured during the WQCF's 13267 monitoring. The 13267 data are used to estimate the dry/below normal water year value. The future EC is derived from the Master Plan Update (Nolte, 2007).

Table 39: WQCF Typical Effluent Quality for Historic and Future Conditions

Parameter	Critical WY 1991/1992	Dry WY 2001/2002	Proposed Project
ADWF (MGD)	2.1	3.5	17.5/27
EC (µmhos/cm)	1,203[1]	1,143[2]	825[3]
DOC (mg/L)[4]	9.0	9.0	9.0
Nitrate (mg/L)	0.8	4.6	5.0

(1) TDS value of 642 mg/L scaled by EC/TDS ratio of (1,143/610).
(2) Mean EC value from 13267 monitoring.
(3) City of Manteca WQCF Master Plan Update January 2007: Table 2-4 ~ Schedule D (Nolte, 2007).
(4) Data only available from August 2005 to April 2006.

Historic ambient water quality conditions at six Delta locations were calculated using data available from several monitoring programs (see **Table 7** and **Table 8**). Representative water quality estimates for EC, DOC, and nitrate for each location and modeled water year are presented in the following Results subsection in **Tables 40** through **45**.

Using the representative water quality at each location in the Delta (C_{obs}), the WQCF effluent quality (C_{eff}) for the modeled water years, and the estimated WQCF percent effluent contribution (f = percentage/100%), a mass balance equation can be used to estimate the water quality in the Delta without a discharge at Manteca ($C_{sans\ WQCF}$).

$$C_{sans\ WQCF} = \frac{C_{obs} - f \cdot C_{eff}}{(1 - f)}$$

Using the estimate of water quality within the Delta without a WQCF discharge ($C_{sans\ WQCF}$), the model results for the contribution of WQCF effluent from project scenarios (f = percentage/100%) may be used in conjunction with projected future WQCF effluent quality (C_{eff}) to estimate the future Delta water quality (C_{future}). The approach is most applicable to EC, as it is a conservative parameter. The approach is also used for nitrate and DOC, both of which undergo reactions and transformations as they travel downstream and through the Delta, therefore the results presented here overestimate the WQCF contribution of these constituents to the Delta.

$$C_{future} = C_{sans\ WQCF} + f \cdot (C_{eff} - C_{sans\ WQCF})$$

Results for the three constituent are tabulated below.

Results: The results from the far-field analysis are presented in **Tables 40** to **45**. Two tables are presented for each constituent representing the results for the critical and dry/below normal water year conditions. The observed water quality for each location is listed under the 2.1 MGD (ADWF) scenario for critical water year conditions and 3.5 MGD (ADWF) for dry/below normal water year conditions. Each table includes a project build-out percent change in concentration, calculated by comparing the calculated concentrations at a location corresponding to the WQCF operating at ADWFs of 9.87 MGD and 27 MGD.

EC results are presented in **Tables 40** and **41**, corresponding to critical and dry/ below normal water years, respectively. Monitoring data for EC are not available for the San Joaquin River at Navigation Light 18 and the Stockton Ship Channel Turning Basin for critical water years and the Delta Mendota Canal intake and Contra Costa Water District intake at Old River for dry/below normal water years. For both water year types, the calculated change in EC at the selected sites is typically less than 1 µmho/cm and no greater than 2 µmho/cm when the WQCF ADWF is increased from 9.87 to 27 MGD.

Table 40: Median Electrical Conductivity (EC) at Select Locations within the Delta for Project Scenarios under Critical Water Year Conditions

Location	EC (µmhos/cm) for WQCF ADWF (MGD)					Δ[3] (µmhos/cm)
	0.0[1]	2.1[2]	9.87	17.5	27	
SWP Clifton Court Intake	546	547	547	547	547	< 1
CVP DMC Intake	593	593	594	594	595	1
CCWD Intake at Rock Slough	599	599	599	599	599	< 1
CCWD Intake at Old River	578	578	578	578	579	1
San Joaquin River at Light 18	No Data					
Stockton Turning Basin	No Data					

(1) Estimated water quality at the selected location without WQCF effluent.
(2) The WQCF ADWF during the modeled critical water year was 2.1 MGD. Values listed represent the median observed at the location.
(3) Incremental change between build-out (27 MGD (ADWF)) and current permitted condition (9.87 MGD (ADWF)).

Table 41: Median Electrical Conductivity (EC) at Select Locations within the Delta for Project Scenarios under Dry/Below Normal Water Year Conditions

Location	EC (µmhos/cm) for WQCF ADWF (MGD)					Δ[3] (µmhos/cm)
	0.0[1]	2.1[2]	9.87	17.5	27	
SWP Clifton Court Intake	428	429	429	429	429	< 1
CVP DMC Intake	No Data					
CCWD Intake at Rock Slough	525	525	525	525	525	< 1
CCWD Intake at Old River	No Data					
San Joaquin River at Light 18	336	337	337	337	338	1
Stockton Turning Basin	652	654	654	655	656	2

(1) Estimated water quality at the selected location without WQCF effluent.
(2) The WQCF ADWF during the modeled critical water year was 3.5 MGD. Values listed represent the median observed at the location.
(3) Incremental change between build-out (27 MGD (ADWF)) and current permitted condition (9.87 MGD (ADWF)).

DOC results are presented in **Tables 42** and **43**, corresponding to critical and dry/ below normal water years, respectively. Monitoring data for DOC are not available for the San Joaquin River at Navigation Light 18 and the Stockton Ship Channel Turning Basin for critical water years and the Delta Mendota Canal intake and Contra Costa Water District intake at Old River for the dry/below normal water year. For both water year types, the calculated change in DOC at the selected sites is generally less than 0.02 mg/L when the WQCF ADWF is increased from 9.87 to 27 MGD (ADWF), with the exception of the Stockton Ship Channel Turning Basin where the change is estimated to be 0.08 mg/L during a dry/below normal water year.

Table 42: Median Dissolved Organic Carbon (DOC) at Select Locations within the Delta for Project Scenarios under Critical Water Year Conditions

Location	DOC (mg/L) for WQCF ADWF (MGD)					Δ[3] (mg/L)
	0.0[1]	2.1[2]	9.87	17.5	27	
SWP Clifton Court Intake	3.90	3.90	3.90	3.91	3.92	0.02
CVP DMC Intake	3.90	3.90	3.91	3.92	3.94	0.03
CCWD Intake at Rock Slough	3.50	3.50	3.50	3.50	3.50	< 0.01
CCWD Intake at Old River	3.50	3.50	3.50	3.51	3.51	0.01
San Joaquin River at Light 18	No Data					
Stockton Turning Basin	No Data					

(1) Estimated water quality at the selected location without WQCF effluent.
(2) The WQCF ADWF during the modeled critical water year was 2.1 MGD. Values listed represent the median observed at the location.
(3) Incremental change between build-out (27 MGD (ADWF)) and current permitted condition (9.87 MGD (ADWF)).

Table 43: Median Dissolved Organic Carbon (DOC) at Select Locations within the Delta for Project Scenarios under Dry/Below Normal Water Year Conditions

Location	DOC (mg/L) for WQCF ADWF (MGD)					Δ[3] (mg/L)
	0.0[1]	2.1[2]	9.87	17.5	27	
SWP Clifton Court Intake	2.90	2.90	2.90	2.91	2.91	0.01
CVP DMC Intake	No Data					
CCWD Intake at Rock Slough	3.10	3.10	3.10	3.10	3.10	< 0.01
CCWD Intake at Old River	No Data					
San Joaquin River at Light 18	2.70	2.70	2.71	2.71	2.72	0.01
Stockton Turning Basin	3.38	3.40	3.43	3.47	3.51	0.08

(1) Estimated water quality at the selected location without WQCF effluent.
(2) The WQCF ADWF during the modeled critical water year was 3.5 MGD. Values listed represent the median observed at the location.
(3) Incremental change between build-out (27 MGD (ADWF)) and current permitted condition (9.87 MGD (ADWF)).

Nitrate results are listed in **Tables 44**, and **45**, corresponding to critical and dry/ below normal water years, respectively. Monitoring data for nitrate are not available for the San Joaquin River at Navigation Light 18 and the Stockton Ship Channel Turning Basin for critical water years and the Delta Mendota Canal intake and Contra Costa Water District intake at Old River for the dry/below normal water year. For both water year types, the calculated change in nitrate at the selected sites is in general less than 0.02 mg/L as N when the WQCF ADWF is increased from 9.87 to 27 MGD (ADWF), with the exceptions of the Stockton Ship Channel Turning Basin where the change is estimated to be 0.05 mg/L as N.

Table 44: Median Nitrate at Select Locations within the Delta for Project Scenarios under Critical Water Year Conditions

Location	Nitrate (mg/L as N) for WQCF ADWF (MGD)					Δ[3] (mg/L)
	0.0[1]	2.1[2]	9.87	17.5	27	
SWP Clifton Court Intake	0.73	0.73	0.74	0.74	0.74	< 0.01
CVP DMC Intake	0.88	0.88	0.89	0.90	0.91	0.02
CCWD Intake at Rock Slough	0.53	0.53	0.53	0.53	0.53	< 0.01
CCWD Intake at Old River	0.51	0.51	0.51	0.51	0.52	0.01
San Joaquin River at Light 18	No Data					
Stockton Turning Basin	No Data					

(1) Estimated water quality at the selected location without WQCF effluent.
(2) The WQCF ADWF during the modeled critical water year was 2.1 MGD. Values listed represent the median observed at the location.
(3) Incremental change between build-out (27 MGD (ADWF)) and current permitted condition (9.87 MGD (ADWF)).

Table 45: Median Nitrate at Select Locations within the Delta for Project Scenarios under Dry/Below Normal Water Year Conditions

Location	Nitrate (mg/L as N) for WQCF ADWF (MGD)					Δ(3) (mg/L)
	0.0(1)	2.1(2)	9.87	17.5	27	
SWP Clifton Court Intake	0.40	0.40	0.40	0.41	0.41	0.01
CVP DMC Intake	No Data					
CCWD Intake at Rock Slough	0.22	0.22	0.22	0.22	0.22	< 0.01
CCWD Intake at Old River	No Data					
San Joaquin River at Light 18	0.61	0.61	0.61	0.62	0.63	0.02
Stockton Turning Basin	1.56	1.57	1.59	1.61	1.64	0.05

(1) Estimated water quality at the selected location without WQCF effluent.
(2) The WQCF ADWF during the modeled critical water year was 3.5 MGD. Values listed represent the median observed at the location.
(3) Incremental change between build-out (27 MGD (ADWF)) and current permitted condition (9.87 MGD (ADWF)).

Comparison to Water Quality Objectives: The basis for EC water quality objectives in the Delta is the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (SWRCB, 1995). Among the far-field sites considered, EC objectives exist only for the Clifton Court and DMC Intakes. A year-round objective of 1,000 µmhos/cm applies to both export sites. The median EC levels at the two locations are well below the objective in critical water years and the incremental change in water quality due to the project is generally 1 µmho/cm or less.

There are no established water quality objectives for DOC in the Delta.

The Water Quality Objective for nitrate is from the Title 22 primary drinking water MCL of 10 mg/L as N. At all modeled far-field locations, the median nitrate levels are expected to be well below the MCL value, and changes to nitrate levels in the Delta as a result of the proposed project are estimated to be generally less than 0.02 mg/L as N.

Evaluation: The proposed project does not affect Delta water quality to a noticeable degree. Results from the hydrologic analysis indicate that implementing the proposed project will not lead to appreciable levels of WQCF effluent in the Delta. Because the WQCF effluent is of high quality, and is highly diluted by the time it reaches the Delta far-field locations of interest, the project is anticipated to have minimal impact on Delta water quality.

Implementing the proposed project is expected to have little impact on the EC levels in the Delta. Levels of DOC are not predicted to change noticeably in the Delta as a result of the project. Typical changes in DOC levels will be less than 0.02 mg/L with the biggest change being 0.08 mg/L.

In summary, only a small fraction of high quality WQCF effluent will be present throughout the Delta, thus there will be little change in Delta water quality due to implementation of the project.

SUMMARY OF WATER QUALITY IMPACTS

The wastewater treatment process upgrades associated with the WQCF Phase III expansion, including nitrification-denitrification, tertiary filtration, and UV disinfection facilities, will allow it to discharge very high quality tertiary treated effluent to the San Joaquin River. The WQCF proposes to discharge this same high quality effluent to the river at higher flowrates as the plant increases its discharge capacity from the currently permitted 9.87 MGD (ADWF) to 27 MGD (ADWF). The near-field and far-field water quality impact assessments presented in the previous two sections of this report show that the proposed increase in WQCF discharge capacity to the San Joaquin River will generally have very minor impacts on the water quality of the San Joaquin River and Delta, with the exception of a near-field exceedance of the U.S. EPA chronic ambient water quality criterion (87 µg/L) for total aluminum (USEPA, 2002) and possible excursions to Thermal Plan objectives. The exceedance of the aluminum water quality objective in the receiving water is the result of the ambient levels of the parameter already exceeding standards upstream of the WQCF discharge. Exceedances of Thermal Plan objectives will be mitigated as necessary (e.g., through the construction of an effluent cooling tower) based on the expert opinion of a fisheries biologist charged with determining the significance of the WQCF thermal plume to migrating salmonids and other resident fish species.

The City recently completed a WER study (City of Manteca, 2007) to identify an appropriate site-specific water quality objective for aluminum in the San Joaquin River that is both sufficiently protective of aquatic life and identifies available assimilative capacity for aluminum in the river under which the WQCF can discharge its effluent. The study indicates that a WER of 22.7 in scientifically defendable. To this end, the next lowest water quality standard for aluminum (Title 22 Secondary MCL of 200 µg/L) may be applicable to WQCF effluent. Title 22 Secondary MCLs are set to evaluate potable water that has received treatment, including filtration that generally removes the particulate materials from the water, leaving essentially only the dissolved fraction. However, Title 22 standards do not directly specify whether the total or dissolved phase should be considered. Applying Secondary MCLs directly to surface water warrants consideration in that only the dissolved fraction would ultimately pass through a drinking water treatment plant. While DHS has recently stated that application of Secondary MCLs as dissolved is sufficient to protect municipal and drinking water uses, it has be the Regional Water Board's policy to apply it as a total concentration objective to be protective of taste and odor for direct consumption of San Joaquin River water. Most importantly, an increase in WQCF permitted discharge capacity from 9.87 MGD (ADWF) to 27 MGD (ADWF) does not negatively impact the San Joaquin River with regard to this parameter, and in fact will decrease total aluminum concentrations in the receiving water.

The Thermal Plan objectives are slightly exceeded for the currently permitted discharge of 9.87 MGD (ADWF); however, an evaluation of the impacts of the thermal plume reveals that there are no significant impacts of the plume and a limited exception is being sought for the WQCF. Increasing the effluent flowrate will increase the thermal plume, resulting in exceedance of both the 1 ºF temperature differential over less than 25% of the cross section, and 4 ºF differential anywhere objectives in the Thermal Plan. Because the Thermal Plan objectives are exceeded, the characteristics of the WQCF plume need to be evaluated for the level of impact on aquatic life. If the plume is found to not impact the aquatic life within the San Joaquin River, then an exception to the Thermal Plan will be required. If the plume is determined to impact aquatic life in the San Joaquin River, then the City is prepared to design, construct, install, and operate a

cooling tower that cools treated effluent prior to its discharge into the San Joaquin River. The cooling tower would be confirmed to perform at final design specifications prior to operation of the WQCF at the proposed expanded capacity. Implementation of a cooling tower would act to sufficiently reduce the modeled thermal impacts of the WQCF's non-cooled effluent plume resulting in no significant adverse thermal effects on fisheries and aquatic resources as a result of the planned increase in WQCF discharge capacity from the current permitted rate (9.87 MGD (ADWF)) to the proposed rate (27 MGD (ADWF)).

All other near- and far-field constituents considered in this report are expected to exhibit only slight to moderate increases in concentration in the receiving water at well-mixed conditions downstream of the discharge at the proposed 27 MGD (ADWF) discharge capacity. More importantly, none of these constituents are anticipated to exceed relevant water quality objectives, and on average are estimated to be present at concentrations well below objectives.

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Assessment of Socio-Economic Considerations

The public benefit derived from an increase in WQCF discharge capacity that is necessary to accommodate growth in the City and the surrounding area is an important consideration in this antidegradation analysis. In accordance with APU 90-004 guidance for a 'complete' antidegradation analysis, the following factors are considered in determining whether the lowering of water quality that is anticipated with the WQCF expansion is necessary to accommodate economic or social development and is consistent with maximum public benefit:

- A consideration of alternative control measures that might reduce, eliminate, or compensate for the water quality impacts of the proposed capacity increase;
- An evaluation of each alternative control measure for costs, impacts on water quality, and compliance with applicable laws, regulations, and policies;
- An assessment of the socio-economic impacts of each alternative; and
- A balancing of the proposed WQCF expansion and the alternatives based on environmental and socio-economic considerations.

COSTS AND BENEFITS OF ALTERNATIVES FOR MAINTAINING EXISTING WATER QUALITY

The first component of the antidegradation analysis, the assessment of projected water quality impacts due to the proposed project, identified constituents that, to varying degrees, may impact water quality in the San Joaquin River (downstream of the WQCF discharge) and in the Delta due to an increase in WQCF discharge. Maintaining existing water quality in the San Joaquin River and the Delta with an increase in WQCF discharge may be approached through effluent-to-land disposal or additional wastewater treatment by microfiltration and reverse osmosis (MF/RO). These alternatives each possess unique abilities to address water quality constituents of concern and each has distinct implementation benefits, liabilities, and costs. In order to maintain existing water quality and mass loading in the San Joaquin River from the time the WQCF reaches its current permitted capacity of 9.87 MGD (AWDF) through the proposed build-out capacity of 27 MGD (ADWF), it is estimated that a maximum effluent-to-land disposal capacity of 18 MGD or a maximum MF/RO capacity of 21 MGD would be required. The implementation of either alternative would maintain WQCF effluent mass loading to the San Joaquin River at the currently permitted 9.87 MGD (ADWF) level as WQCF discharge capacity increases to 27 MGD (ADWF). The costs of implementing an alternative control measure would be above and beyond the Phase IV and Phase V costs associated with increasing WQCF discharge capacity to 27 MGD (ADWF).

As a means of equitably dividing the costs of maintaining existing water quality in the San Joaquin River among current and future sewer ratepayers to accommodate the implementation of either of the two proposed alternatives, the City would look to current ratepayers to pay for 36.6 percent and future ratepayers to pay for 63.4 percent of an alternative's implementation costs. This percent allocation between current and future sewer ratepayers represents a partitioned cost sharing of the WQCF's 27 MGD (ADWF) build-out capacity once the facility reaches its current permitted capacity of 9.87 MGD (ADWF), at which time effluent flow in excess of 9.87 MGD (ADWF) would need to be accommodated by either effluent-to-land disposal or MF/RO advanced treatment (9.87 ÷ 27 = 0.366 or 36.6%). Additionally, cost estimates and socio-

economic impacts are further divided into "residential" and "non-residential" ratepayer categories to reflect the fact that approximately 60 percent of WQCF wastewater treatment capacity is allocated to residential customers. For the purpose of the present analysis, the residential category represents only City residential customers and the "non-residential" category includes City commercial, industrial, and septage users, as well as wastewater[3] received from the City of Lathrop and Raymus Village. Forty (40) percent of WQCF wastewater treatment capacity is allocated to this "non-residential" group of customers. It is anticipated that the City will not need to discharge greater than 9.87 MGD (ADWF) to the San Joaquin River until sometime between the years 2012 to 2017. The proposed sharing of alternative control measure costs among current and future, residential and non-residential ratepayers is provided in **Table 46** as both a percentage and volume (in MGD) of WQCF 27 MGD (ADWF) build-out capacity. In the present analysis, total costs include capital and operations and maintenance costs, and all cost estimates are presented as *planning level estimates* provided in present worth dollars as of March 2007. Annualized total costs are based on a 20-year period and a 6 percent discount rate (annualization factor = 0.08718).

Table 46: Alternative Control Measure Cost Sharing among WQCF Ratepayer Groups

	WQCF Ratepayer Group by User History		
WQCF Ratepayer Group by Sewage Type Contribution	**Current Users (*36.6% of 27 MGD*)**	**Future Users (*63.4% of 27 MGD*)**	**Combined Current and Future Users (MGD)**
Residential Users (*60% WQCF capacity allocation*)	22% or 5.92 MGD	38% or 10.28 MGD	16.2
Non-Residential Users (*40% WQCF capacity allocation*)	15% or 3.95 MGD	25% or 6.85 MGD	10.8
Totals (MGD ADWF)	**9.87**	**17.13**	**27**

Effluent-to-Land Disposal

The use of recycled water for unrestricted urban landscape irrigation and agricultural irrigation represent alternatives for treated wastewater disposal for the City. Effluent from the WQCF is currently either land applied to approximately 360 acres of City-owned/leased parcels or discharged to the San Joaquin River. The City has examined a number of effluent-to-land disposal strategies that would have sufficient capacity for disposal of 18 MGD of treated wastewater year-round. Because of the relatively high unit cost and other implementation constraints of urban water reuse, the City has decided to direct land disposal of undisinfected, denitrified, secondary effluent to existing City-owned land surrounding the WQCF and to future City-purchased land at some distance from the WQCF. While the City has examined the costs of purchasing land from one to 10 miles away from the WQCF for effluent disposal (Nolte, 2004), economic considerations and land availability make the purchase of land farther away from the

[3] Wastewater received from the City of Lathrop and Raymus Village is primarily composed of domestic waste; however, for the purpose of the current analysis the residential customers generating domestic waste in the City of Lathrop and Raymus Village are grouped in the "non-residential" ratepayer category in order to separate their domestic waste contributions from those of City of Manteca residential customers.

WQCF a more tenable proposition for the City. To this end, the effluent-to-land disposal strategy selected for consideration under the current economic impact analysis includes high-rate irrigation (260 in/yr) of City-owned land at the WQCF (4,600 ac-ft/year or 4.11 MGD) and agricultural irrigation (60 in/yr) on acreage within approximately 10 miles from the WQCF that would be purchased by the City (15,560 ac-ft/year or 13.89 MGD) as a means of collectively applying 18 MGD of undisinfected, denitrified, secondary effluent to land when such application is permissible. During the wet season when land application is prohibited or not practicable, depending on amount and timing of seasonal rainfall, the City's treated effluent would be held in lined storage ponds until land application could resume.

Costs

The selection of high-rate irrigation of existing City-owned land along with agricultural irrigation of future City-purchased land represents a moderately priced land application strategy from a cost perspective. The effluent-to-land disposal costs provided in **Table 47** are planning levels estimates intended to provide the reader with cost estimates that allow a cost comparison between the two treatment alternatives presented in this report. **Table 47** presents various costs associated with the implementation of an 18 MGD effluent-to-land application operation. In addition to total project costs, the costs of this alternative are divided among current and future ratepayers, and further subdivided among residential and non-residential customers. If the City was required to treat WQCF effluent to the tertiary level prior to land application, then the costs provided in **Table 47** would significantly increase as a result of increased operation and maintenance costs associated with tertiary wastewater treatment.

Table 47: Effluent-to-Land Disposal Cost Estimates by Ratepayer Group Allocation for 18 MGD Disposal Capacity

Ratepayer Group	Capital Cost(1)	Annualized Capital Cost	Annual Operation and Maintenance Cost(1)	Total Annual Cost	Project Life-Cycle Cost
Current Residential	$17,400,000	$1,500,000	$200,000	$1,700,000	$34,000,000
Current Non-Residential	$11,600,000	$1,000,000	$100,000	$1,100,000	$22,000,000
Future Residential	$30,100,000	$2,600,000	$400,000	$3,000,000	$60,000,000
Future Non-Residential	$20,100,000	$1,800,000	$200,000	$2,000,000	$40,000,000
Totals	**$79,200,000**	**$6,900,000**	**$900,000**	**$7,800,000**	**$156,000,000**

(1) Estimated March 2007 costs based on adjusted 2002 costs provided in Nolte, 2004.

Benefits

Effluent-to-land disposal would allow the reclamation of up to approximately two thirds of WQCF effluent at the proposed build-out capacity of 27 MGD (ADWF) and would provide an additional water supply source to the region. Limiting the discharge of tertiary treated effluent to the San Joaquin River at 9.87 MGD (ADWF) would maintain existing water quality and mass loading in the river at currently permitted levels while the WQCF attained its proposed build-out capacity of 27 MGD (ADWF).

Potential Impacts

Potential environmental impacts related to the effluent-to-land disposal alternative include potential impacts from the addition of salts and minerals of local concern to regional groundwater supplies, the possibility of groundwater mounding in the area(s) of land application, and temporary construction-related impacts. Additionally, increased air emissions would result from increased power consumption[4] needed to pump secondary effluent to storage ponds and then to land application sites. Potential effluent-to-land disposal environmental impacts are provided in **Table 48**. Elevated groundwater TDS concentrations in the Eastern San Joaquin Valley groundwater subbasin are the result of natural weathering of Coast Range marine sedimentary rocks and decades of agricultural irrigation (USGS, 1995). Evaporation of sprayed irrigation water and evapotranspiration of soil moisture and shallow groundwater leaves behind dissolved salts. Land application of treated secondary effluent could further elevate local TDS concentrations in groundwater. Groundwater mounding, as observed in the Kings and Turlock groundwater subbasins (DWR, 2003), could occur if effluent was applied to areas of low or insufficient hydraulic conductivity. Temporary, construction-related impacts associated with the building of a water conveyance and storage system for treated effluent at some distance from the WQCF are anticipated. However, these temporary, construction-related impacts would be mitigated to the greatest extent practicable.

Table 48: Potential Environmental Impacts Associated with Effluent-to-Land Disposal

Potential Effluent-to-Land Disposal Environmental Impacts
Addition of salts (as measured by TDS) to groundwater at a concentration greater than the Title 22 Secondary MCL recommended level(1) of 500 mg/L, or greater than ambient background quality.
Groundwater mounding in the area(s) of land application.
Increases in energy consumption and air emissions due to substantial power requirements of pumping effluent to storage ponds and then to site(s) of land application.

(1) 500 mg/L is the low end of the acceptable Title 22 Secondary MCL range for TDS.

Compliance with Laws and Regulations

State and Federal water quality laws require that discharges not result in an exceedance of water quality standards. Effluent-to-land disposal and storage pond operations would comply with waste discharge requirements set forth by the Regional Water Board. Near-field exceedances of the allowable Title 22 Secondary MCL range for TDS (500 – 1000 mg/L) are not expected to occur. No far-field exceedances of water quality objectives are expected to occur as the result of effluent-to-land disposal.

Microfiltration and Reverse Osmosis

Due to the WQCF's Phase III improvements (including nitrification-denitrification, tertiary filtration, and UV disinfection facilities), the remaining advanced wastewater treatment options available to the City are microfiltration and reverse osmosis. RO is a membrane separation

[4] Although significant energy would be required to treat effluent with tertiary filtration, a larger amount of energy would be consumed by pumping the same volume of secondary effluent a distance of 10 miles.

process that is used for the removal of dissolved constituents from wastewater remaining after advanced treatment with tertiary filtration or microfiltration (Metcalf and Eddy, 2003). RO treatment relies on applied pressure to force water through a semi-permeable membrane while restraining the passage of particulate and high molecular weight constituents. Membranes exclude ions, but require high pressures to produce the deionized water (Metcalf and Eddy, 2003). Passage of water through the membrane produces a relatively ion free effluent stream and a concentrated brine stream. MF occurs prior to RO in order to remove larger organic and inorganic particles that foul the RO membrane and thus increase membrane resistance to water flow and reduce membrane service life. RO is a very energy intensive process that produces a toxic brine concentrate that poses its own waste disposal issues. In regard to pollutants of concern contained in WQCF effluent, RO would reduce concentrations of TDS, metals, ammonia, and organic compounds, and would lower EC. An estimated, future maximum MF/RO capacity of 21 MGD considered in the current analysis is based on the volume of effluent that would require MF/RO treatment when the WQCF reaches its proposed build-out capacity of 27 MGD (ADWF) in order to maintain TDS mass loadings in WQCF effluent at the currently permitted 9.87 MGD (ADWF) level. MF/RO treatment of 21 MGD of WQCF effluent would produce approximately 4.2 MGD of brine that would require disposal. This analysis assumes that the blending of effluent streams of different qualities is permitted, and therefore only a portion of WQCF tertiary effluent would need to undergo MF/RO prior to blending with non-MF/RO tertiary effluent subsequent to discharge to the San Joaquin River.

Costs

The MF/RO costs provided in **Table 49** are planning levels estimates that allow a cost comparison between the two treatment alternatives presented in this report. MF/RO cost estimates assumed 80 percent recovery for the treatment process with effluent making two passes through membranes. The estimates include the on-site cost of controlled thermal evaporation or crystallization of brine, but do not include the off-site disposal of crystallized residuals. Depending on the nature of the brine and residuals produced by MF/RO treatment of WQCF effluent, the need for additional treatment to remove heavy metals and other toxic contaminants from the brine and/or limited disposal options of residuals could significantly increase the ultimate cost of MF/RO above those costs provided herein. It should be emphasized that the cost of crystallized brine residual disposal is not considered in this analysis and could result in significant additional costs and environmental compliance complexities if the crystallized waste is not suitable for land disposal by traditional means. **Table 49** presents various costs associated with the construction and operation of MF/RO facilities having a treatment capacity of 21 MGD. In addition to total project costs, the costs of this alternative are divided among current and future ratepayers, and further subdivided among residential and non-residential customers.

Table 49: Microfiltration and Reverse Osmosis Cost Estimates by Ratepayer Group Allocation for 21 MGD Treatment Capacity

Ratepayer Group	Capital Cost(1,2)	Annualized Capital Cost	Annual Operation and Maintenance Cost(1)	Total Annual Cost	Project Life-Cycle Cost
Current Residential	$29,600,000	$2,600,000	$2,900,000	$5,500,000	$110,000,000
Current Non-Residential	$19,700,000	$1,700,000	$1,900,000	$3,600,000	$72,000,000
Future Residential	$51,200,000	$4,500,000	$5,000,000	$9,500,000	$190,000,000
Future Non-Residential	$34,200,000	$3,000,000	$3,300,00	$6,300,000	$126,000,000
Totals	**$134,700,000**	**$11,800,000**	**$13,100,000**	**$24,900,000**	**$498,000,000**

(1) Estimated March 2007 costs at ENRCCI 7856 based on 2004 costs provided in Carollo, 2005 (ENRCCI 7296).
(2) Project costs include engineering, administrative, legal, and contingency costs.

Benefits

MF/RO of a portion of WQCF tertiary treated effluent would provide sufficient removal of pollutants of concern from blended MF/RO and non-MF/RO WQCF effluent discharged to the San Joaquin River so as to maintain existing water quality and mass loading in the river at pre-project levels (i.e., maintain water quality and mass loading at the currently permitted 9.87 MGD (ADWF) level). However, it should be noted that MF/RO treatment would not significantly lower downstream water quality concentrations in the receiving water.

Potential Impacts

Advanced wastewater treatment employing MF/RO generates a significant level of concern due to energy demand and "cross media impacts" – this term refers to the interrelated impacts caused by removal of a pollutant from one medium and its transfer to one or more other media. In the case of MF/RO, the process removes a pollutant at a certain concentration from wastewater and partitions it at a significantly higher concentration in brine and/or residuals. Pollutants, such as metals, are not destroyed, but transferred from one medium to another. Organic pollutants can be destroyed or converted to other toxic or non-toxic forms and can also be transferred from one medium to another. It should be noted that in transferring from one medium to another, the bioavailability of the pollutant may be changed significantly. MF/RO treatment results in the transfer of pollutants from wastewater into biosolids, air, and/or concentrated waste streams. Depending on regulatory limits, additional treatment of the biosolids, air, or waste streams may be required (Carollo, 2005). In addition to these cross media pollutant transfer impacts, operation of MF/RO processes can generate additional pollutants and greatly elevate local power demand as described by the potential MF/RO environmental impacts provided in **Table 50**. Finally, temporary, construction-related impacts associated with the building of MF/RO treatment facilities are anticipated for this alternative control measure. However, these temporary, construction-related impacts would be mitigated to the greatest extent practicable.

Table 50: Potential Environmental Impacts Associated with Microfiltration/Reverse Osmosis Treatment of Wastewater

Potential MF/RO Environmental Impacts(1)
Ultimate disposal of brine and residuals requiring the energy intensive processes of evaporation, crystallization, and off-site transport.
Potential need for additional treatment of brine waste to remove heavy metals and other contaminants from the aqueous phase prior to crystallization and disposal of waste.
Increases in air emissions due to the substantial power requirements of MF/RO.
Increases in air emissions from truck and rail traffic to dispose of crystallized brine waste.

(1) Metcalf and Eddy, 2003.

Compliance with Laws and Regulations

State and Federal water quality laws require that discharges not result in an exceedance of water quality standards. The portion of WQCF effluent that would undergo MF/RO treatment is expected to meet all relevant water quality objectives and standards, with the possible exception of Thermal Plan objectives. Any near-field thermal issues would be mitigated as necessary (e.g., implementation of a cooling tower to lower effluent temperature prior to its discharge into the San Joaquin River) as part of the WQCF's overall compliance with the Thermal Plan. The MF/RO treatment alternative is not expected to result in far-field exceedances of applicable water quality objectives or standards.

SOCIO-ECONOMIC IMPACTS OF ALTERNATIVES FOR MAINTAINING EXISTING WATER QUALITY

As described in the previous section, the analysis of costs, benefits, and potential impacts of maintaining existing surface water quality in the San Joaquin River by maintaining WQCF effluent mass loading to the river at the currently permitted 9.87 MGD (ADWF) level as WQCF discharge capacity increases to 27 MGD (ADWF) is based on two potential alternatives: effluent-to-land disposal and MF/RO. Both of these alternative control measures will result in a substantial increase in monthly sewer service fees paid by users of the City's treatment facilities. Furthermore, the annual costs of each alternative, and their associated monthly sewer rate increases, can be translated into a set of economic indicators that describe revenue and employment losses in the WQCF service area as a means of modeling the overall socio-economic cost of implementing and operating either alternative control measure. As a means of limiting the number of projections made in the course of estimating alternative control measure project costs and impacts to ratepayers in the WQCF service area, a decision was made to estimate all costs and impacts in present worth dollars (as of March 2007) and apply them to the City's most recent population estimate (65,076[5] residents as of January 1, 2007). This section discusses the impacts of each alternative in terms of monthly sewer rate increases and overall socio-economic impacts to the WQCF service area.

[5] City of Manteca Economic Development Division.

Impacts on Monthly Residential Sewer Rates

The current analysis of monthly sewer rate increases that would be associated with the construction and operation of the two alternative control measures is focused on increases to current City residential ratepayers. An analysis of fee increases to current non-residential[6] ratepayers and all future ratepayers is outside the scope of the current effort; however, socio-economic impacts to all current and future ratepayer categories are considered in the following section (*Modeling of Economic Impacts on the Community*). Limiting the current discussion to increases in residential ratepayer fees follows the common practice of estimating the economic impact of a project on the *average household* within a community. The effluent-to-land disposal and MF/RO project costs presented in **Table 47** and **Table 49**, respectively, can be used to estimate a monthly sewer rate increase that would be assessed to each existing City residential ratepayer was an alternative to be implemented today, as shown in **Table 51**. Based on the current monthly residential sewer fee[7] of $31.40 (as of March 2007), customers in this rate category would pay monthly fees of $37.96 or $52.53, respectively, if an effluent-to-land disposal or MF/RO control measure was implemented today. It is important to note that these estimated monthly fee increases represent only the portion of an alternative's cost assessed to current residential ratepayers to pay for approximately 22 percent of the construction and operation/maintenance costs of an alternative control measure (see **Table 46**). This percentage is calculated from the 9.87 MGD (ADWF) share of the total 27 MGD (ADWF) capacity of the WQCF at build-out to be paid for by current ratepayers, and then multiplied by the 60 percent of WQCF capacity allocated to residential users (9.87/27 x 60% = 21.93%).

Table 51: Estimated Monthly and Annual Residential Sewer Rate Increases assessed to Current Ratepayers to provide Debt Service for Alternative Control Measures

Alternative Control Measure	Current Residential Ratepayer Share of Total Annual Project Cost	Estimated Current Residential Ratepayer Increases	
		Monthly Increase	Annual Increase
Effluent-to-Land Disposal	$1,700,000	$6.56	$78.72
Microfiltration/Reverse Osmosis	$5,500,000	$21.13	$253.56

The monthly sewer rate increases shown in **Table 51** that would be assessed to current residential ratepayers was an alternative control measure to be implemented would provide debt service for only 22 percent of the total cost of an alternative. The remaining 78 percent of an alternative's cost would be borne by existing non-residential and future residential and non-residential ratepayers as shown in **Table 52**. In the case of current non-residential ratepayers, their monthly sewer fees would also increase; however, a detailed accounting and projection of monthly rate increases for existing City commercial, industrial, and septage users, as well as customers in the City of Lathrop and Raymus village is outside the scope of the current effort. Debt service for approximately 63 percent of an alternative's cost (see **Table 46**) will come from

[6] Non-residential ratepayers include City of Manteca commercial, industrial, and septage users, as well as customers in the City of Lathrop and Raymus Village.

[7] Current sewer fees cover the cost of Phase III improvements and treatment capacity of 9.87 MGD.

increased sewer connection fees assessed to future residential and non-residential customers. Once a future customer becomes a current ratepayer, he will pay the current monthly sewer rate assessed to all customers in a specific rate category at the time of his connection. A consolidated assessment of alternative control measure costs to WQCF ratepayers in terms of overall economic impact to the WQCF service area is provided in the following section (*Modeling of Economic Impacts on the Community*).

Table 52: Estimated Annual Debt Service assessed to Current Non-Residential and All Future Ratepayers in WQCF Service Area

Ratepayer Group	Annual Debt Service by Alternative[1]		Debt Service Revenue Source
	Effluent-to-Land Disposal	Microfiltration and Reverse Osmosis	
Current Non-Residential	$1,100,000	$3,600,000	Increased monthly sewer fees
Future Residential	$3,000,000	$9,500,000	Increased connection fees
Future Non-Residential	$2,000,000	$6,300,000	Increased connection fees

(1) Debt amortized over a 20-year period with an annualization factor of 0.08718.

Socio-Economic Impacts to the WQCF Service Area

Socio-economic impacts to the WQCF service area as a result of implementing an alternative control measure are assessed at two levels: (1) impact on individual households due to sewer fee increases, and (2) impact on the community based on a modeling of key economic indicators. As stated earlier, the estimating of alternative control measure costs and impacts to ratepayers in the WQCF service area was made in present worth dollars (as of March 2007) and applied to the City's most recent population estimate (65,076 residents as of January 1, 2007) as a means to reduce the total number of assumptions made in the course of making the estimates. This strategy avoids the uncertainties associated with an estimate based on future population growth in and around the City, future construction costs, and the precise timing of alternative control measure implementation. While it is true that alternative control measures, if pursued, would not be implemented until 2012 to 2017, and projects costs would be greater at that time, household incomes and the total number of ratepayers asked to share the expense of an alternative would also increase, thus maintaining the relative economic burden of an alternative control measure relatively constant over the next several years. The economic impact analysis software used to model economic impacts to the WQCF service area due to the implementation of alternative control measures relies on the distribution of wealth in the community and the spending habits of Manteca's citizens in order to project changes in several key economic indicators. The current distribution of wealth, spending habits, and overall economic health of the City are not anticipated to significantly change in the next five to 10 years, further supporting the use of 2007 project cost estimates to assess the general economic burden imposed by the implementation of effluent-to-land disposal or MF/RO on the City.

Projected Increases in WQCF Residential Rates with Implementation of Alternative Control Measures

The WQCF service area's current residential monthly sewer fee is $31.40. Monthly residential sewer rate increases estimated for the two alternative control measures necessary to maintain

WQCF effluent mass loading to the San Joaquin River at the currently permitted 9.87 MGD (ADWF) level as WQCF discharge capacity increases to 27 MGD (ADWF) will bring total monthly fees to $37.96 for the effluent-to-land disposal alternative and to $52.53 for the MF/RO alternative (see **Table 53**). As stated earlier, the estimated residential monthly fee increases will only support repayment of approximately 22 percent of the total cost of an alternative. The estimated $455.52 and $630.36 annual sewer fees (for effluent-to-land disposal and MR/RO, respectively) shown in **Table 53** only apply to existing residential ratepayers and do not consider the added economic hardship to future home buyers due to increased home prices associated with increased connection fees levied against new development. Depending on how quickly Manteca's population grows and how many years the City ultimately decides to amortize a project's cost over, the cost of supporting repayment of approximately 38 percent of an alternative (see Future Residential Users Group in **Table 46**) could translate into significantly more expensive home prices in Manteca as compared to neighboring cities, thus having a negative affect on the City's growth.

Table 53: Comparison of Current WQCF Treatment Cost to Estimated Costs of Alternative Control Measures

Treatment Level	Monthly Residential Fee	Annual Residential Fee	% Increase in Treatment Cost above Current Level
Current Treatment	$31.40	$376.80	--
Effluent-to-Land Disposal	$37.96[1]	$455.52[1]	20.9%
Microfiltration/Reverse Osmosis	$52.53[1]	$630.36[1]	67.3%

(1) Estimated fee.

Modeling of Economic Impacts on the Community

An economic impact analysis traces spending through an economy and measures the cumulative effects of that spending. The impact region can be an entire state, one or more counties, a single city, or any segment of the population representing a semi self-sufficient economic unit for which relevant economic information exists. The current economic impact analysis evaluates the potential impacts to the City due to an increase in annual sewer fees that would be needed to finance the two alternative water quality control measures presented in this section. An economic impact modeling software package, IMPLAN® (IMpact Analysis for PLANing) Version 2, was used to estimate the socio-economic impacts of increased sewer fees on City residents from a broader perspective, beyond the single economic metric of an annual rate increase. IMPLAN® is a widely accepted model that has been used by the US EPA, the California Department of Water Resources, USDA Forest Service, and USDI Bureau of Land Management. IMPLAN® is an economic impact assessment modeling system that allows the user to build models to estimate the impacts of economic changes at state, county, or community levels. For the current analysis, economic data specific to the Manteca were obtained from the Minnesota IMPLAN® Group, Inc. (MIG), based on zip codes within the City (95336 and 95337).

IMPLAN® is an input-output model that uses multipliers[8] to represent demand and flow of resources among sectors[9] and institutions in the economy. Input-output analysis is a means of examining relationships within an economy, both between businesses and between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. This type of analysis allows examination of the effects – or economic impacts – of a change in one or several economic activities on an entire community. Economic impacts are represented by changes in economic output and employment. The current analysis is based on the assumption that a sewer fee increase to households in the WQCF service area will reduce discretionary spending of disposable income. A loss in discretionary spending will reduce demands for local goods and services, which in turn will reduce demands for local labor, resulting in loss of employment.

Unlike the ratepayer category effects presented in **Table 46** where alternative costs are divided among four ratepayer groups, the economic impact analysis using IMPLAN® considers the impacts of the entirety of an alternative control measure on the City as a whole. Even though the IMPLAN® model uses data only from Manteca, ratepayers from the City of Lathrop and Raymus Village were assumed to be part of the impacted community. While it is true that alternative control measures, if pursued, would not be implemented until 2012 – 2017, and projects costs would be greater at that time, household incomes and the total number of ratepayers asked to share the expense of an alternative would also increase, thus maintaining the relative economic burden of an alternative control measure comparatively constant over the next several years. The IMPLAN® model utilizes information regarding the distribution of wealth and spending habits in the City to estimate changes in several key economic indicators. The current distribution of wealth, spending habits, and overall economic health of the City are not anticipated to significantly change in the next five to 10 years, further supporting the use of 2007 project cost estimates to access the general economic burden imposed by the implementation of effluent-to-land disposal or MF/RO on the City. In short, the current economic impact analysis looks at present day economic effects of the entire cost of an alternative control measure on all WQCF ratepayers.

IMPLAN® data from 2003 were the most recent economic data available for the City, as compiled by MIG, and were used in the current analysis. As a means of equating 2003 model data to 2007 project costs, 2007 inflators were applied to model data to account for the change in the actual value of the dollar over the 4-year period. Basic 2003 economic information for the City used by the IMPLAN® model is shown in **Table 54**. The largest household (HH) income class in the community is the 50 – 75K group representing 24 percent of the total community. If one uses the U.S. Census Bureau's 2002 offering of "middle class" as the middle 20 percent of the country having incomes ranging from $40,000 – $95,000, then roughly 55 percent of Manteca's residents could be described as belonging to the "middle class" (this grouping includes members of the 35 – 50K, 50 – 75K, and 75 – 100K HH income classes). This leaves the City with approximately 35 percent representation in the "lower class" and about 10 percent representation in the "upper class". As shown by **Table 54**, low and middle income households

[8] Multipliers describe the response of an economy to a stimulus (a change in demand or production).

[9] A sector represents an economic activity that produces goods and/or services. Fruit farming, natural gas distribution, real estate, and medical practices, to name but a few, all represent economic activities, and hence sectors in an economy.

would contribute the vast majority (approximately 90 percent) of financing for any required alternative control measure.

Table 54: Summary of Household Income Classes in the City of Manteca and their Relative Contributions to Alternative Control Measure Annual Costs

				Relative Annual Contribution to Alternative Cost by HH Income Class	
HH Income Class(1)	**Average Annual HH Income(2,3,4)**	**No. of HH in Class(4)**	**Percent of Total HH**	**Effluent-to-Land Disposal**	**Microfiltration/ Reverse Osmosis**
<10K	$7,071	1,302	6%	$486,000	$1,494,000
10 – 15K	$17,678	878	4%	$312,000	$996,000
15 – 25K	$28,285	2,447	12%	$936,000	$2,988,000
25 – 35K	$42,428	2,697	13%	$1,014,000	$3,237,000
35 – 50K	$60,106	4,035	19%	$1,482,000	$4,731,000
50 – 75K	$98,998	5,148	24%	$1,872,000	$5,976,000
75 – 100K	$127,283	2,447	12%	$936,000	$2,988,000
100 – 150K	$176,782	1,779	8%	$624,000	$1,992,000
150K+	$247,495	516	2%	$156,000	$498,000

HH = Households
(1) HH income class is based on median monetary income (money income) data collected by the U.S. Census Bureau.
(2) Average annual household income is based on average personal income data collected by the U.S. Bureau of Economic Analysis.
(3) Due to the manner in which average annual household income is calculated, it commonly falls above the upper boundary of the household income class to which it is associated. The difference lays in the definition of personal income versus money income.
(4) Data source IMPLAN® 2003.

The annual financial burden on lower income households of financing an alternative control measure (see **Table 53**) would result in proportionately less disposable personal income (DPI; a percentage of total average income) available to these households as compared to middle and upper income classes as presented in **Table 55**. DPI represents "after tax" income and is considered as 82.5 percent of average annual income by the IMPLAN® model. A decrease in disposable income translates into fewer dollars available to spend on essential goods and services such as food, lodging, and healthcare. An increase in annual sewer fees due to the implementation of effluent-to-land disposal would result in households in the < 10K income class spending 7.8 percent of their average annual DPI on sewer treatment (see **Table 55**). This same income class would spend 10.8 percent of its average annual DPI on sewer treatment with the implementation of the MF/RO alternative. It is clear that increased monthly sewer fees due to the implementation of either alternative control measure would result in proportionately larger financial burdens to lower household income classes as compared to middle and upper income classes. However, the estimated, annual residential sewer fees provided in **Table 53** upon which the percentages provided in **Table 55** are based do not address fee increases to current non-residential or future residential and non-residential ratepayers. Financial impacts to these ratepayer groups in terms of projected sewer rate increases is beyond the scope of the current effort, but community level socio-economic impacts to all ratepayer groups are considered in aggregate by the IMPLAN® model.

Table 55: Percent Household Income and Average Annual Disposable Personal Income by Household Income Class Required to Finance Alternative Control Measure Costs

HH Income Class	Average Annual Disposable Personal Income (DPI)[1,2]	Annual Sewer Fee by Treatment Level as Percentage of Average Annual Household Income (HHI) and Annual Average Disposal Personal Income (DPI)					
		Current Treatment ($376.80)		ETLD Treatment ($456.84)		MF/RO Treatment ($635.64)	
		% of HHI	% of DPI	% of HHI	% of DPI	% of HHI	% of DPI
<10K	$5,834	5.33	6.46	6.44	7.81	8.91	10.81
10 – 15K	$14,584	2.13	2.58	2.58	3.12	3.57	4.32
15 – 25K	$23,335	1.33	1.61	1.61	1.95	2.23	2.70
25 – 35K	$35,003	0.89	1.08	1.07	1.30	1.49	1.80
35 – 50K	$49,587	0.63	0.76	0.76	0.92	1.05	1.27
50 – 75K	$81,673	0.38	0.46	0.46	0.56	0.64	0.77
75 – 100K	$105,008	0.30	0.36	0.36	0.43	0.50	0.60
100 – 150K	$145,845	0.21	0.26	0.26	0.31	0.36	0.43
150K+	$204,183	0.15	0.18	0.18	0.22	0.25	0.31

ETLD = Effluent-to-Land Disposal
(1) Calculated as 82.5% of Average Annual HH Income provided in Table 54.
(2) Data source IMPLAN® 2003.

Table 56 presents the IMPLAN®-modeled economic impacts of each treatment alternative in terms of labor income loss, indirect business tax loss, employment loss, and total output loss. Labor income constitutes the wages and benefits of employees and proprietors, and indirect business tax includes the excise and sales taxes paid by individuals and businesses. Total output is the sum of all the goods and services produced in a community's economy. The IMPLAN® model was run using the 50 – 75K income class as a surrogate for all income classes as the spending habits of the 50 – 75K income class have been found to be representative of the spending habits of all income classes within a community. The losses projected by the model (i.e., model output) are the sum of all direct, indirect, and induced effects of the cost of an alternative control measure on the City's economy. The model input is the estimated total annual cost for a particular alternative control measure (see **Table 47** and **Table 49** for cost estimates).

Table 56: Annualized Socio-Economic Impacts of Increased Sewer Fees Required to Finance Alternative Control Measure Costs

Alternative Control Measure	Estimated Annual Sewer Fee Increase[1]	Economic Indicators[2]			
		Labor Income Loss	Indirect Business Tax Loss	Employment Loss	Total Output Loss
Effluent-to-Land Disposal	$78.72	$1,675,250	$398,247	55.3 jobs	$8,534,028
Microfiltration and Reverse Osmosis	$253.56	$5,347,914	$1,271,326	176.6 jobs	$27,243,243

(1) Reflects only estimated increase in current residential ratepayer annual fees.
(2) Considers annual losses to the community due to the entire cost of an alternative control measure.

As shown by the economic indicators provided in **Table 56**, the effluent-to-land disposal and MF/RO alternatives are projected to have widely different impacts on the City's local economy. Because the economic indicators represent only a single year's impacts on the City's economy – they are, in fact, *annualized* economic indicators – these impacts would be repeated every year for the 20-year life-cycle of the alternative. The losses, whether in dollars or jobs, are linked to a reduction in DPI due to increased sewer fees required to pay for an alternative control measure. All communities possess somewhat unique spending habits as a whole, and a reduction in DPI has different consequences for some economic sectors as compared to others depending on the community in which the reduction in DPI occurs. The IMPLAN® model output also includes a listing of affected sectors for each economic indicator. The Top 10 sectors in the City projected to be affected by the implementation of alternative control measures in terms of both losses in employment and labor income are shown in **Table 57**. The sectors hit hardest by employment loss are not necessarily the same ones projected to have the greatest impact on loss of income labor because a smaller number of medium to high paying jobs (for example, health care industry jobs) will have a greater impact on a community's labor income than a larger number of low paying jobs (for example, food service jobs).

Table 57: Top 10 Sectors Affected by Implementation of Alternative Control Measures

Top 10 Affected Employment Sectors[1]	Top 10 Affected Labor Income Sectors[1]
Food service and drinking places	Hospitals
Hospitals	Health care offices
Health care offices	Food service and drinking places
General merchandise stores	Motor vehicle and parts dealers
Non-store retailers (includes internet retailers)	Food and beverage stores
Food and beverage stores	Wholesale trade
Motor vehicle and parts dealers	General merchandise stores
Religious organizations	Automotive repair and maintenance
Nursing and residential care facilities	Nursing and residential care facilities
Automotive repair and maintenance	Monetary authorities and depository credit intermediation (banks, savings institutions, credit unions, etc.)

(1) Taken from IMPLAN® model output.

In terms of the impact to the current unemployment rate in Manteca (6.5% as May 2007), implementation of the effluent-to-land disposal alternative would slightly increase the overall unemployment rate in the City to 6.8 percent. The implementation of MF/RO treatment would increase the overall unemployment rate in the City to 7.3 percent. While these incremental increases in unemployment rate may appear small, San Joaquin County (unemployment rate reported at 7.5% for May 2007) is currently experiencing levels of unemployment over 50 percent higher than the statewide average of 4.9 percent. Even a small increase in the unemployment rate in the City would have a detrimental impact on a county already experiencing the twelfth highest unemployment rate among California's 58 counties. The projected losses to labor income and total output (similar to gross metropolitan product) for the City as a result of financing either the effluent-to-land disposal or MF/RO treatment alternative

would be minor on a percent basis when compared to the total labor income and output of the City, yet the estimated job losses and reduction in local output (see **Table 56**) would produce economic hardship at the household level, with lower income households bearing a larger impact on an annual basis, in relative terms, than wealthier households in the community. Furthermore, the final economic impact of the effluent-to-land disposal alternative would increase significantly if WQCF effluent was required to go through tertiary filtration prior to land application. Likewise, the cost of MF/RO treatment could increase significantly if (1) the brine produced by the process requires additional treatment to remove heavy metals and other contaminants, and/or (2) brine waste requires specialized disposal in some type of hazardous materials containment site. Contingencies of this sort were not considered from an economic perspective by the IMPLAN® model, but certainly could generate additional direct and indirect economic and environmental impacts to be borne by existing and future WQCF ratepayers.

BALANCE OF ENVIRONMENTAL BENEFITS AND SOCIO-ECONOMIC CONSIDERATIONS

State Water Board guidance requires that a complete antidegradation analysis include a balancing of the proposed action against the public interest. The City's approach for compliance with this requirement is to compare the environmental impacts of the proposed project (increase in NPDES-permitted discharge of 17.13[10] MGD (ADWF) tertiary treated effluent) with the environmental and socio-economic impacts of two alternative control measures. These alternatives include (1) effluent-to-land disposal and (2) MR/RO treatment integrated with the proposed project as a means of essentially eliminating the incremental water quality impacts of the proposed tertiary discharge above the already permitted 9.87 MGD (ADWF) level. The socio-economic impacts of the proposed project need not be estimated in the analysis because they form a baseline[11] common to the proposed project and both alternative control measures. The current comparison focuses on the socio-economic impacts and environmental benefits and impacts of the two alternatives relative to the water quality impacts of the proposed project. Additionally, the *no project* alternative is also considered. Based on these comparisons, a project deemed to be consistent with best practicable treatment or control consistent with maximum benefit to the people of the State is identified.

The socio-economic and water quality impacts of the proposed project, the effluent-to-land disposal alternative, and the MF/RO treatment alternative considered in this analysis are compared in **Table 58**. The proposed 17.13 MGD (ADWF) tertiary treated discharge is projected to have both favorable and unfavorable effects on San Joaquin River water quality downstream of the WQCF outfall depending on the parameter, time of discharge (i.e., season), and ambient flow conditions. The proposed tertiary discharge is projected to have a slight diluting effect, albeit *de minimus*, on some constituents (TSS, total aluminum, dissolved iron,

[10] WQCF requested maximum discharge capacity of 27 MGD (ADWF) less existing NPDES-permitted discharge of 9.87 MGD (ADWF) results in a net requested increase in discharge capacity of 17.13 MGD (ADWF).

[11] While the proposed project will result in an increase to monthly residential sewer fees and socio-economic impacts as a result of constructing and operating/maintaining the proposed project, these costs represent a baseline effect common to the proposed project and the effluent-to-land disposal and MF/RO treatment alternatives, and therefore do not require quantification as a means of assessing the incremental socio-economic effect of the effluent-to-land disposal and MF/RO alternatives.

and dissolved manganese (under critical low flows)) in the receiving water, and a slight concentrating effect on other constituents (ammonia as N (Oct. – May), dissolved arsenic, dissolved copper, total cyanide, MBAS, nitrate as N, nitrite as N, total mercury, and EC (Sept. – Mar.)). A minor increase in downstream San Joaquin River concentration is projected for BOD and EC (Apr. – Aug.). Additionally, a moderate increase in downstream receiving water concentration, relative to its chronic EPA criterion (0.62 mg/L), is projected for ammonia as N during the months of June through September. However, it should be noted that this near-field, seasonally-based, moderate increase in ammonia levels will attenuate through natural processes downstream in the receiving water as ammonia is utilized by phytoplankton and other primary producers, thus reducing the pollutant's downstream impact from that projected in the near-field.

Table 58: Comparison of the Socio-Economic Impacts and Environmental Benefits and Impacts of the Proposed Project and Two Alternative Control Measures

Treatment Level	Monthly Residential Fee Increase	Estimated Loss in Jobs	Treatment and Disposal Process Environmental Impacts
Tertiary Filtration (*proposed project*[(1)])	Not estimated	Not estimated	**Favorable Impact** ● Slight decrease, albeit *de minimis*, in downstream San Joaquin River concentration for the following parameters: TSS, total aluminum, dissolved iron, and dissolved manganese. **Unfavorable Impact** ● Slight increase in downstream San Joaquin River concentration and mass for the following parameters: TSS (*mass only*), total aluminum (*mass only*), ammonia as N (Oct. – May), dissolved arsenic, dissolved copper, total cyanide, dissolved iron (*mass only*), dissolved manganese (*mass only*), MBAS, nitrate as N, nitrite as N, total mercury; slight increase in downstream EC (Sept. – Mar.). ● Minor increase in downstream San Joaquin River mass loading for BOD; minor increase in downstream EC (Apr. – Aug.). ● Moderate increase in downstream San Joaquin River concentration and mass loading for ammonia as N (June – Sept.).
Effluent-to-Land Disposal *(in addition to proposed project*[(2)]*)*	$6.56	55.3	**Favorable Impact** ● No change in downstream San Joaquin River water quality above that realized once the WQCF reaches its currently permitted capacity of 9.87 MGD (ADWF). ● Additional water supply source to the region. **Unfavorable Impact** ● Addition of salts to groundwater. ● Groundwater mounding in the area(s) of land application. ● Increase in energy consumption and air emissions due to substantial power requirements of pumping effluent to storage ponds and then to site(s) of land application.

Table 58: Comparison of the Socio-Economic Impacts and Environmental Benefits and Impacts of the Proposed Project and Two Alternative Control Measures (Continued)

Treatment Level	Monthly Residential Fee Increase	Estimated Loss in Jobs	Treatment and Disposal Process Environmental Impacts
Micro-Filtration/ Reverse Osmosis (*in addition to proposed project*[(1)])	$21.13	176.6	**Favorable Impact** ● No net annual change in downstream San Joaquin River TDS mass loading above the currently permitted 9.87 MGD (ADWF) level. ● An indirect effect of MF/RO treatment is a reduction in mass loadings of metals and nutrients discharged to the San Joaquin River. **Unfavorable Impact** ● Increases in energy consumption and air emissions due to power requirements of MF/RO treatment. ● Disposal of toxic substances and contaminated media resulting from the separation of unwanted pollutants from wastewater. ● Potential need for additional treatment of brine waste to remove heavy metals and other contaminants from the aqueous phase prior to crystallization and disposal of residuals. ● On- or off-site disposal of brine or crystallized residuals. ● Increases in air emissions from truck and rail traffic to dispose of brine or crystallized residuals.

(1) Treatment process upgrades incorporated into the proposed project include nitrification-denitrification, tertiary filtration, and UV disinfection.
(2) The effluent-to-land disposal alternative considered in this analysis includes discharging 9.87 MGD (ADWF) tertiary treated effluent to the San Joaquin River and land applying 18 MGD of undisinfected, denitrified, secondary effluent within approximately 10 miles of the WQCF.

The implementation of an effluent-to-land disposal operation as a means of limiting the discharge of WQCF effluent to the San Joaquin River at the currently permitted 9.87 MGD (ADWF) level is anticipated to possess both favorable and unfavorable environmental impacts. The favorable impacts include the maintaining of San Joaquin River water quality downstream of the WQCF outfall at the level realized once the WQCF completes its Phase III expansion and discharges tertiary treated effluent at its permitted capacity of 9.87 MGD (ADWF). To this end, effluent-to-land disposal addresses all incremental changes in downstream San Joaquin River water quality that this report's assessment of projected water quality impacts has identified. A second favorable impact is the additional water supply source to the region that would be provided by the reclaimed water. Unfavorable impacts as a result of land application of undisinfected, denitrified, secondary effluent include addition of salts (as measured by TDS) to groundwater at a concentration greater than the Title 22 Secondary MCL *recommended* level of 500 mg/L, or greater than ambient background quality; groundwater mounding in the area(s) of land application; and increased energy consumption and air emissions due to the substantial power requirements of pumping effluent to storage ponds and then to site(s) of land application.

The implementation of MF/RO as an additional treatment process for tertiary filtered effluent is also projected to have both favorable and unfavorable environmental impacts. The favorable impact is the maintaining of TDS mass loading to the San Joaquin River downstream of the WQCF outfall with an increase of 17.13 MGD (ADWF) tertiary treated effluent discharged to the river. While the MF/RO process would be operated to maintain TDS mass loading to the receiving water at pre-project levels, it would have a favorable indirect impact on downstream water quality through the further reduction of metals and nutrients from the tertiary treated effluent that undergoes MF/RO. This ancillary reduction in tertiary effluent pollutant loading would likewise act to maintain downstream San Joaquin River water quality and mass loading to pre-project levels. It should be noted that the extent of MR/RO treatment considered in this alternatives analysis will not produce demonstrable downstream water quality improvements in the receiving water; the modeled level of MF/RO treatment is designed to maintain downstream TDS mass loading to the San Joaquin River at pre-project levels. Unfavorable impacts of MF/RO treatment stem from the concentration of brine, its potential toxic contaminants and their subsequent removal, ultimate disposal of brine or crystallized residuals, and the substantial energy requirements inherent in this advanced treatment process. Apart from these direct and more obvious effects, MF/RO treatment brings with it the potential to transfer environmental impacts outside of the project area when off-site transport and disposal of residuals create new environmental impacts in other areas of the State.

As directed by the State Water Board's guidelines, the costs of offsetting a proposed project's potential impacts must be estimated and compared to the expected environmental benefits to be gained by maintaining water quality. Within the context of this comparison, it is also appropriate to consider the environmental and socio-economic implications of not going forward with the proposed project; a scenario commonly referred to as the no project alternative. Four scenarios emerge from the current analysis that warrant evaluation: the no project alternative, the effluent-to-land disposal alternative, the MF/RO treatment alternative, and the City's proposed project. As part of this antidegradation analysis, the balance of economic consideration and environmental benefits under each scenario are evaluated herein.

No Project Alternative

If the City chooses not to increase the discharge capacity of the WQCF, the decision would produce unfavorable socio-economic impacts both locally and regionally. From a socio-economic perspective, an increase in WQCF discharge capacity is needed to accommodate continued growth in the City and surrounding communities. Among cities in San Joaquin County with populations greater than 50,000, Manteca is the second fastest growing city and is quickly becoming an urban and economic focal point for the county. Similar to the pace of growth experienced by the City, San Joaquin County is currently ranked as the third fastest growing in California. A restriction in the City's growth due to insufficient wastewater treatment capacity will negatively affect residential development, retail markets, an already high local unemployment rate, and the economic prosperity of San Joaquin County in general. In terms of housing affordability as measured by the First Quarter 2007 HAI-FTB Index[12], San Joaquin County possesses more affordable housing than Alameda and Contra Costa counties, but

[12] The First-Time Buyer Housing Affordability Index (HAI-FTB) describes the percentage of California households that can afford to purchase a median-priced home. Source: California Association of Realtors.

holds slightly less affordable housing than Stanislaus and Sacramento counties. Restricting new development in Manteca will prompt prospective home buyers – as well as retail and commercial development – to look to other cities within the county, or even outside of the county, for affordable housing and business development opportunities. For these reasons, not seeking to increase WQCF discharge capacity runs contrary to the enhancement of the economic health of the City and surrounding communities.

Effluent-to-Land Disposal Alternative

The environmental benefits of effluent-to-land application are proportional to the incremental changes in San Joaquin River water quality that will be offset. Projected increases in downstream receiving water concentrations for a small number of parameters (see **Table 58**) attributable to the proposed 17.13 MGD (ADWF) tertiary discharge are generally estimated to be slight to minor, thus resulting in effluent-to-land disposal acting to offset only slight to minor reductions in San Joaquin River water quality. The moderate increase in downstream San Joaquin River concentration, relative to its chronic EPA criterion, projected for ammonia (as nitrogen) during June through September similarly would be offset by effluent-to-land disposal. Land application of undisinfected, denitrified, secondary effluent would also provide an additional water supply source to the region. However, land application of secondary treated effluent would add salts (as measured by TDS) to the groundwater basin underlying the application site(s). Addition of salts to groundwater at a concentration greater than the Title 22 Secondary MCL *recommended* level of 500 mg/L, or greater than ambient background quality, would produce an unfavorable environmental impact, especially in light of the existing, elevated salinity and boron levels found in Central Valley surface waters and groundwater. Effluent-to-land disposal also carries the risk of causing groundwater mounding in the area(s) of land application. A final unfavorable environmental impact of the effluent-to-land disposal alternative is an increase in energy consumption and air emissions due to the substantial power requirements of pumping effluent to storage ponds and then to land application sites.

In regard to socio-economic impacts, the IMPLAN® model estimated that the effluent-to-land disposal alternative would result in the loss of approximately 55 jobs per year during the 20-year life-cycle over which WQCF ratepayers would provide debt service for this treatment alternative. This level of employment loss is projected to result in a nearly $1.7 million annual labor income loss to the City. These losses would act to further impact a local job market that is currently experiencing an unemployment rate over 50 percent higher than the statewide average. In total, the cost of effluent-to-land disposal is estimated to result in an annual $8.5 million output loss from the local economy. This suite of impacts is the result of increased sewer fees (existing users) and connection fees (future users) levied against WQCF ratepayers and the associated loss of disposal personal income that is no longer available to purchase local goods and services. Furthermore, the *actual* economic impact of effluent-to-land disposal could increase significantly above that estimated in this analysis if the City was required to provide tertiary filtration of its effluent prior to land application. To this end, the environmental and socio-economic costs associated with effluent-to-land disposal are unduly high compared to the water quality benefits that would be achieved through the implementation of this alternative as a means of offsetting the incremental water quality changes projected for the proposed project. For these reasons, it is not in the public interest to require the City to implement effluent-to-land disposal as a means of maintaining existing water quality in the San Joaquin River.

Reverse Osmosis Treatment Alternative

Similar to the effluent-to-land disposal alternative discussed above, the environmental benefits of MF/RO treatment are proportional to the incremental changes in San Joaquin River water quality that will be offset by the alternative control measure. As stated earlier, the MF/RO treatment alternative would not improve downstream water quality in the San Joaquin River, but merely maintain it at pre-project levels. The projected increases in downstream receiving water concentrations for a small collection of constituents due to the proposed 17.13 MGD (ADWF) tertiary discharge (see **Table 58**) are the exact same as those described for the effluent-to-land disposal alternative. These incremental changes in downstream water quality are estimated to be slight to moderate, thus resulting in MF/RO treatment acting to offset only slight to moderate reductions in San Joaquin River water quality. The more striking effects of MF/RO treatment are found in the unfavorable environmental impacts inherent in the process resulting from brine concentration, potential need for removal of toxic contaminants, cross-media contamination, brine or crystallized residuals disposal, and the substantial energy requirements of the process with their associated natural resource and air quality impacts.

From a socio-economic perspective, MF/RO treatment is estimated to result in the loss of approximately 177 jobs per year during the 20-year life-cycle over which WQCF ratepayers would provide debt service for this treatment alternative. This level of employment loss is projected to result in an over $5.3 million annual labor income loss to the City. These losses would act to further impact a local job market that is currently experiencing an unemployment rate over 50 percent higher than the statewide average. In total, the cost of MF/RO treatment is estimated to result in an annual $27.2 million output loss from the local economy. This suite of impacts is the result of increased sewer fees (existing users) and connection fees (future users) levied against WQCF ratepayers and the associated loss of disposal personal income that is no longer available to purchase local goods and services. Furthermore, the *actual* economic impact of MF/RO treatment could increase significantly above that estimated in this analysis if (1) the brine produced by the process requires additional treatment to remove heavy metals and other contaminants, and/or (2) brine waste requires specialized disposal in some type of hazardous materials containment site. To this end, the environmental and socio-economic costs associated with MF/RO treatment are unduly high compared to the water quality benefits that would be achieved through the implementation of this alternative as a means of offsetting the incremental water quality changes projected for the proposed project. For these reasons, it is not in the public interest to require the City to implement MF/RO treatment of its effluent to maintain existing water quality in the San Joaquin River.

Proposed Project

The water quality impacts analysis conducted earlier in this report shows that WQCF effluent undergoing nitrification-denitrification, tertiary filtration, and UV disinfection will generally result in water of very high quality being discharged by the City into the San Joaquin River. As shown in **Table 58**, *de minimis* decreases in the downstream concentrations of TSS, total aluminum, dissolved iron, dissolved manganese are projected, while slight to minor increases are estimated for ammonia as N (October through May), dissolved arsenic, dissolved copper, total cyanide, MBAS, nitrate, nitrite, total mercury, BOD, and EC. A moderate increase in downstream San Joaquin River concentration, relative to its chronic EPA criterion, is projected for ammonia as N during the months of June through September. However, this near-field,

seasonally-based, moderate increase in ammonia levels will attenuate through natural processes downstream in the receiving water as ammonia is utilized by phytoplankton and other primary producers, thus reducing the pollutant's downstream impact from that projected in the near-field. More importantly, projected median ammonia concentrations in the San Joaquin River are projected to remain below the more stringent chronic EPA ammonia objective calculated for the river on a year round basis. With the exceptions of aluminum and temperature, none of the water quality parameters evaluated in this report are anticipated to exceed relevant water quality objectives, and on average are estimated to be present at concentrations well below objectives. Any near-field thermal impacts resulting from the WQCF's expanded discharge capacity will be mitigated as necessary (e.g., implementation of a cooling tower to lower effluent temperature prior to its discharge into the receiving water) to ensure no adverse thermal effects on fisheries and aquatic resources in the San Joaquin River. The proposed project is not expected to result in far-field exceedances of applicable water quality objectives or standards in the Delta. Additionally, the proposed project will be operated to ensure compliance with the NPDES regulatory program (i.e., future effluent limitations) which will make sure that water quality objectives in the receiving water are met. Furthermore, the reduction in water quality that would result from the proposed project will not unreasonably affect actual or potential beneficial uses.

Project Identified as Providing Maximum Benefit to the State

Considering the 17.13 MGD (ADWF) increase in discharge capacity that is sought relative to the range of year-round flows observed in the San Joaquin River, the difference in downstream pollutant concentrations produced by effluent undergoing tertiary filtration compared to effluent undergoing additional MF/RO treatment is essentially *de minimis* for most constituents once WQCF effluent and receiving water are well-mixed. With regard to the effluent-to-land disposal control measure, the difference in projected downstream receiving water quality when the WQCF is discharging at the currently permitted 9.87 MGD (ADWF) capacity compared to the proposed 27 MGD (ADWF) build-out capacity is generally slight, relative to water quality objectives, for most constituents once WQCF effluent and receiving water are well-mixed. Therefore, the critical comparison to be made between alternatives is a balancing of the generally very minor degradation in downstream receiving water quality for a small number of parameters attributable to the discharge of 17.13 MGD (ADWF) tertiary treated effluent against the environmental impacts of effluent-to-land disposal and MF/RO treatment, and the significant socio-economic impacts of these two alternative control measures as estimated by the IMPLAN® model. Based on the balancing of environmental and socio-economic impacts associated with the four scenarios described above, the City has identified the proposed project as the project providing best practicable treatment or control consistent with maximum benefit to the people of the State.

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Evaluation of Consistency with Antidegradation Policy

The guidelines set by the State Water Board for the antidegradation analysis (APU 90-004) provide direction on evaluating the WQCF's proposed discharge increase into the San Joaquin River by focusing on whether and the degree that water quality is lowered and by considering whether or not the assumed water quality change is consistent with the maximum benefit to the people of the State. In developing the antidegradation analysis, the San Joaquin River beneficial uses and relevant water quality objectives and commonly used criteria were considered, as well as the environmental and socio-economic costs of wastewater treatment alternatives that would maintain existing water quality in an effort to avoid any potential environmental impacts of the proposed project.

CONSISTENCY WITH ANTIDEGRADATION POLICIES

The proposed project, a 17.13 MGD (ADWF) increase in WQCF discharge capacity with accompanying nitrification-denitrification, tertiary filtration, and UV disinfection treatment upgrades to treat the increased flow, is determined to comprise best practicable treatment or control and is consistent with Federal and State antidegradation policies for the following reasons:

- The increase in permitted discharge capacity is necessary to accommodate important economic and social development in the City and surrounding communities, and is consistent with the City's General Plan. Failure to approve the increase, or alternatively requiring the City to implement control measures that would maintain existing water quality and mass emissions in the San Joaquin River, would have significant adverse economic and social impacts on the City and surrounding communities and their citizens and businesses.
- The increase will not adversely affect existing or probable beneficial uses of the San Joaquin River, nor will it cause water quality to fall below applicable water quality objectives.
- The increase, while causing slight increases in downstream water quality concentrations for some constituents (ammonia (October through May), dissolved arsenic, dissolved copper, total cyanide, MBAS, nitrate, nitrite, total mercury, and EC (September through March)), will produce slight decreases in downstream concentrations for others (TSS, total aluminum, dissolved iron, and dissolved manganese). The proposed increase in discharge capacity is also projected to cause minor increases in downstream water quality concentrations for BOD and EC (April through August), as well as a moderate increase for ammonia (June through September). Total aluminum currently exceeds its water quality objective in the San Joaquin River upstream of the WQCF outfall.
- The benefits of maintaining existing water quality and mass emissions for the constituents analyzed are not commensurate with the costs of additional treatment. The small decrease in quality with respect to the constituents considered in the analysis is unlikely to affect beneficial uses of the San Joaquin River.

- Based on the above, the requested increase in permitted capacity is consistent with Federal and State antidegradation policies in that the lowering of water quality for several pollutants is necessary to accommodate important economic or social development, will not unreasonably affect beneficial uses, will not cause further exceedances of applicable water quality objectives, and is consistent with the maximum benefit to the people of the State.
- Based on the above, the requested increase in permitted capacity is consistent with the Porter-Cologne Act in that the resulting water quality will constitute the highest water quality that is reasonable, considering all demands placed on the waters, economic and social considerations, and other public interest factors.

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Appendix A: Diffuser Temperature Increment Analysis

Using the mass (energy) balance equation, the difference between discharge and ambient river temperatures can be calculated to achieve desired temperature differences between plume and ambient river.

$$T_{plume} = T_{up} + \frac{1}{S} \cdot \left(T_{effluent} - T_{up}\right) = T_{up} + \frac{T_{effluent}}{S} - \frac{T_{up}}{S}$$

Where T_{plume}, T_{up}, $T_{effluent}$, and S are the in-plume, ambient river, and effluent temperatures; and in-plume dilution, respectively.

$$T_{effluent} - T_{up} = S \cdot \left(T_{plume} - T_{up}\right)$$

Where $T_{plume} - T_{up}$ is the desired difference between in-plume and ambient river.

For a temperature differential between the plume and ambient river to be less than 1.0 °F the differential between the effluent and ambient river temperatures in degrees Fahrenheit should be less than the calculated minimum dilution of the fully developed plume (RMA, 2006). For example, if the minimum in-plume dilution is calculated to be 5, the effluent temperature would have to be within 5.0 °F of the ambient river temperature for the in-plume temperature to be within 1.0 °F of the ambient river temperature. Likewise, a similar calculation can be made to determine the increment between the discharge and ambient river temperatures to obtain a 4 °F temperature differential in the fully developed plume. If the difference between the discharge and ambient river temperatures in degrees Fahrenheit is within four times the in-plume dilution, the temperatures within the plume will be within 4 °F of the the ambient river temperature. By knowing where objectives should be met and the available dilution at that point, the allowable temperature differential between the effluent and the ambient river may be calculated. Using the relation that the dilution, S, equals the dilution ratio, D, plus one, the relationships are presented as the following:

$T_{eff} - T_{upstream} = S = D + 1$ is the location of the 1 °F temperature differential

$T_{eff} - T_{upstream} = 4 \cdot S = 4\ (D+1)$ is the location of the 4 °F temperature differential

The minimum dilution from the diffuser occurs a short distance downstream of the outfall due to the tidal effects and timed discharge of effluent. If the allowable effluent temperature is limited so that the differential between the effluent and ambient temperatures in degrees Fahrenheit is less than the minimum dilution, then there will be less than a 1 °F temperature differential between the centerline of the plume and the ambient river for the river transect where the dilution is at the minimum. .

The results for the diffuser scenario are for the fully developed plume and the analysis assumes complete mixing through the water column at the point of discharge. As the effluent leaves the individual ports of the diffuser and the initial momentum driven mixing occurs, the temperatures will be higher than the analysis would indicate, but the area is much smaller because the plume has not yet fully formed. The plume area starts at the diffuser as the area of the ports and increases to the area of the fully formed plume, typically over a distance equal to five river depths.

Appendix B: Streeter-Phelps Dissolved Oxygen Analysis

Using the Streeter-Phelps model, the float time downstream to where the minimum DO will occur can the calculated using the equation as follows (Tchobanoglous and Schroeder, 1985):

$$\Theta_H^* = \begin{cases} \dfrac{1}{k_2 - k} ln\left[\dfrac{k_2}{k}\left(1 - \dfrac{D_i(k_2 - k)}{kL_i}\right)\right] & \text{if } \dfrac{k_2}{k}\left(1 - \dfrac{D_i(k_2 - k)}{kL_i}\right) > 1 \\ 0 & \text{if } \dfrac{k_2}{k}\left(1 - \dfrac{D_i(k_2 - k)}{kL_i}\right) \le 1 \end{cases}$$

Where Θ_H^* is the float time in days to the location of minimum DO concentration. The variables D_i and L_i are the combined river and discharge initial DO deficit and ultimate oxygen demand, respectively. The deficit is the difference between the oxygen saturation concentration for the river temperature and the estimated DO concentration of the mixed river and effluent. Values for oxygen saturation are a function of temperature and are from Tchobanoglous and Schroeder (1985). The variables k and k_2 represent the decay rate of BOD constituents and the reaeration rate, respectively.

The BOD decay rate at 20 ºC of 0.10 1/d is the value determined for the San Joaquin River in Chen and Tsai (2002). The temperature dependence of the decay rate is represented as an Arrhenius relationship using the theta value of Chen and Tsai (2002) as follows:

$$k_T = k_{20} \cdot 1.04^{(T-20)}$$

Where k_T is the decay rate at a desired temperature, T (in ºC), given the decay rate at 20 ºC, k_{20}.

The reaeration rate for the San Joaquin River is determined using the empirical formula from Tchobanoglous and Schroeder (1985) as follows:

$$k_2 = \frac{294(D_{L_T} u)^{1/2}}{\overline{H}^{3/2}}$$

Where the average depth and cross sectional velocity are represented as $\overline{H}$ and u, respectively. The molecular diffusivity of oxygen at a given temperature, D_{L_T}, is calculated as follows:

$$D_{L_T} = D_{L_{20}} \cdot 1.037^{(T-20)}$$

Where $D_{L_{20}}$ = $1.760 \cdot 10^{-4}$ m^2/d (Tchobanoglous and Schroeder, 1985).

The bathymetric and flowrate transect data collected for the Thermal Plan Exception analysis (LWA, 2006a) is used to determine relationships between San Joaquin River flowrate and the average depth and cross sectional velocity. The river depth is estimated using a Manning's equation developed using the data collected for the Thermal Plan Exception analysis (LWA, 2006a), and is as follows:

$$\overline{H} = 2.0 \cdot \left(\frac{Q}{1{,}412}\right)^{3/8}$$

Where $\overline{H}$ is calculated in meters for the desired flowrate, Q expressed in cfs. The average cross sectional velocity is calculated using a nominal channel width of 100 meters as follows:

$$u = \frac{Q \cdot (0.02832\, m^3/ft^3)}{100 \cdot \overline{H}}$$

Performing the above calculations allows the calculation of the critical deficit, D_c, as follows:

$$D_c = \begin{cases} D_i & \text{if } \Theta_H^* = 0 \\ \dfrac{k}{k_2} L_i e^{-k\Theta_H^*} & \text{else} \end{cases}$$

The minimum DO is then calculated as follows:

$$DO_{min} = DO_{sat} - D_c$$

APPENDIX D

Summary Statistics for Existing Water Quality

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

ELECTRICAL CONDUCTIVITY (µmhos/cm) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	60	60	100%	192	1550	**896.8**	582.6	700.0	**858.1**	1051.9	1263.7
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485 DWR-MWQI	San Joaquin R. @ Mossdale	10/4/1989	9/23/1994	90	90	100%	238	1470	**882.5**	609.3	715.2	**854.5**	1020.8	1198.4
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/2/1990	9/20/1994	30	30	100%	362	988	**630.6**	382.6	473.2	**599.1**	758.5	938.1
DWR-MWQI	Old River near Byron*	1/24/1990	7/20/1994	60	60	100%	311	947	**604.9**	383.8	466.1	**578.2**	717.2	870.8
DWR-MWQI	Delta Pumping Plant Headworks	10/2/1989	9/22/1994	88	88	100%	325	877	**564.4**	389.9	457.7	**546.7**	653.1	766.6
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/2/1989	9/22/1994	87	87	100%	246	1150	**624.8**	384.0	471.9	**593.3**	746.0	916.9

* Reported as Specific Conductance

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

ELECTRICAL CONDUCTIVITY (µmhos/cm) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-Stockton	San Joaquin R. nr. Vernalis	10/3/2000	9/30/2004	419	419	100%	108.1	1200	**717.8**	443.1	543.2	**680.9**	853.5	1046.3
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	16	16	100%	370	1100	**702.8**	427.0	529.5	**672.1**	853.3	1058.0
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	4	4	100%	363	737	**555.0**	295.1	390.1	**531.6**	724.4	957.5
DO-Stockton	San Joaquin R. @ Mossdale	10/3/2000	9/25/2001	18	18	100%	357	812	**680.2**	510.3	579.2	**666.6**	767.1	870.6
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES DO-Stockton Stktn-13267	San Joaquin R. @ RWCF-R1	10/3/2000	9/28/2004	56	56	100%	329	1100	**730.8**	519.6	602.9	**711.0**	838.5	972.9
DO-Stockton DO-UOP	San Joaquin R. @ Turning Basin*	10/3/2000	9/26/2000	21	21	100%	351	895	**669.0**	485.3	558.9	**653.7**	764.6	880.5
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	10/3/2000	9/28/2004	44	44	100%	344	941	**667.8**	498.8	567.1	**654.0**	754.2	857.5
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	10/3/2000	9/28/2004	44	44	100%	348	827	**644.6**	479.3	546.1	**631.1**	729.4	831.0
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	10/3/2000	9/28/2004	44	44	100%	179	599	**354.4**	216.3	266.7	**336.6**	424.8	523.9
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	9/8/2004	39	39	100%	233	1120	**582.6**	277.7	375.4	**524.7**	733.2	991.4
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	22	100%	265	685	**448.9**	276.7	340.5	**428.5**	539.2	663.4
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

* Reported as Specific Conductance

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

ELECTRICAL CONDUCTIVITY (µmhos/cm) - Wet/Above Normal Water Year Type

Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	percentile statistics 10th	25th	median (50th)	75th	90th
SWAMP DWR-MWQI DO-Stockton	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	492	492	100%	4.08	1450	**495.2**	220.0	304.2	**435.8**	624.4	863.4
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	53	53	100%	113	911	**442.9**	162.2	240.5	**372.3**	576.3	854.3
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	6/21/2006	44	44	100%	113	910	**456.3**	165.0	246.2	**383.7**	598.2	892.6
DWR-MWQI DWR-D-1485 DO-Stockton	San Joaquin R. @ Mossdale	10/7/1992	9/26/2000	79	79	100%	134	1310	**528.1**	236.2	326.6	**467.9**	670.5	927.1
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	5/9/2006	5	5	100%	122	824	**371.6**	98.6	168.9	**307.1**	558.3	956.7
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R1	6/20/2000	10/18/2005	56	56	100%	130	930	**503.0**	248.9	332.3	**458.0**	631.2	842.8
DO-Stockton	San Joaquin R. @ Turning Basin*	6/20/2000	9/26/2000	13	13	100%	438	732	**564.9**	446.0	496.3	**558.8**	629.2	700.2
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	6/20/2000	10/18/2005	51	51	100%	127	940	**509.2**	257.6	341.3	**466.3**	637.0	843.9
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	6/20/2000	10/18/2005	51	51	100%	139	789	**506.3**	269.3	349.9	**468.0**	625.9	813.3
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	6/20/2000	10/18/2005	51	51	100%	130	748	**339.5**	190.0	242.2	**317.1**	415.1	529.1
DWR-MWQI	Contra Costa Pumping Plant #1	10/7/1992	6/5/2006	99	99	100%	146	1390	**470.1**	179.7	260.3	**392.8**	592.8	858.9
DWR-MWQI	Old River near Byron*	10/7/1992	9/6/2000	73	73	100%	133	908	**334.8**	174.8	227.6	**305.1**	409.0	532.7
DWR-MWQI	Delta Pumping Plant Headworks	10/7/1992	5/17/2006	106	106	100%	139	767	**364.1**	197.2	253.8	**336.0**	444.7	572.4
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	63	63	100%	152	1070	**416.4**	212.6	279.8	**379.6**	515.0	677.9

* Reported as Specific Conductance

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL DISSOLVED SOLIDS (mg/L) - Critical Water Year Type

Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	percentile statistics 10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	52	52	100%	117	803	**521.8**	342.0	409.5	**500.2**	610.9	731.6
Mntca-NPDES	San Joaquin R. @ WQCF-R1	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-D-1485 DWR-MWQI	San Joaquin R. @ Mossdale	10/4/1989	9/9/1994	67	67	100%	144	809	**533.1**	365.2	430.1	**515.7**	618.2	728.0
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	5/21/1991	9/20/1994	29	29	100%	202	529	**338.8**	210.0	257.6	**323.0**	405.1	496.8
DWR-MWQI	Old River near Byron	1/24/1990	7/20/1994	19	19	100%	207	425	**310.3**	209.7	248.8	**300.7**	363.4	431.1
DWR-MWQI	Delta Pumping Plant Headworks	1/24/1990	9/22/1994	49	49	100%	183	475	**305.2**	215.6	251.0	**297.0**	351.6	409.3
DWR-MWQI	DMC Intake @ Lindemann Rd.	1/24/1990	9/22/1994	48	48	100%	147	548	**327.3**	199.7	246.2	**310.6**	391.9	483.3

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL DISSOLVED SOLIDS (mg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-USGS	San Joaquin R. nr. Vernalis	10/4/2000	9/9/2004	123	123	100%	160	654	**408.6**	261.8	316.5	**390.7**	482.2	582.9
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	12/11/2002	12	12	100%	210	1300	**497.5**	249.0	330.3	**451.8**	618.2	819.9
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI	San Joaquin R. @ Mossdale	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	9/28/2004	38	38	100%	212	650	**429.8**	299.0	350.3	**417.5**	497.7	583.0
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	1/6/2004	9/28/2004	26	26	100%	228	489	**375.6**	288.7	324.6	**369.7**	421.1	473.6
Stktn-NPDES	San Joaquin R. @ RWCF-R6	1/6/2004	9/28/2004	26	26	100%	232	452	**367.0**	278.3	314.7	**360.8**	413.6	467.7
Stktn-NPDES	San Joaquin R. @ RWCF-R8	1/6/2004	9/28/2004	26	26	100%	94	308	**185.7**	111.7	138.7	**176.4**	224.4	278.6
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	9/8/2004	39	39	100%	131	676	**333.9**	156.8	213.1	**299.5**	421.0	572.0
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	21	21	100%	155	409	**253.0**	155.6	191.6	**241.4**	304.2	374.7
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL DISSOLVED SOLIDS (mg/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-USGS	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	214	214	100%	75	726	**282.3**	135.0	181.8	**252.8**	351.6	473.3
Mntca-NPDES	San Joaquin R. @ WQCF-R1	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI DWR-D-1485	San Joaquin R. @ Mossdale	10/1/1992	9/2/1997	66	66	100%	90	832	**315.0**	136.7	190.7	**276.0**	399.4	557.2
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	10/5/2004	10/11/2005	37	37	100%	96	547	**274.5**	140.5	185.4	**252.2**	343.2	452.9
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	10/5/2004	10/11/2005	37	37	100%	77	503	**267.4**	127.5	172.9	**242.3**	339.6	460.3
Stktn-NPDES	San Joaquin R. @ RWCF-R6	10/5/2004	10/11/2005	37	37	100%	88	430	**258.2**	123.9	167.3	**233.5**	325.9	440.1
Stktn-NPDES	San Joaquin R. @ RWCF-R8	10/5/2004	10/11/2005	37	37	100%	86	350	**187.9**	109.3	137.5	**177.2**	228.4	287.1
DWR-MWQI	Contra Costa Pumping Plant #1	10/7/1992	6/5/2006	100	100	100%	86	797	**271.5**	104.3	150.8	**227.1**	342.0	494.6
DWR-MWQI	Old River near Byron	10/7/1992	9/6/2000	68	68	100%	92	450	**189.3**	106.3	134.8	**175.5**	228.4	289.7
DWR-MWQI	Delta Pumping Plant Headworks	10/7/1992	5/17/2006	101	101	100%	85	413	**202.7**	113.8	144.6	**188.5**	245.8	312.2
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	59	59	100%	97	613	**230.5**	121.4	157.9	**211.3**	282.8	367.7

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

pH (standard units) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	54	54	100%	6.20	9.50	**7.79**	7.15	7.44	**7.78**	8.13	8.46
Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/2/1990	8/16/1994	54	54	100%	6.90	8.90	**7.86**	7.43	7.63	**7.86**	8.09	8.31
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-D-1485 DWR-MWQI	San Joaquin R. @ Mossdale	10/4/1989	9/23/1994	84	84	100%	7.00	10.10	**8.14**	7.30	7.68	**8.11**	8.57	9.00
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	1/2/1991	10/20/1993	24	24	100%	7.20	8.50	**7.60**	7.24	7.41	**7.59**	7.78	7.96
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/2/1989	9/22/1994	79	79	100%	6.10	8.80	**7.65**	7.13	7.37	**7.64**	7.93	8.19

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

pH (standard units) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-Stockton	San Joaquin R. nr. Vernalis	10/4/2002	9/30/2004	415	415	100%	6.10	9.10	**7.90**	7.31	7.57	**7.88**	8.20	8.50
Mntca-NPDES Mntca-13267	San Joaquin R. @ WQCF-R1	10/3/2000	9/22/2004	69	69	100%	6.04	9.20	**7.57**	6.67	7.07	**7.53**	8.03	8.51
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/3/2000	9/22/2004	64	64	100%	6.49	9.82	**7.62**	6.80	7.16	**7.60**	8.05	8.49
DO-Stockton	San Joaquin R. @ Mossdale	6/12/2001	10/2/2001	15	15	100%	7.63	8.93	**8.39**	7.81	8.07	**8.38**	8.69	8.99
Mntca-NPDES	San Joaquin R. @ WQCF-R3	4/27/2004	9/22/2004	4	4	100%	7.25	8.38	**7.82**	6.90	7.32	**7.80**	8.33	8.83
Mntca-NPDES	San Joaquin R. @ WQCF-R4	4/27/2004	9/22/2004	4	4	100%	7.27	8.36	**7.84**	6.93	7.34	**7.82**	8.33	8.82
Stktn-NPDES DO-Stockton Stktn-13267	San Joaquin R. @ RWCF-R1	6/12/2001	9/28/2004	66	66	100%	7.25	9.10	**8.06**	7.54	7.78	**8.05**	8.33	8.59
DO-Stockton	San Joaquin R. @ Turning Basin	6/12/2001	10/2/2001	15	15	100%	7.37	8.09	**7.65**	7.38	7.50	**7.64**	7.79	7.92
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	6/12/2001	9/28/2004	54	54	100%	7.19	7.86	**7.46**	7.24	7.34	**7.46**	7.58	7.68
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	6/12/2001	9/28/2004	41	41	100%	7.25	7.67	**7.41**	7.26	7.33	**7.41**	7.48	7.56
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	6/12/2001	9/28/2004	41	41	100%	7.28	7.87	**7.53**	7.37	7.44	**7.53**	7.61	7.69
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	9/8/2004	39	39	100%	5.50	8.80	**7.16**	6.25	6.65	**7.13**	7.64	8.13
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	22	100%	5.90	8.00	**7.03**	6.27	6.61	**7.01**	7.43	7.83
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

pH (standard units) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP DWR-MWQI	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	477	477	100%	5.40	8.50	**7.45**	6.80	7.09	**7.44**	7.80	8.13
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/18/1992	3/29/2006	209	209	100%	5.30	8.85	**7.18**	6.57	6.85	**7.17**	7.50	7.81
Mntca-NPDES	San Joaquin R. @ WQCF-R2	1/5/1999	6/21/2006	86	86	100%	6.00	8.85	**7.20**	6.50	6.81	**7.18**	7.57	7.94
DWR-MWQI DWR-D-1485	San Joaquin R. @ Mossdale	10/1/1992	9/2/1997	66	66	100%	6.70	8.80	**7.45**	6.92	7.16	**7.44**	7.73	7.99
Mntca-NPDES	San Joaquin R. @ WQCF-R3	10/6/2004	3/29/2006	52	52	100%	6.18	8.00	**7.14**	6.54	6.81	**7.13**	7.45	7.76
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/6/2004	6/21/2006	44	44	100%	5.79	8.00	**7.15**	6.46	6.77	**7.13**	7.52	7.88
Stktn-NPDES	San Joaquin R. @ RWCF-R1	10/5/2004	10/18/2005	55	55	100%	6.82	8.01	**7.51**	7.20	7.34	**7.50**	7.67	7.82
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	10/5/2004	10/18/2005	55	55	100%	6.99	7.80	**7.41**	7.19	7.29	**7.41**	7.53	7.64
Stktn-NPDES	San Joaquin R. @ RWCF-R6	10/5/2004	10/18/2005	39	39	100%	7.00	7.61	**7.35**	7.15	7.24	**7.34**	7.45	7.54
Stktn-NPDES	San Joaquin R. @ RWCF-R8	10/5/2004	10/18/2005	38	38	100%	6.92	7.62	**7.33**	7.12	7.22	**7.33**	7.44	7.55
DWR-MWQI	Contra Costa Pumping Plant #1	12/10/1997	6/5/2006	49	49	100%	6.50	8.60	**7.44**	6.74	7.06	**7.42**	7.81	8.18
DWR-MWQI	Old River near Byron	10/7/1992	9/6/2000	63	63	100%	6.80	8.34	**7.77**	7.20	7.46	**7.76**	8.07	8.36
DWR-MWQI	Delta Pumping Plant Headworks	12/17/1997	5/17/2006	54	54	100%	6.30	8.20	**7.22**	6.60	6.88	**7.21**	7.54	0.79
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	65	65	100%	6.31	8.10	**7.45**	6.95	7.18	**7.44**	7.71	7.96

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TEMPERATURE (°Celcius) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	55	55	100%	7.8	26.4	**17.1**	10.6	13.0	**16.3**	20.4	25.1
Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/2/1990	8/16/1994	54	54	100%	7.3	23.4	**13.8**	8.1	10.1	**13.0**	16.6	20.8
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-D-1485 DWR-MWQI	San Joaquin R. @ Mossdale	10/4/1989	9/23/1994	89	89	100%	6.5	28.0	**19.0**	11.5	14.2	**18.0**	22.8	28.1
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	1/2/1991	10/20/1993	26	26	100%	5.3	25.9	**19.3**	10.7	13.7	**17.9**	23.5	30.0
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/2/1989	9/22/1994	82	82	100%	7.0	26.2	**18.3**	11.0	13.6	**17.3**	22.0	27.2

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TEMPERATURE (°Celcius) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-Stockton	San Joaquin R. nr. Vernalis	10/3/2000	9/30/2004	421	421	100%	1.6	29.0	**18.2**	11.3	13.9	**17.3**	21.6	26.3
Mntca-NPDES Mntca-13267	San Joaquin R. @ WQCF-R1	10/3/2000	9/22/2004	70	70	100%	6.4	27.3	**17.3**	10.0	12.6	**16.2**	21.0	26.4
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/3/2000	9/22/2004	63	63	100%	7.8	27.3	**16.8**	9.7	12.2	**15.8**	20.3	25.6
DO-Stockton	San Joaquin R. @ Mossdale	10/3/2000	10/2/2001	19	19	100%	14.3	26.4	**22.5**	17.8	19.8	**22.2**	25.0	27.8
Mntca-NPDES	San Joaquin R. @ WQCF-R3	4/27/2004	9/22/2004	4	4	100%	20.1	21.6	**20.7**	19.5	20.1	**20.7**	21.3	21.9
Mntca-NPDES	San Joaquin R. @ WQCF-R4	4/27/2004	9/22/2004	4	4	100%	2.1	21.6	**16.2**	2.3	4.9	**11.7**	27.9	61.1
Stktn-NPDES DO-Stockton Stktn-13267	San Joaquin R. @ RWCF-R1	10/3/2000	9/28/2004	70	70	100%	7.9	26.7	**19.7**	12.8	15.4	**18.9**	23.1	27.8
DO-Stockton DO-UOP DO-DWR	San Joaquin R. @ Turning Basin	10/3/2000	10/25/2001	31	31	100%	14.5	26.5	**21.8**	16.7	18.8	**21.5**	24.5	27.6
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	10/3/2000	9/28/2004	58	58	100%	8.4	26.8	**20.7**	13.4	16.1	**19.8**	24.3	29.2
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	10/3/2000	9/28/2004	45	45	100%	8.7	26.4	**22.5**	16.7	19.0	**21.9**	25.3	28.8
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	10/3/2000	9/28/2004	45	45	100%	8.3	34.3	**22.1**	16.4	18.6	**21.5**	24.9	28.4
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TEMPERATURE (°Celcius) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP DWR-MWQI DO-Stockton DO-USGS	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	489	489	100%	6.2	29.1	**17.0**	10.8	13.1	**16.2**	20.1	24.3
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/18/1992	3/29/2006	207	207	100%	6.8	28.4	**15.7**	10.1	12.1	**15.0**	18.4	22.3
Mntca-NPDES	San Joaquin R. @ WQCF-R2	1/5/1999	6/21/2006	84	84	100%	7.5	26.8	**16.2**	10.3	12.5	**15.4**	19.1	23.2
DWR-MWQI DWR-D-1485 DO-Stockton	San Joaquin R. @ Mossdale	10/1/1992	9/26/2000	80	80	100%	9.0	27.0	**18.3**	12.0	14.4	**17.6**	21.5	25.8
Mntca-NPDES	San Joaquin R. @ WQCF-R3	10/6/2004	3/29/2006	52	52	100%	8.7	25.8	**15.3**	9.9	11.9	**14.7**	18.0	21.7
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/6/2004	6/21/2006	44	44	100%	8.6	24.8	**15.9**	10.2	12.3	**15.2**	18.8	22.7
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R1	6/20/2000	10/18/2005	68	68	100%	8.4	27.0	**17.7**	11.2	13.6	**16.9**	21.1	25.7
DO-Stockton DO-DWR	San Joaquin R. @ Turning Basin	6/20/2000	9/28/2000	17	17	100%	20.8	26.6	**24.0**	21.6	22.7	**23.9**	25.3	26.5
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	6/20/2000	10/18/2005	68	68	100%	8.5	26.9	**18.4**	11.5	14.0	**17.6**	22.0	26.9
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	6/20/2000	10/18/2005	52	52	100%	9.5	27.0	**20.6**	14.1	16.6	**19.9**	23.9	28.2
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	6/20/2000	10/18/2005	51	51	100%	9.3	26.2	**20.6**	14.6	16.9	**20.0**	23.6	27.5
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	10/7/1992	9/1/1993	8	8	100%	10.6	24.1	**18.0**	10.9	13.6	**17.3**	22.1	27.5
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	66	66	100%	7.7	26.3	**17.6**	11.3	13.6	**16.8**	20.8	25.1

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED OXYGEN (mg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	54	54	100%	5.6	14.7	**9.1**	7.1	7.9	**9.0**	10.2	11.4
Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/2/1990	8/16/1994	53	53	100%	5.0	13.0	**9.5**	7.3	8.2	**9.3**	10.6	11.8
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-D-1485 DWR-MWQI	San Joaquin R. @ Mossdale	10/4/1989	9/23/1994	89	89	100%	4.6	17.1	**10.4**	7.3	8.5	**10.0**	11.9	13.8
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	1/2/1991	10/20/1993	24	24	100%	6.5	12.0	**8.2**	6.4	7.2	**8.1**	9.1	10.1
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/2/1989	9/22/1994	77	77	100%	5.3	12.4	**8.5**	6.5	7.3	**8.3**	9.5	10.7

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED OXYGEN (mg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-Stockton DO-USGS	San Joaquin R. nr. Vernalis	10/3/2000	9/27/2004	372	372	100%	1.3	16.6	**9.7**	7.6	8.5	**9.6**	10.8	12.1
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/3/2000	9/22/2004	64	64	100%	6.1	11.3	**8.5**	6.9	7.6	**8.4**	9.4	10.3
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/3/2000	9/22/2004	64	64	100%	6.0	11.8	**8.6**	6.9	7.6	**8.5**	9.4	10.3
DO-Stockton	San Joaquin R. @ Mossdale	10/3/2000	10/2/2001	19	19	100%	7.6	12.2	**9.3**	7.5	8.2	**9.2**	10.3	11.4
Mntca-NPDES	San Joaquin R. @ WQCF-R3	10/3/2000	9/22/2004	64	64	100%	5.7	12.8	**8.6**	6.8	7.6	**8.5**	9.5	10.5
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/3/2000	9/22/2004	64	64	100%	5.8	13.0	**8.7**	6.7	7.6	**8.6**	9.7	10.9
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R1	10/3/2000	9/28/2004	44	44	100%	4.2	13.2	**7.9**	5.5	6.4	**7.6**	9.1	10.7
DO-Stockton DO-UOP	San Joaquin R. @ Turning Basin	10/3/2000	10/25/2001	26	26	100%	3.9	8.7	**5.8**	3.9	4.6	**5.6**	8.7	8.2
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	10/3/2000	9/28/2004	44	44	100%	2.0	10.0	**4.9**	2.6	3.4	**4.6**	6.1	7.9
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	10/3/2000	9/28/2004	44	44	100%	2.8	9.6	**4.9**	3.0	3.7	**4.6**	5.9	7.3
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	10/3/2000	9/28/2004	44	44	100%	5.3	11.6	**7.0**	5.7	6.2	**6.9**	7.6	8.3
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED OXYGEN (mg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-Stockton DO-USGS	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	259	259	100%	4.0	13.0	**9.3**	7.6	8.3	**9.2**	10.1	11.1
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/18/1992	3/29/2006	206	206	100%	4.4	12.1	**8.5**	6.9	7.6	**8.4**	9.3	10.2
Mntca-NPDES	San Joaquin R. @ WQCF-R2	1/5/1999	6/21/2006	87	87	100%	4.6	13.3	**8.1**	6.4	7.2	**8.0**	9.0	10.0
DWR-MWQI DWR-D-1485 DO-Stockton	San Joaquin R. @ Mossdale	10/1/1992	9/26/2000	80	80	100%	6.3	12.4	**9.0**	7.4	8.1	**8.9**	9.8	10.7
Mntca-NPDES	San Joaquin R. @ WQCF-R3	1/5/1999	3/29/2006	64	64	100%	5.7	12.8	**8.6**	6.8	7.6	**8.5**	9.5	10.5
Mntca-NPDES	San Joaquin R. @ WQCF-R4	1/5/1999	6/21/2006	85	85	100%	4.5	12.2	**8.1**	6.4	7.1	**8.0**	9.0	10.0
Stktn-NPDES	San Joaquin R. @ RWCF-R1	6/20/2000	10/18/2005	58	58	100%	7.2	11.2	**8.6**	7.5	8.0	**8.6**	9.2	9.9
DO-Stockton	San Joaquin R. @ Turning Basin	6/20/2000	9/26/2000	13	13	100%	4.0	7.9	**5.9**	4.3	5.0	**5.8**	6.7	7.7
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	6/20/2000	10/18/2005	53	53	100%	4.8	9.4	**6.9**	5.3	6.0	6.8	7.7	8.7
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	6/20/2000	10/18/2005	53	53	100%	3.9	9.3	**6.3**	4.4	5.1	**6.1**	7.3	8.5
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	6/20/2000	10/18/2005	51	51	100%	4.3	10.0	**7.0**	5.6	6.2	**6.9**	7.7	8.6
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	10/7/1992	9/1/1993	7	7	100%	7.2	9.3	**8.3**	7.2	7.7	**8.2**	8.9	9.5
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	64	64	100%	4.6	12.9	**8.4**	6.4	7.2	**8.2**	9.4	10.6

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ORGANIC CARBON (mg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R1	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI	San Joaquin R. @ Mossdale	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ORGANIC CARBON (mg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-Stockton DO-DWR	San Joaquin R. nr. Vernalis	10/3/2000	9/27/2004	291	289	99%	1.5	18.0	**4.2**	2.5	3.1	**3.9**	4.9	6.1
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DO-Stockton DO-DWR	San Joaquin R. @ Mossdale	10/3/2000	10/3/2001	26	26	100%	2.8	7.0	**4.4**	3.1	3.6	**4.3**	5.1	5.9
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
DO-Stockton	San Joaquin R. @ RWCF-R1	10/3/2000	8/28/2001	15	15	100%	3.0	6.8	**4.5**	2.9	3.5	**4.3**	5.3	6.3
DO-Stockton DO-DWR	San Joaquin R. @ Turning Basin	10/3/2000	10/3/2001	28	28	100%	2.7	9.3	**4.6**	2.9	3.5	**4.4**	5.4	6.5
DO-Stockton	San Joaquin R. @ RWCF-R4	10/3/2000	8/28/2001	15	15	100%	2.6	7.6	**4.8**	2.8	3.5	**4.5**	5.8	7.3
DO-Stockton	San Joaquin R. @ RWCF-R6	10/3/2000	8/28/2001	15	15	100%	2.7	7.4	**4.8**	2.8	3.5	**4.5**	5.8	7.2
DO-Stockton	San Joaquin R. @ RWCF-R8	10/3/2000	8/28/2001	15	15	100%	2.2	6.5	**3.9**	2.2	2.8	**3.7**	4.8	6.1
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ORGANIC CARBON (mg/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-Stockton	San Joaquin R. nr. Vernalis	9/2/1998	9/7/2005	180	180	100%	2.0	10.5	**3.6**	2.3	2.8	**3.4**	4.2	5.1
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/22/2005	4/26/2006	9	9	100%	3.3	11.0	**6.0**	2.9	4.0	**5.6**	7.8	10.6
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DO-Stockton DO-DWR	San Joaquin R. @ Mossdale	6/20/2000	9/28/2000	17	17	100%	2.4	7.0	**3.3**	2.4	2.8	**3.2**	3.8	4.4
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	4/26/2006	9	9	100%	3.0	8.4	**5.7**	3.0	3.9	**5.3**	7.2	9.5
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
DO-Stockton	San Joaquin R. @ RWCF-R1	6/20/2000	9/26/2000	13	13	100%	3.0	7.0	**3.9**	2.6	3.1	**3.7**	4.5	5.3
DO-Stockton DO-DWR	San Joaquin R. @ Turning Basin	6/20/2000	9/28/2000	20	20	100%	2.7	6.0	**3.5**	2.7	3.0	**3.4**	3.9	4.4
DO-Stockton	San Joaquin R. @ RWCF-R4	6/20/2000	9/26/2000	13	13	100%	3.0	6.0	**3.6**	2.7	3.0	**3.5**	4.0	4.5
DO-Stockton	San Joaquin R. @ RWCF-R6	6/20/2000	9/26/2000	13	13	100%	3.0	7.0	**3.7**	2.6	3.0	**3.6**	4.3	5.0
DO-Stockton	San Joaquin R. @ RWCF-R8	6/20/2000	9/26/2000	13	13	100%	2.0	5.0	**3.1**	2.2	2.5	**3.0**	3.6	4.2
DWR-MWQI	Contra Costa Pumping Plant #1	9/2/1998	8/2/2000	22	22	100%	1.7	5.2	**3.4**	2.2	2.7	**3.3**	4.0	4.8
DWR-MWQI	Old River near Byron	1/5/1998	9/6/2000	33	33	100%	2.2	9.8	**3.8**	2.3	2.8	**3.6**	4.5	5.5
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ORGANIC CARBON (mg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	51	51	100%	2.2	7.9	**3.7**	2.6	3.0	**3.6**	4.2	4.9
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	1/24/1990	7/20/1994	17	17	100%	2.1	4.6	**3.3**	2.3	2.7	**3.2**	3.8	4.4
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/2/1990	9/20/1994	30	30	100%	2.3	6.7	**3.6**	2.4	2.9	**3.5**	4.2	5.0
DWR-MWQI	Old River near Byron	1/24/1990	7/20/1994	58	58	100%	2.4	7.1	**3.7**	2.5	2.9	**3.5**	4.3	5.1
DWR-MWQI	Delta Pumping Plant Headworks	10/2/1989	9/22/1994	84	84	100%	2.4	8.4	**4.0**	2.7	3.2	**3.9**	4.7	5.6
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/2/1989	9/22/1994	83	83	100%	2.5	9.4	**4.0**	2.8	3.2	**3.9**	4.7	5.5

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ORGANIC CARBON (mg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI DO-USGS DO-Stockton DO-DWR	San Joaquin R. nr. Vernalis	10/3/2000	9/27/2004	223	223	100%	1.8	8.1	**3.2**	2.2	2.6	**3.1**	3.7	4.4
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DO-DWR DO-Stockton	San Joaquin R. @ Mossdale	10/3/2000	10/3/2001	15	15	100%	2.9	4.5	**3.3**	2.8	3.0	**3.3**	3.6	3.9
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
DO-Stockton	San Joaquin R. @ RWCF-R1	10/3/2000	10/31/2000	4	4	100%	2.8	3.4	**3.2**	2.7	2.9	**3.1**	3.4	3.7
DO-DWR DO-Stockton	San Joaquin R. @ Turning Basin	10/3/2000	10/3/2001	18	18	100%	2.7	4.4	**3.5**	2.9	3.1	**3.4**	3.8	4.2
DO-Stockton	San Joaquin R. @ RWCF-R4	10/3/2000	10/31/2001	4	4	100%	2.6	3.5	**3.2**	2.6	2.8	**3.2**	3.6	3.9
DO-Stockton	San Joaquin R. @ RWCF-R6	10/3/2000	10/31/2001	4	4	100%	2.5	2.9	**2.7**	2.4	2.6	**2.7**	2.9	3.0
DO-Stockton	San Joaquin R. @ RWCF-R8	10/3/2000	10/31/2001	4	4	100%	2.4	2.9	**2.7**	2.3	2.4	**2.7**	2.9	3.1
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	9/8/2004	39	39	100%	2.2	5.4	**3.2**	2.1	2.6	**3.1**	3.8	4.5
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/30/2004	41	41	100%	1.9	5.1	**3.0**	2.2	2.5	**2.9**	3.4	3.9
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ORGANIC CARBON (mg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI DO-Stockton DO-USGS	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	231	231	100%	1.9	11.4	**3.3**	2.2	2.6	**3.1**	3.8	4.5
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/22/2005	4/26/2006	9	9	100%	3.6	7.8	**5.4**	3.2	4.0	**5.2**	6.7	8.4
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no available data												
DWR-MWQI DO-Stockton DO-DWR	San Joaquin R. @ Mossdale	10/7/1992	9/28/2000	55	55	100%	2.4	10.6	**3.6**	2.3	2.8	**3.4**	4.1	4.9
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	4/26/2006	9	9	100%	3.3	8.3	**5.4**	3.0	3.9	**5.1**	6.8	8.7
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no available data												
DO-Stockton	San Joaquin R. @ RWCF-R1	6/20/2000	9/26/2000	13	13	100%	3.0	7.0	**3.7**	2.5	3.0	**3.5**	4.2	4.9
DO-Stockton DO-DWR	San Joaquin R. @ Turning Basin	6/20/2000	9/28/2000	20	20	100%	2.9	6.0	**3.4**	2.7	3.0	**3.3**	3.7	4.0
DO-Stockton	San Joaquin R. @ RWCF-R4	6/20/2000	9/26/2000	13	13	100%	3.0	6.0	**3.3**	2.7	2.9	**3.2**	3.6	3.9
DO-Stockton	San Joaquin R. @ RWCF-R6	6/20/2000	9/26/2000	13	13	100%	3.0	6.0	**3.6**	2.7	3.0	**3.5**	4.0	4.6
DO-Stockton	San Joaquin R. @ RWCF-R8	6/20/2000	9/26/2000	13	13	100%	2.0	5.0	**3.2**	2.3	2.7	**3.1**	3.7	4.2
DWR-MWQI	Contra Costa Pumping Plant #1	10/7/1992	6/5/2006	99	99	100%	1.5	9.1	**3.7**	2.2	2.7	**3.4**	4.4	5.5
DWR-MWQI	Old River near Byron	10/7/1992	9/6/2000	79	79	100%	2.2	11.0	**3.8**	2.3	2.8	**3.5**	4.5	5.5
DWR-MWQI	Delta Pumping Plant Headworks	10/7/1992	5/17/2006	90	90	100%	2.2	10.5	**3.9**	2.3	2.9	**3.6**	4.6	5.7
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	62	62	100%	2.3	11.0	**3.9**	2.3	2.9	**3.6**	4.5	5.6

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

FECAL COLIFORM (MPN/100 mL) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R1	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI	San Joaquin R. @ Mossdale	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

FECAL COLIFORM (MPN/100 mL) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	4/27/2004	9/22/2004	4	4	100%	30	1600	**458.3**	5.6	24.8	**128.1**	661.8	2906.3
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	4	4	100%	30	1600	**440.0**	6.6	25.9	**117.7**	534.4	2089.3
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1	1/6/2004	9/28/2004	26	26	100%	2	140	**30.7**	4.8	9.4	**19.7**	41.7	81.7
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	1/6/2004	9/28/2004	26	26	100%	3	900	**128.0**	6.3	16.0	**44.5**	124.1	312.8
Stktn-NPDES	San Joaquin R. @ RWCF-R6	1/6/2004	9/28/2004	26	26	100%	4	170	**23.2**	3.7	6.7	**12.9**	24.8	44.9
Stktn-NPDES	San Joaquin R. @ RWCF-R8	1/6/2004	9/28/2004	26	26	96%	4	170	**32.4**	3.1	6.6	**15.4**	36.1	77.8
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

FECAL COLIFORM (MPN/100 mL) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	6/21/2006	44	44	100%	23	1600	**418.6**	36.3	78.4	**184.5**	434.1	938.7
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	6/21/2006	44	44	100%	23	1600	**390.8**	35.6	76.3	**177.6**	413.4	885.4
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1	10/5/2004	10/5/2005	36	36	100%	4	500	**78.4**	13.3	24.9	**49.9**	100.0	187.3
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	10/5/2004	10/4/2005	36	36	100%	4	1600	**136.1**	16.4	32.2	**67.9**	143.4	281.1
Stktn-NPDES	San Joaquin R. @ RWCF-R6	10/5/2004	10/4/2005	36	36	100%	8	240	**45.5**	10.4	17.6	**31.8**	57.3	97.5
Stktn-NPDES	San Joaquin R. @ RWCF-R8	10/5/2004	10/4/2005	36	36	100%	2	170	**27.8**	3.7	7.4	**15.8**	33.7	66.8
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

ESCHERICHIA COLI (MPN/100 mL) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

ESCHERICHIA COLI (MPN/100 mL) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP	San Joaquin R. nr. Vernalis	7/31/2002	9/16/2004	20	20	100%	24	1300	**135.9**	19.6	35.0	**66.8**	127.6	228.4
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

ESCHERICHIA COLI (MPN/100 mL) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP DWR-MWQI	San Joaquin R. nr. Vernalis	11/14/1996	6/23/2005	28	28	100%	16	3440	**309.6**	21.0	45.9	**109.3**	259.9	567.6
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	11/14/1996	9/2/1997	10	10	100%	7.4	406	**143.5**	18.9	40.7	**95.3**	223.0	480.0
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron	11/13/1996	9/3/1997	11	11	100%	3.1	531	**64.3**	1.8	5.1	**15.9**	49.7	138.6
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.	11/14/1996	9/2/1997	11	11	100%	8.7	782	**124.6**	4.8	12.7	**36.7**	106.6	278.3

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLORINE RESIDUAL (mg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLORINE RESIDUAL (mg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/3/2000	3/16/2004	56	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/3/2000	3/16/2004	56	0	0%			(A)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLORINE RESIDUAL (mg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/5/1999	2/19/2005	41	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2	1/5/1999	2/19/2005	41	0	0%			(A)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron	4/10/1996	10/7/1997	19	19	100%	0.62	1.6	**1.2**	0.8	1.0	**1.2**	1.4	1.6
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.	4/11/1996	9/2/1997	18	18	100%	0.4	1.4	**0.9**	0.5	0.7	**0.9**	1.2	1.5

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CHLORINE (mg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron													
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CHLORINE (mg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/6/2001	9/22/2004	8	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2	11/6/2001	9/22/2004	8	0	0%			(A)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CHLORINE (mg/L) - Wet/Above Normal Water Year Type

Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	percentile statistics 10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	6/21/2006	44	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	6/21/2006	44	0	0%			(A)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron													
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLORIDE (mg/L) - Critical Water Year Type

Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	percentile statistics 10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	59	59	100%	20	221	**129.9**	80.8	98.7	**123.4**	154.1	188.4
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no available data					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no available data					
DWR-D-1485 DWR-MWQI	San Joaquin R. @ Mossdale	10/4/1989	9/9/1994	67	67	100%	26	197	**132.0**	87.6	104.5	**127.0**	154.3	184.0
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no available data					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no available data					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/2/1990	9/20/1994	30	30	100%	42	233	**126.6**	52.6	74.9	**110.8**	163.9	233.4
DWR-MWQI	Old River near Byron	1/24/1990	7/20/1994	58	58	100%	33	211	**118.0**	56.3	76.2	**106.5**	148.9	201.3
DWR-MWQI	Delta Pumping Plant Headworks	10/2/1989	9/22/1994	88	88	100%	37	185	**103.0**	55.6	71.8	**95.2**	126.3	162.9
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/2/1989	9/22/1994	87	87	100%	28	179	**103.8**	55.5	71.9	**95.9**	128.0	165.9

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLORIDE (mg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-USGS DO-Stockton DO-DWR	San Joaquin R. nr. Vernalis	10/3/2000	9/9/2004	133	133	100%	18	400	**92.0**	51.2	65.1	**85.1**	111.2	141.4
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	12/11/2002	12	12	100%	51	170	**100.2**	60.1	74.9	**95.6**	122.1	152.1
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no available data												
DO-DWR DO-Stockton	San Joaquin R. @ Mossdale	10/3/2000	10/3/2001	15	15	100%	43	111	**81.1**	49.7	61.4	**77.6**	98.1	121.1
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no available data												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no available data												
Stktn-13267 DO-Stockton	San Joaquin R. @ RWCF-R1	10/3/2000	12/4/2002	16	16	100%	38	140	**92.6**	46.3	61.9	**85.5**	118.0	157.7
DO-DWR DO-Stockton	San Joaquin R. @ Turning Basin	10/3/2000	10/3/2001	18	18	100%	51	148	**84.8**	53.2	65.1	**81.3**	101.7	124.3
DO-Stockton	San Joaquin R. @ RWCF-R4	10/3/2000	10/31/2000	4	4	100%	43	60	**54.5**	42.7	47.7	**54.0**	61.2	68.5
DO-Stockton	San Joaquin R. @ RWCF-R6	10/3/2000	10/31/2000	4	4	100%	41	56	**50.8**	40.2	44.7	**50.4**	56.7	63.1
DO-Stockton	San Joaquin R. @ RWCF-R8	10/3/2000	10/31/2000	4	4	100%	25	51	**41.3**	23.6	30.3	**39.8**	52.4	67.1
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	9/8/2004	39	39	100%	16	239	**98.9**	27.2	44.4	**76.4**	131.5	214.4
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	22	100%	24	143	**76.4**	29.9	43.6	**66.1**	100.3	146.2
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLORIDE (mg/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-Stockton DO-USGS	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	241	241	100%	7	161	**59.2**	22.1	32.5	**49.8**	76.2	111.8
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/22/2005	3/15/2006	2	2	100%	21	110	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no available data												
DWR-MWQI DWR-D-1485 DO-Stockton DO-DWR	San Joaquin R. @ Mossdale	10/1/1992	9/28/2000	82	82	100%	11	197	**66.7**	24.1	35.8	**55.8**	86.8	129.3
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	3/15/2006	2	2	100%	21	120	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no available data												
DO-Stockton	San Joaquin R. @ RWCF-R1	6/20/2000	9/26/2000	13	13	100%	45	93	**69.5**	49.3	57.4	**67.9**	80.4	93.6
DO-Stockton DO-DWR	San Joaquin R. @ Turning Basin	6/20/2000	9/28/2000	20	20	100%	51	136	**71.3**	50.0	58.3	**69.2**	82.0	95.6
DO-Stockton	San Joaquin R. @ RWCF-R4	6/20/2000	9/26/2000	13	13	100%	46	89	**69.4**	50.1	57.9	**68.0**	79.9	92.3
DO-Stockton	San Joaquin R. @ RWCF-R6	6/20/2000	9/26/2000	13	13	100%	53	94	**72.1**	54.3	61.6	**70.9**	81.7	92.7
DO-Stockton	San Joaquin R. @ RWCF-R8	6/20/2000	9/26/2000	13	13	100%	15	57	**33.4**	15.0	20.9	**30.1**	43.5	60.5
DWR-MWQI	Contra Costa Pumping Plant #1	10/7/1992	6/5/2006	99	99	100%	9	229	**70.9**	14.7	25.8	**48.1**	89.5	156.8
DWR-MWQI	Old River near Byron	10/7/1992	9/6/2000	73	73	100%	9	190	**45.2**	13.7	21.3	**34.6**	56.2	87.2
DWR-MWQI	Delta Pumping Plant Headworks	10/7/1992	5/17/2006	106	106	100%	11	156	**49.2**	17.6	26.1	**40.3**	62.4	92.3
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	63	63	100%	12	178	**52.6**	20.0	29.1	**44.1**	66.9	97.4

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

SODIUM (mg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/2004	59	59	100%	18	200	**105.8**	65.9	80.5	**100.6**	125.6	153.5
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	1/24/1990	7/20/1994	18	18	100%	23	165	**106.1**	57.8	74.6	**99.0**	131.4	169.5
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/2/1990	9/20/1994	30	30	100%	32	141	**77.1**	38.6	51.3	**70.5**	96.8	128.8
DWR-MWQI	Old River near Byron	1/24/1990	7/20/1994	58	58	100%	26	128	**73.2**	39.2	50.8	**67.8**	90.3	117.0
DWR-MWQI	Delta Pumping Plant Headworks	10/2/1989	9/22/1994	88	88	100%	28	109	**65.4**	39.8	49.1	**62.0**	78.3	96.6
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/2/1989	9/22/1994	87	87	100%	23	143	**71.4**	39.2	50.3	**66.4**	87.5	112.2

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

SODIUM (mg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-USGS	San Joaquin R. nr. Vernalis	10/4/2000	9/9/2004	124	124	100%	28	140	**79.0**	47.2	58.6	**74.6**	94.8	117.8
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	9/8/2004	39	39	100%	18	141	**66.4**	24.0	35.8	**55.6**	86.5	128.7
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	22	100%	20	82	**50.0**	24.2	32.6	**45.5**	63.4	85.6
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

SODIUM (mg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-USGS	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	216	216	100%	10	142	**52.2**	21.5	30.5	**45.0**	66.4	94.3
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	10/7/1992	9/2/1997	39	39	100%	13	116	**55.9**	20.8	30.7	**47.4**	73.2	108.3
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/7/1992	6/5/2006	99	99	100%	11	188	**52.6**	14.9	23.8	**39.9**	67.1	107.1
DWR-MWQI	Old River near Byron	10/7/1992	9/6/2000	73	73	100%	10	112	**34.3**	14.0	19.8	**29.1**	42.8	60.5
DWR-MWQI	Delta Pumping Plant Headworks	10/7/1992	5/17/2006	105	105	100%	12	97	**38.0**	16.9	23.3	**33.3**	77.5	65.4
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	62	62	100%	12	126	**42.8**	18.6	25.9	**37.4**	54.0	75.3

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

AMMONIA as NITROGEN (mg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-D-1485	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485	San Joaquin R. @ Mossdale	10/4/1989	9/23/1994	73	73	100%	0.010	0.820	**0.066**	0.006	0.013	**0.027**	0.058	0.115
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

AMMONIA as NITROGEN (mg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI DO-Stockton DO-USGS DO-DWR SWAMP	San Joaquin R. nr. Vernalis	10/3/2000	9/9/2004	53	22	42%	0.010	0.630	**0.069**	0.001	0.005	**0.017**	0.060	0.191
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	16	12	75%	0.029	0.300	**0.137**	0.026	0.048	**0.095**	0.188	0.348
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	4	4	100%	0.036	0.078	**0.050**	0.027	0.035	**0.048**	0.065	0.085
DO-Stockton DO-DWR	San Joaquin R. @ Mossdale	10/3/2000	10/3/2001	25	18	72%	0.020	0.910	**0.302**	0.030	0.067	**0.165**	0.403	0.902
Mntca-NPDES	San Joaquin R. @ WQCF-R3	4/27/2004	9/22/2004	4	4	100%	0.011	0.110	**0.046**	0.006	0.013	**0.032**	0.079	0.176
Mntca-NPDES	San Joaquin R. @ WQCF-R4	4/27/2004	9/22/2004	4	4	100%	0.025	0.109	**0.061**	0.018	0.031	**0.054**	0.095	0.158
Stktn-NPDES DO-Stockton Stktn-13267	San Joaquin R. @ RWCF-R1	10/3/2000	9/28/2004	65	31	48%	0.100	0.800	**0.259**	0.106	0.150	**0.221**	0.325	0.460
DO-DWR DO-Stockton	San Joaquin R. @ Turning Basin	10/3/2000	10/3/2001	28	23	82%	0.020	0.910	**0.296**	0.042	0.085	**0.186**	0.404	0.813
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	10/17/2000	9/28/2004	52	34	65%	0.220	4.500	**0.948**	0.143	0.274	**0.566**	1.169	2.246
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	10/3/2000	9/28/2004	40	15	38%*	0.120	2.400	**0.386**	0.102	0.165	**0.281**	0.478	0.773
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	10/3/2000	9/28/2004	38	11	29%*	0.100	1.000	**0.206**	0.077	0.112	**0.170**	0.257	0.373
DWR-MWQI	Contra Costa Pumping Plant #1	11/5/2000	9/8/2004	21	16	76%	0.010	0.080	**0.024**	0.005	0.008	**0.017**	0.033	0.060
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	22	100%	0.030	0.140	**0.065**	0.030	0.041	**0.058**	0.082	0.011
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
* Estimates of distribution parameters become less accurate as the percent detected data decreases, and may be unacceptable below a 40% detection threshold.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

AMMONIA as NITROGEN (mg/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI DO-Stockton DO-USGS SWAMP	San Joaquin R. nr. Vernalis	7/18/1996	9/7/2005	97	70	72%	0.010	1.400	**0.127**	0.006	0.016	**0.045**	0.127	0.320
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	6/21/2006	44	44	100%	0.010	0.450	**0.098**	0.033	0.050	**0.079**	0.125	0.188
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	6/21/2006	44	44	100%	0.020	0.330	**0.097**	0.388	0.056	**0.083**	0.124	0.177
DWR-D-1485 DWR-MWQI DO-Stockton DO-DWR	San Joaquin R. @ Mossdale	10/1/1992	9/28/2000	60	42	70%	0.008	0.950	**0.100**	0.004	0.011	**0.032**	0.096	0.256
Mntca-NPDES	San Joaquin R. @ WQCF-R3	10/6/2004	6/21/2006	44	44	100%	0.010	0.246	**0.088**	0.030	0.046	**0.073**	0.115	0.173
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/6/2004	6/21/2006	44	44	100%	0.010	0.251	**0.087**	0.025	0.041	**0.068**	0.114	0.181
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R1	6/27/2000	9/27/2005	64	14	22%	0.200	0.500	(C)					
DO-Stockton DO-DWR	San Joaquin R. @ Turning Basin	6/20/2000	9/28/2000	19	7	37%*	0.040	0.240	**0.119**	0.054	0.074	**0.106**	0.152	0.210
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R4	6/20/2000	9/27/2005	64	14	22%*	0.600	2.600	**0.433**	0.043	0.092	**0.216**	0.507	1.093
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R6	6/20/2000	9/27/2005	48	3	6%	0.500	1.000	(B)					
Stktn-NPDES DO-Stockton	San Joaquin R. @ RWCF-R8	6/27/2000	9/27/2005	44	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1	6/6/1996	6/5/2006	42	31	74%	0.010	0.200	**0.034**	0.005	0.010	**0.021**	0.043	0.082
DWR-MWQI	Old River near Byron	6/12/1996	8/4/1998	21	21	100%	0.008	0.140	**0.047**	0.014	0.022	**0.037**	0.063	0.100
DWR-MWQI	Delta Pumping Plant Headworks	6/13/1996	5/17/2006	67	67	100%	0.008	0.183	**0.065**	0.026	0.037	**0.055**	0.082	0.117
DWR-MWQI	DMC Intake @ Lindemann Rd.	6/13/1996	9/2/1997	16	16	100%	0.017	0.167	**0.065**	0.023	0.035	**0.055**	0.087	0.131

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
* Estimates of distribution parameters become less accurate as the percent detected data decreases, and may be unacceptable below a 40% detection threshold.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

SULFATE (mg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/29/1994	71	71	100%	16	230	**119.8**	67.2	85.5	**111.7**	145.9	185.6
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	1/24/1990	7/20/1994	18	18	100%	25	225	**127.4**	58.7	80.8	**115.2**	164.1	225.8
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	5/21/1991	9/20/2004	29	29	100%	22	67	**35.9**	25.3	29.5	**34.9**	41.4	48.2
DWR-MWQI	Old River near Byron	1/24/1990	7/20/1994	19	19	100%	19	53	**33.0**	21.8	26.1	**31.9**	39.0	46.8
DWR-MWQI	Delta Pumping Plant Headworks	1/24/1990	9/22/2004	49	49	100%	19	65	**38.0**	24.2	29.4	**36.4**	45.1	54.7
DWR-MWQI	DMC Intake @ Lindemann Rd.	1/24/1990	9/22/1994	48	48	100%	21	131	**50.9**	21.0	29.7	**43.6**	64.1	90.6

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

SULFATE (mg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-USGS	San Joaquin R. nr. Vernalis	10/4/2000	9/9/2004	128	128	100%	19	470	**93.7**	49.8	64.3	**85.6**	113.8	147.1
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	12/11/2002	12	12	100%	53	160	**93.8**	56.2	70.1	**89.7**	114.7	143.1
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	12	100%	37	130	**93.1**	54.7	68.8	**88.7**	114.4	143.8
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	9/8/2004	39	39	100%	15	163	**46.0**	17.5	25.4	**38.6**	58.5	85.2
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	22	100%	15	53	**29.0**	16.9	21.2	**27.4**	35.3	44.4
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

SULFATE (mg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP USGS-NAWQA DO-USGS	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	39	39	100%	22	530	**132.3**	35.3	57.0	**97.1**	165.2	266.8
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/22/2005	3/15/2006	2	2	100%	23	99	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	10/7/1992	9/2/1997	39	39	100%	14	138	**66.9**	26.4	38.3	**57.9**	87.5	127.0
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	3/15/2006	2	2	100%	24	99	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/7/1992	6/5/2006	97	97	100%	10	195	**43.6**	13.0	20.2	**33.2**	54.4	84.9
DWR-MWQI	Old River near Byron	10/7/1992	9/6/2000	68	68	100%	7	71	**26.8**	11.9	16.4	**23.5**	33.7	46.5
DWR-MWQI	Delta Pumping Plant Headworks	10/7/1992	5/17/2006	102	102	100%	11	77	**33.2**	15.6	21.1	**29.6**	41.4	56.1
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	59	59	100%	13	124	**45.9**	19.6	27.5	**40.1**	58.3	81.7

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL HARDNESS as $CaCO_3$ (mg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	56	56	100%	48	286	**205.3**	138.2	163.7	**197.6**	238.6	282.6
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	1/24/1990	7/20/1994	18	18	100%	57	311	**212.4**	126.0	157.4	**201.4**	257.8	321.9
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/2/1990	9/20/1994	30	30	100%	80	162	**113.0**	86.2	97.2	**111.2**	127.1	143.5
DWR-MWQI	Old River near Byron	1/24/1990	7/20/1994	57	57	100%	76	166	**110.6**	84.5	95.2	**108.6**	124.0	139.7
DWR-MWQI	Delta Pumping Plant Headworks	1/24/1990	9/22/2004	82	82	100%	68	161	**111.8**	86.0	96.7	**110.0**	125.1	140.5
DWR-MWQI	DMC Intake @ Lindemann Rd.	1/24/1990	9/22/2004	80	80	100%	57	228	**135.0**	85.1	103.5	**128.6**	159.8	194.4

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL HARDNESS as $CaCO_3$ (mg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-USGS	San Joaquin R. nr. Vernalis	10/4/2000	9/9/2004	119	119	100%	66	250	**156.4**	101.6	122.1	**149.9**	184.0	221.3
Mntca-13267	San Joaquin R. @ WQCF-R1	3/13/2002	12/11/2002	10	10	100%	80	240	**173.6**	99.0	126.1	**164.9**	215.5	274.4
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI	San Joaquin R. @ Mossdale	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	12	100%	90	240	**179.2**	119.8	143.0	**173.9**	211.6	252.6
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	3/3/2003	23	23	100%	65	237	**129.5**	77.1	96.2	**123.0**	157.3	196.3
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	12/18/2002	8	8	100%	96	127	**106.6**	92.4	98.7	**106.2**	114.3	122.1
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL HARDNESS as $CaCO_3$ (mg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI SWAMP DO-USGS	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	231	231	100%	32	276	**111.6**	57.4	75.3	**101.8**	137.6	180.5
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/22/2005	4/26/2006	9	9	100%	15	180	**78.6**	20.6	34.8	**62.2**	111.3	188.0
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI	San Joaquin R. @ Mossdale	10/7/1992	9/2/1992	39	39	100%	36	232	**119.5**	53.6	74.2	**106.3**	152.5	211.0
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	4/26/2006	9	9	100%	44	180	**95.6**	37.0	54.3	**83.2**	127.4	187.1
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	10/7/1992	8/2/2000	78	78	100%	43	270	**103.6**	48.3	65.4	**91.5**	128.1	173.3
DWR-MWQI	Old River near Byron	10/7/1992	9/6/2000	73	73	100%	36	136	**23.4**	49.9	60.3	**74.5**	92.0	111.4
DWR-MWQI	Delta Pumping Plant Headworks	10/7/1992	9/20/2000	86	86	100%	38	138	**84.0**	53.2	64.6	**80.2**	99.5	120.9
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	63	63	100%	39	255	**99.3**	54.1	69.5	**91.9**	121.4	156.1

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ALUMINUM (µg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ALUMINUM (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	14	14	100%	240	2200	**894.3**	360.1	521.1	**785.1**	1183.0	1711.7
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	2	2	100%	470	630	(C)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	12	100%	100	1800	**797.5**	203.6	349.2	**635.3**	1155.9	1982.2
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ALUMINUM (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	3/29/2006	8	8	100%	440	5200	**1708.8**	351.5	624.2	**1218.8**	2379.7	4349.2
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	4/26/2006	7	7	100%	183	4700	**1681.9**	197.8	443.8	**1088.2**	2668.1	5986.7
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ALUMINUM (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ALUMINUM (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	17	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ALUMINUM (µg/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	12/17/1997	5/17/2006	54	1	2%	24	24	(B)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ARSENIC (µg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485	San Joaquin R. @ Mossdale	5/1/1990	9/2/1992	6	6	100%	2	5	**2.8**	1.5	2.0	**2.7**	3.6	4.6
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ARSENIC (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP	San Joaquin R. nr. Vernalis	6/7/2001	6/26/2003	22	5	23%*	2.1	4.9	**2.4**	1.4	1.8	**2.3**	3.0	3.7
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	14	13	93%	1.9	3.5	**2.6**	1.9	2.2	**2.6**	3.0	3.5
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	2	0	0%			(C)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	12	100%	0.5	4.1	**2.5**	1.1	1.5	**2.3**	3.3	4.7
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
* Estimates of distribution parameters become less accurate as the percent detected data decreases, and may be unacceptable below a 40% detection threshold.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL ARSENIC (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	7	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	4/26/2006	7	1	14%	1.3	1.3	(B)					
DWR-D-1485	San Joaquin R. @ Mossdale	5/10/1993	9/7/1993	2	2	100%	2	3	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ARSENIC (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	7/23/1991	9/22/1994	18	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485 DWR-MWQI	San Joaquin R. @ Mossdale	5/1/1990	4/20/1994	8	6	75%	2	4	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	8/21/1991	9/20/1994	15	0	0%			(A)					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	7/24/1991	9/22/1994	21	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	7/24/1991	7/20/1994	9	9	100%	2	3	(D)			**2.0**		

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
(D). Arithmetic median calculated for data set.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ARSENIC (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP	San Joaquin R. nr. Vernalis	6/7/2001	11/21/2002	18	2	11%	2.1	3	(B)					
Mntca-13267	San Joaquin R. @ WQCF-R1	2/7/2002	12/11/2002	11	10	91%	1.3	3.1	**2.0**	1.1	1.5	**1.9**	2.5	3.2
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	22	100%	1	3	**2.1**	1.6	1.8	**2.0**	2.3	2.5
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
(D). Arithmetic median calculated for data set.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED ARSENIC (µg/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	3/9/1993	8/25/1998	69	37	54%	1	3	**1.4**	0.7	0.9	**1.3**	1.8	2.4
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI DWR-D-1485	San Joaquin R. @ Mossdale	9/7/1993	9/2/1997	34	1	3%	2	2	(B)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	3/11/1993	10/7/1997	45	19	42%	1	3	**1.6**	1.1	1.3	**1.6**	1.9	2.2
DWR-MWQI	Old River near Byron	6/12/1996	3/5/1997	2	2	100%	1	2	(C)					
DWR-MWQI	Delta Pumping Plant Headworks	3/9/1993	5/17/2006	98	68	69%	1	3	**1.5**	0.1	1.1	**1.4**	1.8	2.2
DWR-MWQI	DMC Intake @ Lindemann Rd.	4/8/1993	9/2/1997	36	15	42%	1	2	(C)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
(D). Arithmetic median calculated for data set.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BORON (mg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI USGS-NAWQA	San Joaquin R. nr. Vernalis	10/2/1989	9/29/1994	69	68	99%	0.1	1	**0.51**	0.29	0.37	**0.48**	0.62	0.79
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	1/24/1990	7/20/1994	18	18	100%	0.2	1	**0.54**	0.29	0.38	**0.50**	0.67	0.87
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	5/21/1991	9/20/1994	29	27	93%	0.1	0.2	(C)					
DWR-MWQI	Old River near Byron	1/24/1990	7/20/1994	19	16	84%	0.1	0.3	**0.15**	0.07	0.10	**0.13**	0.18	0.25
DWR-MWQI	Delta Pumping Plant Headworks	1/24/1990	9/22/1994	49	48	98%	0.1	0.4	**0.17**	0.09	0.12	**0.16**	0.20	0.26
DWR-MWQI	DMC Intake @ Lindemann Rd.	1/24/1990	9/22/1994	48	41	85%	0.1	0.6	**0.21**	0.07	0.10	**0.17**	0.27	0.42

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BORON (mg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP DWR-MWQI	San Joaquin R. nr. Vernalis	10/4/2000	9/30/2004	287	286	100%	0.1	0.9	**0.4**	0.2	0.3	**0.4**	0.5	0.6
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/3/2000	9/8/2004	39	31	80%	0.1	0.5	**0.16**	0.06	0.09	**0.13**	0.21	0.31
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	15	68%	0.1	0.2	(C)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BORON (mg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP DWR-MWQI USGS-NAWQA	San Joaquin R. nr. Vernalis	10/6/1992	9/7/2005	487	478	98%	0.05	0.9	**0.3**	0.1	0.2	**0.2**	0.3	0.5
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	10/7/1992	9/2/1997	39	37	95%	0.1	1.1	**0.30**	0.11	0.17	**0.26**	0.39	0.58
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/7/1992	6/5/2006	97	72	74%	0.1	0.9	**0.19**	0.06	0.09	**0.15**	0.25	0.39
DWR-MWQI	Old River near Byron	10/7/1992	9/6/2000	68	45	66%	0.1	0.4	**0.12**	0.04	0.07	**0.10**	0.16	0.24
DWR-MWQI	Delta Pumping Plant Headworks	10/7/1992	5/17/2006	100	82	82%	0.1	1.2	**0.17**	0.06	0.09	**0.14**	0.21	0.31
DWR-MWQI	DMC Intake @ Lindemann Rd.	10/7/1992	5/26/1999	58	53	91%	0.1	0.7	**0.21**	0.08	0.12	**0.18**	0.26	0.37

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CHROMIUM (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CHROMIUM (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	12/11/2002	12	12	100%	1	4	**2.4**	1.2	1.6	**2.2**	3.0	4.0
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	12	100%	0.6	3.8	**1.6**	0.7	1.0	**1.5**	2.1	3.0
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CHROMIUM (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHROMIUM VI (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHROMIUM VI (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	1/7/2003	13	9	69%	0.17	0.5	**0.3**	0.1	0.1	**0.2**	0.3	0.5
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	11	8	73%	0.2	0.41	**0.27**	0.14	0.19	**0.25**	0.34	0.45
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	1/17/2001	12/18/2002	5	1	20%	0.2	0.2	(C)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHROMIUM VI (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED CHROMIUM (ug/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED CHROMIUM (ug/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	19	86%	1	7	**2.6**	0.6	1.0	**1.8**	3.3	5.6
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED CHROMIUM (ug/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	6/14/1995	3/12/1997	7	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	3/5/1997	4	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	6/22/1995	5/17/2006	60	29	48%	1	8	**2.4**	0.7	1.2	**1.9**	3.1	4.8
DWR-MWQI	DMC Intake @ Lindemann Rd.	6/22/1995	3/13/1997	6	0	0%			(A)					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL COPPER (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL COPPER (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP	San Joaquin R. nr. Vernalis	10/26/2000	6/26/2003	31	30	97%	1.30	9.40	**2.93**	1.54	2.00	**2.68**	3.59	4.68
Mntca-132678 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	14	13	93%	2.60	6.10	**3.42**	2.33	2.74	**3.29**	3.95	4.65
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	2	0	0%			(A)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	12	100%	2.40	5.00	**3.27**	2.23	2.64	**3.18**	3.83	4.53
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL COPPER (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP	San Joaquin R. nr. Vernalis	10/25/1995	9/28/2000	28	28	100%	1.80	8.00	**3.39**	2.09	2.57	**3.22**	4.04	4.96
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	5/9/2006	17	13	77%	1.80	14.00	**3.90**	1.40	2.04	**3.10**	4.72	6.88
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	4/26/2006	7	3	43%	1.30	13.00	**4.25**	0.40	0.95	**2.50**	6.55	15.61
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	5/9/2006	10	10	100%	1.96	7.44	**2.91**	1.70	2.11	**2.68**	3.40	4.21
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED COPPER (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	9/22/1994	16	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	10/20/1993	9/20/1994	12	0	0%			(A)					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/20/1993	9/22/2004	13	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	4/20/1994	7/20/1994	2	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED COPPER (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
SWAMP	San Joaquin R. nr. Vernalis	10/26/2000	11/21/2002	27	13	48%	1.00	3.40	**1.09**	0.39	0.58	**0.91**	1.42	2.13
Mntca-13267	San Joaquin R. @ WQCF-R1	2/7/2002	12/11/2002	11	10	91%	1.30	4.70	**2.04**	1.28	1.55	**1.91**	2.37	2.87
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	22	100%	2.00	5.00	**2.23**	1.78	1.95	**2.16**	2.40	2.63
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED COPPER (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	3/9/1993	8/25/1998	68	40	59%	1.00	10.00	**2.49**	1.18	1.58	**2.20**	3.05	4.11
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/22/2005	5/9/2006	10	10	100%	0.89	2.09	**1.24**	0.84	0.99	**1.20**	1.46	1.73
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	11/7/1994	9/2/1997	31	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	5/9/2006	10	10	100%	0.95	2.30	**1.29**	0.85	1.02	**1.24**	1.52	1.81
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	3/11/1993	9/2/1997	41	4	10%	2.00	10.00	(B)					
DWR-MWQI	Old River near Byron	6/12/1996	3/5/1997	2	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	3/25/1993	5/17/2006	95	57	60%	1.00	11.00	**2.61**	1.17	1.59	**2.23**	3.13	4.25
DWR-MWQI	DMC Intake @ Lindemann Rd.	4/8/1993	9/2/1997	34	2	6%	10.00	10.00	(B)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL IRON (ug/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485	San Joaquin R. @ Mossdale	5/1/1990	9/2/1992	6	6	100%	1400	2400	**1833.3**	1313.5	1527.0	**1804.7**	2132.9	2479.5
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL IRON (ug/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	14	14	100%	490	2800	**1519.3**	703.6	969.1	**1382.5**	1972.1	2716.2
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	2	2	100%	770	1100	(C)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	12	100%	580	3200	**1495.8**	660.8	926.8	**1348.8**	1963.1	2753.1
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL IRON (ug/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	13	13	100%	400	7800	**2233.0**	495.8	865.8	**1607.5**	2984.6	5212.5
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	4/26/2006	7	7	100%	355	7100	**2536.4**	376.2	778.8	**1746.6**	3917.1	8110.5
DWR-D-1485	San Joaquin R. @ Mossdale	5/10/1993	9/7/1993	2	2	100%	2800	2900	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	4/26/2006	6	6	100%	890	4700	**1736.7**	628.4	929.5	**1435.2**	2216.0	3277.8
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED IRON (ug/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	12/5/1989	3	3	100%	10.0	20.0	(D)			**3.0**		
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485	San Joaquin R. @ Mossdale	5/1/1990	9/2/1992	6	6	100%	5.0	31.0	**16.0**	5.0	8.0	**13.8**	23.5	38.1
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
(D). Arithmetic median calculated for data set.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED IRON (ug/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DO-USGS	San Joaquin R. nr. Vernalis	10/4/2000	11/1/2001	7	7	100%	10.0	20.0	**12.4**	8.2	9.9	**12.0**	14.7	17.5
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	14	64%	5.0	49.0	**19.3**	3.5	6.5	**13.0**	25.9	48.4
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
(D). Arithmetic median calculated for data set.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED IRON (ug/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DO-USGS	San Joaquin R. nr. Vernalis	7/12/2000	9/20/2000	6	4	67%	8.6	14.0	**10.5**	7.2	8.5	**10.2**	12.2	14.4
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/22/2005	4/26/2006	6	2	33%	80.0	190.0	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485	San Joaquin R. @ Mossdale	5/10/1993	9/7/1993	2	2	100%	50.0	81.0	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	4/26/2006	6	2	33%	70.0	90.0	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	12/17/1997	5/17/2006	54	44	82%	5.0	75.0	**16.7**	2.8	5.2	**10.5**	21.1	39.6
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
(D). Arithmetic median calculated for data set.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MANGANESE (ug/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485	San Joaquin R. @ Mossdale	5/1/1990	9/2/1992	6	6	100%	154	388	**211.0**	122.2	154.1	**199.5**	258.1	325.6
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MANGANESE (ug/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	13	13	100%	82	230	**141.7**	78.7	101.1	**133.4**	176.2	226.4
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	2	2	100%	79	140	(C)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	12	100%	60	240	**131.2**	61.0	83.7	**118.9**	169.0	232.0
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MANGANESE (ug/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	13	13	100%	37.3	410	**132.3**	41.8	65.6	**108.2**	178.3	279.7
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	4/26/2006	7	7	100%	30.4	420	**158.6**	36.0	64.5	**123.0**	234.8	420.4
DWR-D-1485	San Joaquin R. @ Mossdale	5/10/1993	9/7/1993	2	2	100%	140	176	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	4/26/2006	6	6	100%	39	190	**94.3**	33.6	51.6	**83.0**	133.6	205.1
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MANGANESE (ug/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	10/2/1989	12/5/1989	3	3	100%	20	40	**30.0**	14.9	20.4	**28.8**	40.8	55.7
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485	San Joaquin R. @ Mossdale	5/1/1990	9/2/1992	6	6	100%	35	126	**59.3**	25.9	36.5	**53.2**	77.6	109.1
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MANGANESE (ug/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DO-USGS	San Joaquin R. nr. Vernalis	10/4/2000	10/18/2000	2	2	100%	6	9	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	20	91%	7	19	**12.4**	7.1	9.0	**11.7**	15.2	19.2
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MANGANESE (ug/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DO-USGS	San Joaquin R. nr. Vernalis	7/12/2000	9/20/2000	6	6	100%	4	9	**6.3**	4.1	5.0	**6.2**	7.6	9.3
Mntca-NPDES	San Joaquin R. @ WQCF-R1	11/22/2005	4/26/2006	6	5	83%	7.9	47	**18.3**	3.2	6.2	**13.2**	28.1	55.3
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-D-1485	San Joaquin R. @ Mossdale	5/10/1993	9/7/1993	2	2	100%	31	37	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3	11/22/2005	4/26/2006	6	5	83%	7.2	42	**16.3**	3.1	5.9	**12.1**	25.0	47.9
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	6/14/1995	3/12/1997	8	8	100%	10	30	**14.8**	7.4	9.8	**13.5**	18.4	24.5
DWR-MWQI	Old River near Byron	6/12/1996	3/5/1997	4	4	100%	13	26	**18.5**	10.9	13.8	**17.9**	23.3	29.5
DWR-MWQI	Delta Pumping Plant Headworks	6/22/1995	5/17/2006	61	52	85%	5	37	**14.8**	5.6	8.2	**12.5**	19.0	27.8
DWR-MWQI	DMC Intake @ Lindemann Rd.	6/22/1995	3/13/1997	7	7	100%	10	30	**22.9**	12.2	16.0	**21.6**	29.1	38.0

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MERCURY (ng/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	10/29/1993	4/27/1994	3	3	100%	3.98	9.30	**6.70**	2.82	4.13	**6.32**	9.66	14.15
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MERCURY (ng/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	10/28/2000	10/1/2001	11	11	100%	3.12	10.50	**7.22**	4.28	5.37	**6.90**	8.87	11.12
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	14	14	100%	3.60	9.30	**5.57**	3.66	4.39	**5.38**	6.58	7.90
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	2	2	100%	5.28	6.60	(C)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267 Stktn-NPDES	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	15	15	100%	0.80	8.80	**4.77**	1.52	2.40	**3.98**	6.61	10.43
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	2/12/2004	8/18/2004	3	3	100%	2.70	3.80	**3.23**	2.31	2.70	**3.20**	3.80	4.43
Stktn-NPDES	San Joaquin R. @ RWCF-R6	2/12/2004	8/18/2004	3	3	100%	2.60	3.90	**3.10**	2.07	2.49	**3.05**	3.74	4.49
Stktn-NPDES	San Joaquin R. @ RWCF-R8	2/12/2004	8/18/2004	3	3	100%	2.70	3.70	**3.10**	2.28	2.62	**3.07**	3.60	4.14
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MERCURY (ng/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	3/28/2000	9/26/2000	7	7	100%	6.21	12.70	**8.86**	5.75	6.96	**8.61**	10.64	12.88
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2004	7	6	86%	2.40	18.20	**7.09**	2.02	3.30	**5.66**	9.72	15.83
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	4/26/2006	7	6	86%	4.63	19.40	**9.72**	3.19	4.94	**8.00**	12.98	20.07
DWR-MWQI	San Joaquin R. @ Mossdale	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	11/10/2004	8/3/2005	4	4	1.00	3.80	7.10	**5.53**	3.23	4.11	**5.36**	6.99	8.88
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	11/10/2004	8/3/2005	4	4	1.00	2.70	4.80	**3.55**	2.28	2.78	**3.47**	4.33	5.29
Stktn-NPDES	San Joaquin R. @ RWCF-R6	11/10/2004	8/3/2005	4	4	1.00	2.00	5.30	**3.98**	1.89	2.62	**3.74**	5.35	7.39
Stktn-NPDES	San Joaquin R. @ RWCF-R8	11/10/2004	8/3/2005	4	4	1.00	1.70	11.00	**5.38**	1.05	2.04	**4.29**	9.02	17.61
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MERCURY (ng/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	10/29/1993	10/29/1993	1	1	100%	1.62	1.62	(C)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI	San Joaquin R. @ Mossdale	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	3/26/1992	4/7/1992	2	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	3/26/1992	4/7/1992	2	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MERCURY (ng/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	10/28/2000	10/1/2001	11	11	100%	25	3.04	**1.0**	0.3	0.4	**0.8**	1.3	2.2
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	22	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MERCURY (ng/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	3/28/2000	9/26/2000	7	7	100%	0.73	1.33	**1.0**	0.6	0.8	**1.0**	1.2	1.5
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	6/14/1995	3/12/1997	6	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	3/5/1997	4	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	6/22/1995	5/17/2006	58	1	2%	200	200	(B)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	6/22/1995	3/13/1997	6	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL METHYLMERCURY (ng/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL METHYLMERCURY (ng/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	10/28/2000	10/1/2001	11	11	100%	0.0934	0.256	**0.167**	0.099	0.124	**0.159**	0.205	0.257
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL METHYLMERCURY (ng/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	3/28/2000	9/26/2000	7	7	100%	0.0986	0.22	**0.146**	0.095	0.115	**0.142**	0.175	0.212
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED METHYLMERCURY (ng/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED METHYLMERCURY (ng/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	10/28/2000	10/1/2001	11	11	100%	0.007	0.0766	**0.037**	0.009	0.015	**0.028**	0.053	0.094
Mntca-NPDES	San Joaquin R. @ WQCF-R1	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI	San Joaquin R. @ Mossdale	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED METHYLMERCURY (ng/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
CALFED	San Joaquin R. nr. Vernalis	3/28/2000	9/26/2000	6	6	100%	0.022	0.0713	**0.039**	0.017	0.024	**0.036**	0.053	0.076
Mntca-NPDES	San Joaquin R. @ WQCF-R1	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R2	no data available												
DWR-MWQI	San Joaquin R. @ Mossdale	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R3	no data available												
Mntca-NPDES	San Joaquin R. @ WQCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R1	no data available												
DO-Stockton	San Joaquin R. @ Turning Basin	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R4	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R6	no data available												
Stktn-NPDES	San Joaquin R. @ RWCF-R8	no data available												
DWR-MWQI	Contra Costa Pumping Plant #1	no data available												
DWR-MWQI	Old River near Byron	no data available												
DWR-MWQI	Delta Pumping Plant Headworks	no data available												
DWR-MWQI	DMC Intake @ Lindemann Rd.	no data available												

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MOLYBDENUM (µg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MOLYBDENUM (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	4/27/2004	9/22/2004	2	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2	4/27/2004	9/22/2004	2	0	0%			(A)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL MOLYBDENUM (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	7	1	14%	1	1	(B)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2	10/6/2004	4/26/2006	7	1	14%	0.9	0.9	(B)					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MOLYBDENUM (ug/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MOLYBDENUM (ug/L) - Dry/Below Normal Water Year Type															
										percentile statistics					
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DISSOLVED MOLYBDENUM (ug/L) - Wet/Above Normal Water Year Type															
										percentile statistics					
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	12/6/1995	9/5/1996	4	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	12/11/1996	3	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	12/7/1995	12/12/1996	5	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/7/1995	12/12/1996	4	0	0%			(A)					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

METHYLENE BLUE ACTIVE SUBSTANCES (mg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

METHYLENE BLUE ACTIVE SUBSTANCES (mg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	12/11/2002	12	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	1	8%	0.15	0.15	(B)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

METHYLENE BLUE ACTIVE SUBSTANCES (mg/L) - Wet/Above Normal Water Year Type															
										percentile statistics					
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CYANIDE (µg/L) - Critical Water Year Type															
										percentile statistics					
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CYANIDE (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	12/11/2002	12	3	25%*	1.4	5	**0.09**	0.02	0.08	**0.28**	1.02	3.29
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	1	8%	3	3	(B)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.
* Estimates of distribution parameters become less accurate as the percent detected data decreases, and may be unacceptable below a 40% detection threshold.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL CYANIDE (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	12/6/1995	3/12/1997	6	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	3/5/1997	4	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	12/7/1995	12/12/1996	5	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/7/1995	3/13/1997	5	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BIS(2-ETHYLHEXYL)PHTHALATE (µg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BIS(2-ETHYLHEXYL)PHTHALATE (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/9/2002	9/22/2004	6	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	4/27/2004	9/22/2004	2	0	0%			(A)					
Stktn-13267 Stktn-NPDES	San Joaquin R. @ RWCF-R1	2/20/2002	8/18/2004	9	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	2/12/2004	8/18/2004	2	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	2/12/2004	5/5/2004	2	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BIS(2-ETHYLHEXYL)PHTHALATE (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	7	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/6/2004	4/26/2006	7	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R1	11/10/2004	8/3/2005	4	1	25%	3.2	3.2	(B)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	11/10/2004	8/3/2005	4	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1	12/6/1995	3/12/1997	6	1	17%	6.4	6.4	(B)					
DWR-MWQI	Old River near Byron	6/12/1996	3/5/1997	4	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	12/7/1995	12/12/1996	5	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/7/1995	3/13/1997	5	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BROMODICHLOROMETHANE (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BROMODICHLOROMETHANE (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/15/2002	9/22/2004	14	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	4/27/2004	9/22/2004	2	0	0%			(A)					
Stktn-13267 Stktn-NPDES	San Joaquin R. @ RWCF-R1	1/29/2002	8/18/2004	15	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	2/12/2004	8/18/2004	3	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	18	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BROMODICHLOROMETHANE (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	7/2/1997	5/24/1999	23	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	7	1	14%	0.2	0.2	(B)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	7/2/1997	7/2/1997	1	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/6/2004	4/26/2006	7	1	14%	0.2	0.2	(B)					
Stktn-NPDES	San Joaquin R. @ RWCF-R1	11/10/2004	8/3/2005	3	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	11/10/2004	5/11/2005	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	11/10/2004	8/3/2005	4	4	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1	9/5/1996	8/28/1997	5	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	1/5/1998	9	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	9/12/1996	5/17/2006	56	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/12/1996	7/7/1997	4	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BROMOFORM (µg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BROMOFORM (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267 Mntca-NPDES	San Joaquin R. @ WQCF-R1	1/15/2002	9/22/2004	14	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	4/27/2004	9/22/2004	2	0	0%			(A)					
Stktn-13267	San Joaquin R. @ RWCF-R1	1/29/2002	12/4/2002	12	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	18	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

BROMOFORM (µg/L) - Wet/Above Normal Water Year Type

Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	percentile statistics 10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	4/9/1997	5/24/1999	27	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	7	1	14%	0.2	0.2	(B)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	5/13/1997	8/7/1997	3	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/6/2004	4/26/2006	7	2	29%	0.4	0.5	(C)					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	9/5/1996	8/28/1997	6	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	1/5/1998	10	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	9/12/1996	5/17/2006	57	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/12/1996	9/2/1997	5	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLOROFORM (µg/L) - Critical Water Year Type

Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	percentile statistics 10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLOROFORM (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/15/2002	12/11/2002	12	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	4/27/2004	9/22/2004	2	0	0%			(A)					
Stktn-13267 Stktn-NPDES	San Joaquin R. @ RWCF-R1	1/29/2002	8/18/2004	15	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	2/12/2004	8/18/2004	3	1	33%	0.5	0.5	(C)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	2/12/2004	8/18/2004	3	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	18	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

CHLOROFORM (µg/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	7/2/1997	5/24/1999	23	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/13/2005	4/26/2006	3	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	7/2/1997	7/2/1997	1	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/6/2004	4/26/2006	7	1	14%	0.07	0.07	(B)					
Stktn-NPDES	San Joaquin R. @ RWCF-R1	5/11/2005	5/11/2005	1	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	5/11/2005	5/11/2005	1	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	5/11/2005	5/11/2005	1	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	5/11/2005	5/11/2005	1	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1	9/5/1996	8/28/1997	5	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	1/5/1998	9	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	9/12/1996	5/17/2006	56	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/12/1996	7/7/1997	4	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DIBROMOCHLOROMETHANE (µg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DIBROMOCHLOROMETHANE (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/15/2002	9/22/2004	14	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	4/27/2004	9/22/2004	2	0	0%			(A)					
Stktn-13267 Stktn-NPDES	San Joaquin R. @ RWCF-R1	1/29/2002	8/18/2004	15	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	2/12/2004	8/18/2004	3	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	18	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

DIBROMOCHLOROMETHANE (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	4/9/1997	5/24/1999	29	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1	10/6/2004	4/26/2006	7	1	14%	0.3	0.3	(B)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	4/9/1997	9/2/1997	5	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4	10/6/2004	4/26/2006	7	1	14%	0.5	0.5	(B)					
Stktn-NPDES	San Joaquin R. @ RWCF-R1	11/10/2004	8/3/2005	4	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	11/10/2004	8/3/2005	4	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1	12/6/1995	10/7/1997	13	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	1/5/1998	14	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	12/7/1995	5/17/2006	60	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/7/1995	9/2/1997	11	0	0%			(A)					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TETRACHLOROETHENE [PCE] (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.
(B). Less than 20% detected data. General summary statistics provided only.
(C). Insufficient unique detected data points. General summary statistics provided only.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TETRACHLOROETHENE [PCE] (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/15/2002	12/11/2002	12	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267 Stktn-NPDES	San Joaquin R. @ RWCF-R1	1/29/2002	8/18/2004	15	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	2/12/2004	8/18/2004	3	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	18	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TETRACHLOROETHENE [PCE] (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	4/9/1997	5/24/1999	32	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	4/9/1997	9/2/1997	5	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1	11/10/2004	8/3/2005	4	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	11/10/2004	8/3/2005	4	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1	12/6/1995	10/7/1997	14	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	1/5/1998	15	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	12/7/1995	5/17/2006	61	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/7/1995	9/2/1997	11	0	0%			(A)					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TRICHLOROETHENE [TCE] (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TRICHLOROETHENE [TCE] (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/15/2002	12/11/2002	12	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267 Stktn-NPDES	San Joaquin R. @ RWCF-R1	1/29/2002	8/18/2004	15	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	2/12/2004	8/18/2004	3	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	2/12/2004	8/18/2004	3	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	10/18/2000	9/15/2004	18	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TRICHLOROETHENE [TCE] (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis	4/9/1997	5/24/1999	29	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale	4/9/1997	7/2/1997	3	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1	11/10/2004	8/3/2005	4	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R6	11/10/2004	8/3/2005	4	0	0%			(A)					
Stktn-NPDES	San Joaquin R. @ RWCF-R8	11/10/2004	8/3/2005	3	0	0%			(A)					
DWR-MWQI	Contra Costa Pumping Plant #1	9/5/1996	9/2/1997	9	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	1/5/1998	12	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks	9/12/1996	5/17/2006	57	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/12/1996	7/7/1997	4	0	0%			(A)					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1016 (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1016 (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	10/1/2002	4	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	5/22/2002	1/7/2003	6	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	9/18/2002	9/15/2004	6	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1016 (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	3/18/1998	3/15/2006	13	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1221 (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1221 (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	10/1/2002	4	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	5/22/2002	1/7/2003	6	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	9/18/2002	9/15/2004	6	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1221 (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	3/18/1998	3/15/2006	13	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1232 (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1232 (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	10/1/2002	4	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	5/22/2002	1/7/2003	6	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	9/18/2002	9/15/2004	6	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1232 (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	3/18/1998	3/15/2006	13	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1242 (µg/L) - Critical Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1242 (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	10/1/2002	4	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	5/22/2002	1/7/2003	6	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	9/18/2002	9/15/2004	6	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1242 (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	3/18/1998	3/15/2006	13	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1248 (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1248 (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	10/1/2002	4	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	5/22/2002	1/7/2003	6	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	9/18/2002	9/15/2004	6	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1248 (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	Monitoring Period end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	3/18/1998	3/15/2006	13	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1254 (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1254 (µg/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	10/1/2002	4	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	5/22/2002	1/7/2003	6	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	9/18/2002	9/15/2004	6	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1254 (µg/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	3/18/1998	3/15/2006	13	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1260 (µg/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1260 (µg/L) - Dry/Below Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-13267	San Joaquin R. @ WQCF-R1	1/9/2002	10/1/2002	4	0	0%			(A)					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-13267	San Joaquin R. @ RWCF-R1	5/22/2002	1/7/2003	6	0	0%			(A)					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	3/18/2002	9/15/2004	6	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

PCB 1260 (µg/L) - Wet/Above Normal Water Year Type										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
City of Stockton	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks	3/18/1998	3/15/2006	13	0	0%			(A)					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL PCBs (ug/L) - Critical Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL PCBs (ug/L) - Dry/Below Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1								no data available					
DWR-MWQI	Old River near Byron								no data available					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.								no data available					

(A). No detected data.

Appendix X. Summary Statistics for Existing Water Quality of Selected Receiving Waters in Project Area

TOTAL PCBs (ug/L) - Wet/Above Normal Water Year Type														
										percentile statistics				
Monitoring Program	Site Description	Monitoring Period start	end	n	n det	% det	min det	max det	mean	10th	25th	median (50th)	75th	90th
DWR-MWQI	San Joaquin R. nr. Vernalis								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R1								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R2								no data available					
DWR-MWQI	San Joaquin R. @ Mossdale								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R3								no data available					
Mntca-NPDES	San Joaquin R. @ WQCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R1								no data available					
DO-Stockton	San Joaquin R. @ Turning Basin								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R4								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R6								no data available					
Stktn-NPDES	San Joaquin R. @ RWCF-R8								no data available					
DWR-MWQI	Contra Costa Pumping Plant #1	12/6/1995	3/12/1997	6	0	0%			(A)					
DWR-MWQI	Old River near Byron	6/12/1996	3/5/1997	4	0	0%			(A)					
DWR-MWQI	Delta Pumping Plant Headworks								no data available					
DWR-MWQI	DMC Intake @ Lindemann Rd.	12/7/1995	3/13/1997	5	0	0%			(A)					

(A). No detected data.

APPENDIX E

City of Manteca WQCF NPDES Permit

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2004-0028

NPDES NO. CA0081558

WASTE DISCHARGE REQUIREMENTS
FOR
CITY OF MANTECA, CITY OF LATHROP AND DUTRA FARMS
WASTEWATER QUALITY CONTROL FACILITY
SAN JOAQUIN COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds that:

BACKGROUND

1. The City of Manteca submitted a Report of Waste Discharge, dated 27 November 2001, and applied for a permit renewal to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the Wastewater Quality Control Facility (WQCF). Supplemental information to complete filing of the application was submitted on 14 March 2002, 5 September 2002, 17 October 2002, 20 May 2003, and 17 July 2003.

   The City of Manteca's WQCF accepts wastewater flows from certain areas of the City of Lathrop, therefore the City of Lathrop is named in this permit and is responsible for operation and maintenance of its wastewater collection system. The City of Manteca leases 150 acres of land from Dutra Farms (Assessor's parcel Nos. 241-320-01 and 241-320-02) for application of treated wastewater; therefore Dutra Farms is named in this permit and is responsible for the proper application and management of the wastewater on its land. The City of Manteca is solely responsible for the wastewater treatment facility. The City of Manteca, the City of Lathrop and Dutra Farms are hereafter individually and/or jointly referred to as Discharger.

2. The Discharger owns and operates a wastewater collection, treatment, and disposal system, and provides sewerage service to the City of Manteca and the City of Lathrop. The WQCF is in Section 4, T2S, R6E, MDB&M, as shown on Attachment B, a part of this Order. The existing treatment plant is on property owned by the City of Manteca. Land disposal of effluent is maximized by discharging effluent at agronomic rates seasonally to existing City-owned property, and additional leased property as shown on Attachment A, a part of this Order. Excess flow of treated municipal wastewater is discharged to the San Joaquin River, a water of the United States, and part of the Sacramento-San Joaquin Delta (Delta) at the point, latitude 37°, 46', 45" (deg, min, sec) and longitude 121°, 18', 00" (deg, min, sec).

3. The collection system consists of two main lines servicing the City of Manteca and one line for the City of Lathrop. A separate industrial waste line has been constructed for collection of food processing waste so that it can be separately treated and disposed on land. The industrial waste

line is not in service. All waste is currently treated in the municipal treatment plant. The treatment system consists of raw influent bar screening, flow metering, and grit removal, followed by primary sedimentation, biofiltration, conventional activated sludge and secondary sedimentation. Secondary effluent is applied to agricultural fields at agronomic rates. Excess flows are chlorinated, dechlorinated and discharged to the San Joaquin River. Biosolids are dewatered by settling and evaporation and disposed of on-site by application to the City-owned property at agronomic rates. The discharger has requested the option to dispose of biosolids in a landfill in the future. The Report of Waste Discharge and additional reports provided by the discharger describe the current City of Manteca discharge as follows:

Monthly Average Flow:	5.72	million gallons per day (mgd)
Daily Peak Wet Weather Flow:	7.21	mgd
Design Flow (dry weather):	6.95	mgd
Average Temperature:	79.5°F Summer; 63.3°F Winter	

Discharge to the San Joaquin River (Outfall 001) averages 4.89 mgd with a maximum of 6.29 mgd.

Constituent	Units	Concentration Range	lbs/day[2] average
BOD[1]	mg/l	17 (avg)/59 (max)[5]	690
Total Suspended Solids	mg/l	14 (avg)/31 (max)[5]	570
Ammonia	mg/l	ND-42.8 [3]	720
Chloride	mg/l	100-230 [3]	5600
Electrical Conductivity	umhos/cm	819-1300 [3]	
Total Dissolved Solids	mg/l	540-727 [3]	26,000
Aluminum	mg/l	0.07-0.35 [4]	6.1
Iron	mg/l	0.17-0.73 [4]	20
Manganese	mg/l	0.013-0.12 [4]	2.0
Arsenic	ug/l	11-14 [4]	0.5
Copper	ug/l	7.4-13 [4]	0.4
Cyanide	ug/l	1.5-31 [4]	0.2
Dibromochloromethane	ug/l	ND-1.2 [4]	0.02
Bromodichloromethane	ug/l	1-3.5 [4]	0.08
2,4,6-Trichlorophenol	ug/l	ND-11 [4]	0.2
Bis(2-ethylhexyl)phthalate	ug/l	0.9-7 [4]	0.16
Mercury	ug/l	0.013-0.028 [4]	0.00077

1 5-day, 20°C biochemical oxygen demand
2 Based on 4.89 mgd
3 January 1998 to December 2002 monitoring reports
4 January 2002 to December 2002 data collection
5 Form 2A of the Report of Waste Discharge

Discharge to land averages 2.0 mgd.

Constituent	Units	Concentration Range	lbs/day[2] average
BOD[1]	mg/l	6-124 [3]	530
Ammonia	mg/l	12-33.8 [3]	330
Nitrate	mg/l	0-9.8	25
Electrical Conductivity	umhos/cm	946-1354 [3]	
Total Dissolved Solids	mg/l	557-614 [3]	9800

1 5-day, 20°C biochemical oxygen demand
2 Based on 2.0 mgd
3 January 2002 to December 2002 monitoring reports

4. The municipal treatment system capacity will be expanded through the addition of primary and secondary treatment units that will be similar to and parallel to the existing units. In addition, nitrification, denitrification, tertiary filtration, and UV disinfection will be added to improve the effluent quality. The expansion will include additional sludge digestion and dewatering units, as well as improvements to buildings, pump stations, ponds, and chemical handling. Chemical additions of sodium hydroxide, lime, sodium hypochlorite, or similar products may be required to control pH, alkalinity and disinfection in the plant processes. Additional expansion of the municipal waste collection system is planned to support further development of the City. In order to mitigate thermal impacts of the discharge to the San Joaquin River, the treated municipal wastewater will be discharged only during the outgoing tide. The Report of Waste Discharge describes the proposed City of Manteca discharge as follows:

Design Flow (dry weather): 9.87 mgd municipal sanitary waste
Average Temperature: 81°F Summer; 62°F Winter

Constituent	Units	30-Day[4] Average	Daily[4] Maximum	lbs/day[2] average
BOD[1]	mg/l	10	50	820
Total Suspended Solids	mg/l	10	50	820
Ammonia (as N)	mg/l	2[3]		160
Total Dissolved Solids	mg/l	640		53,000
Total Organic Carbon	mg/l	13		1100
Chlorine Residual	mg/l		0.1	
Settleable Matter	mg/l	0.1	0.2	8
Oil and Grease	mg/l	10	15	820
Total Coliform Organisms	MPN/100 ml	2.2[5]	23[6]	
NTU	NTU units	2[7]	10[8]	
pH	pH units		6.5-8.0[9]	

Footnotes next page

1 5-day, 20°C biochemical oxygen demand
2 Based on 9.87 mgd
3 0.5 mg/l during certain low flow conditions
4 Table 5, Basis of Design Report, August 2002
5 7-day mean
6 30-day maximum
7 Daily Average
8 Maximum anytime
9 Revised to 8.0 per 17 October 2002 letter from City of Manteca

A separate industrial collection system that was constructed earlier will deliver food processing waste to an aeration basin that will be separate from the main treatment plant prior to disposal to land. Discharge to land averages 2.0 mgd, which includes up to 0.55 mgd of food processing waste, and contains the following:

Constituent	Units	Concentration average	lbs/day[2] average
BOD[1]	mg/l	143 [3]	2400
Total Nitrogen	mg/l	9 [3]	150

1 5-day, 20°C biochemical oxygen demand
2 Based on 2.0 mgd
3 Wastewater Management Plan, August 2002

5. The U.S. Environmental Protection Agency (USEPA) and the Regional Board have classified this discharge as a major discharge.

BENEFICIAL USES/WATER QUALITY CONTROL PLANS

6. The Regional Board adopted a *Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.

7. The beneficial uses of the Delta downstream of the discharge as identified in Table II-1 of the Basin Plan are municipal and domestic supply, agricultural irrigation, agricultural stock watering, industrial process water supply, industrial service supply, water contact recreation, other non-contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, wildlife habitat, and navigation.

8. The beneficial uses of the underlying ground water are municipal and domestic, industrial service, industrial process and agricultural supply.

9. Clean Water Act Section 303(a-c), required states to adopt water quality standards, including criteria where they are necessary to protect beneficial uses. The Regional Board adopted water quality criteria as water quality objectives in the Basin Plan. The Basin Plan states that "[t]*he numerical and narrative water quality objectives define the least stringent standards that the Regional Board will apply to regional waters in order to protect the beneficial uses*." The Basin Plan includes numeric and narrative water quality objectives for various beneficial uses and water bodies. This Order contains Receiving Water Limitations based on the Basin Plan numerical and narrative water quality objectives for biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, turbidity, and electrical conductivity. Numeric Basin Plan objectives that are applicable to this discharge and which have been incorporated as Receiving Water Limitations include:

   a. *Dissolved Oxygen*—The Basin Plan includes a water quality objective that within the legal boundaries of the Delta, the dissolved oxygen concentration shall not be reduced below 5.0 mg/l in all Delta waters except in those waters designated otherwise. Numeric Receiving Water Limitations for dissolved oxygen are included in this Order and are based on the Basin Plan objectives.

   b. *pH*—The Basin Plan includes numeric water quality objectives that the pH "*…not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses*." Numeric Receiving Water Limitations for pH are included in this Order and are based on the Basin Plan objectives for pH.

   c. *Turbidity*—The Basin Plan includes a water quality objective that "[i]*ncreases in turbidity attributable to controllable water quality factors shall not exceed the following limits:*

      - *Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU.*
      - *Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent.*
      - *Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs.*
      - *Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent."*

   A numeric Receiving Water Limitation for turbidity is included in this Order and is based on the Basin Plan objective for turbidity.

10. The State Water Resources Control Board (State Board or SWRCB) on 16 May 1974, adopted Resolution No. 74-43 titled "Water Quality Control Policy for the Enclosed Bays and Estuaries of California". The requirements within this Order are consistent with the Policy.

11. The State Board adopted the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary on 22 May 1995 (Bay/Delta Plan). The Plan includes water quality objectives, which are implemented as part of this Order.

12. The Basin Plan contains the "Policy for Application of Water Quality Objectives" (Implementation Policy) that, among other policies, establishes policies for implementation of narrative water quality objectives. This Implementation Policy states, in part,

    > "Where compliance with these narrative objectives is required (i.e., where the objectives are applicable to protect specified beneficial uses), the Regional Board will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives. To evaluate compliance with the narrative water quality objectives, the Regional Board considers, on a case-by-case basis, direct evidence of beneficial use impacts, all material and relevant information submitted by the discharger and other interested parties, and relevant numerical criteria and guidelines developed and/or published by other agencies and organizations . . ."

    Narrative water quality objectives applied in this Order include (1) the "Chemical Constituents" objective, which states that "waters shall not contain chemical constituents that adversely affect beneficial uses. The Chemical Constituent objective also lists specific numeric objectives for certain constituents and incorporates state Maximum Contaminant Levels (MCLs) promulgated in Title 22 California Code of Regulations (CCR) Division 4, Chapter 15, and (2) the "Narrative Toxicity Objective", which states, in part, "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life."

13. The SWRCB Water Quality Control Plan for Control of Temperatures in Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan) is applicable to this discharge. For purposes of the Thermal Plan, the Discharger is considered to be an Existing Discharger of Elevated Temperature Waste.

ANTIDEGRADATION

14. State Board Resolution No. 68-16 (hereafter Resolution 68-16) and 40 Code of Federal Regulations (CFR) section 131.12 require the Regional Board, in regulating discharge of waste, to maintain high quality waters of the State until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Regional Board's policies. Resolution 68-16 requires the discharge be regulated to meet best practicable treatment or control to assure that pollution or nuisance will not occur and the highest water quality consistent with the maximum benefit to the people of the State be maintained.

15. With regard to surface water, the receiving water may exceed applicable water quality objectives for certain constituents as described in this Order. However, this Order requires the discharger, in accordance with specified compliance schedules, to meet requirements that will result in the use of best practicable treatment or control of the discharge and will result in compliance with water quality objectives. Table 1 of the information sheet provides an analysis of the mass loading to the receiving water for a number of constituents based on current operations and for an expanded discharge flow following plant upgrades. This Order requires compliance with technology-based standards and more stringent water quality-based standards. In developing effluent limitations, this Order allows the use of some of the assimilative capacity of the receiving water based on the current performance of the discharger and is consistent with the SIP. Where assimilative capacity is available in the receiving water, this Order does not authorize the full use of the assimilative capacity. This Order is consistent with California Water Code section 13263(b). Any further use of the assimilative capacity would not be consistent with Resolution 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The impact on existing water quality will be insignificant. The total allowable discharge to surface water of 9.87 mgd has been increased from 6.95 mgd from the previous Order. The discharge is consistent with Resolution 68-16 and 40 CFR section 131.12 because this Order requires the discharger to meet requirements that will result in best practicable treatment or control to assure that pollution or nuisance will not occur prior to allowing flows to increase.

16. With regard to groundwater, domestic wastewater contains constituents such as total dissolved solids (TDS), specific conductivity, pathogens, nitrates, organics, and metals. The Discharger's use of unlined ponds and the application of wastewater and sludge to land may result in an increase in the concentration of these constituents in groundwater. Some degradation of groundwater by the Discharger is consistent with Resolution 68-16 provided that:

    a. The degradation is limited in extent;
    b. The degradation after effective source control, treatment, and control is limited to waste constituents typically encountered in municipal wastewater as specified in the groundwater limitations in this Order;
    c. The Discharger minimizes the degradation by fully implementing, regularly maintaining, and optimally operating best practicable control technology (BPCT) measures; and
    d. The degradation does not result in water quality less than that prescribed in the Basin Plan, e.g., does not exceed water quality objectives.

    As further discussed in Findings 18-20 and in the Provisions, the discharge to land authorized by this Order must comply with ground water limitations, groundwater monitoring requirements, and a schedule to evaluate whether the Discharger is implementing best practicable treatment or control of the discharge. Compliance with this Order will result in use of best practicable treatment or control and will not further degrade the groundwater.

17. On 4 February 2003, the State Board adopted the 2002 California 303(d) list of impaired water bodies. The listing for the eastern portion of the Delta waterways includes the organo-phosphate pesticides (diazinon and chlorpyrifos), organo-chlorine Group A pesticides (including the organo-chlorine pesticides DDT, endrin aldehyde, and lindane), mercury, and unknown toxicity. The listing for the San Joaquin River downstream of the discharge also includes organic enrichment/low dissolved oxygen. These listings require review and assessment of effluent quality to determine if applicable effluent limitations are necessary. The USEPA requires the Regional Board to develop total maximum daily loads (TMDLs) for each 303(d) listed pollutant.

GROUNDWATER

18. Monitoring of the groundwater must be conducted to determine if the discharge has caused an increase in constituent concentrations, when compared to background. The monitoring must, at a minimum, require a complete assessment of groundwater impacts including an assessment of all wastewater-related constituents which may have migrated to groundwater, the vertical and lateral extent of any degradation, and an analysis of whether additional or different methods of treatment or control of the discharge are necessary to provide best practicable treatment or control to comply with Resolution 68-16. Economic analysis is only one of many factors considered in determining best practicable treatment. If monitoring indicates that the discharge has incrementally increased constituent concentrations in groundwater above background, this permit may be reopened and modified. Until groundwater monitoring is sufficient, this Order contains Groundwater Limitations that allow groundwater quality to be degraded for certain constituents when compared to background groundwater quality, but not to exceed water quality objectives. If groundwater quality has been degraded by the discharge, the incremental change in waste concentration (when compared with background) may not be increased. If groundwater quality has been or may be degraded by the discharge, this Order may be reopened and specific numeric limitations established consistent with Resolution 68-16 and the Basin Plan.

19. The discharge authorized herein and the treatment and storage facilities associated with the discharge of treated municipal wastewater, except for discharges of residual sludge and solid waste, are exempt from the requirements of Title 27, CCR, Section 20005 et seq. (hereafter Title 27). The exemption, pursuant to Title 27, CCR, Section 20090(a), is based on the following:

    a. The waste consists primarily of domestic sewage and treated effluent;

    b. The waste discharge requirements are consistent with water quality objectives; and

    c. The treatment and storage facilities described herein are associated with a municipal wastewater treatment plant.

20. This Order requires the Discharger to prepare technical and monitoring reports as authorized by California Water Code (CWC) Section 13267. This Order also requires that the Discharger conduct groundwater monitoring and includes a regular schedule of groundwater monitoring in the attached Monitoring and Reporting Program. The groundwater monitoring reports are

necessary to evaluate impacts to waters of the State to assure protection of beneficial uses and compliance with Regional Board plans and policies, including Resolution 68-16, and to assure compliance with this Order. Evidence in the record includes effluent monitoring data that indicates the presence of constituents that may degrade groundwater and surface water.

BIOSOLIDS

21. USEPA has promulgated biosolids reuse regulations in 40 CFR 503, *Standard for the Use or Disposal of Sewage Sludge*, which establishes management criteria for protection of groundwater and surface waters, sets application rates for heavy metals, and establishes stabilization and disinfection criteria. The Regional Board is using the standards in 40 CFR 503 as guidelines in establishing this Order, but the Regional Board is not the implementing agency for 40 CFR 503 regulations. The Discharger may have separate and/or additional compliance, reporting, and permitting responsibilities to USEPA, which are not covered by this Order.

22. Biosolids, food processing wastewater, and treated municipal wastewater are applied to the City-owned lands. Only the treated municipal wastewater is applied to leased lands. This order requires that the City demonstrate that there is adequate capacity on the City-owned lands to agronomically apply the food processing wastes and all biosolids.

COLLECTION SYSTEM

23. The Discharger's sanitary sewer system collects wastewater using sewers, pipes, pumps, and/or other conveyance systems and directs this raw sewage to the wastewater treatment plant. A "sanitary sewer overflow" is defined as a discharge to ground or surface water from the sanitary sewer system at any point upstream of the wastewater treatment plant. Storage and conveyance facilities (such as wet wells, regulated impoundments, tanks, highlines, etc.) for temporary storage may be part of a sanitary sewer system and discharges to these facilities are not considered sanitary sewer overflows, provided that the waste is fully contained within these storage/conveyance facilities.

24. Sanitary sewer overflows consist of varying mixtures of domestic sewage, industrial wastewater, and commercial wastewater. This mixture depends on the pattern of land use in the sewage collection system tributary to the overflow. The chief causes of sanitary sewer overflows include grease blockages, root blockages, debris blockages, sewer line flood damage, manhole structure failures, vandalism, pump station mechanical failures, power outages, storm or groundwater inflow/infiltration, lack of capacity, and contractor caused blockages.

25. Sanitary sewer overflows often contain high levels of suspended solids, pathogenic organisms, toxic pollutants, nutrients, oxygen demanding organic compounds, oil and grease, and other pollutants. Sanitary sewer overflows can cause temporary exceedances of applicable water quality objectives, pose a threat to public health, adversely affect aquatic life, and impair the public recreational use and aesthetic enjoyment of surface waters in the area.

26. The Discharger is expected to take all necessary steps to adequately maintain and operate its sanitary sewer collection system. This Order requires the Discharger to prepare and implement a Sanitary Sewer System Operation, Maintenance, Overflow Prevention, and Response Plan.

REASONABLE POTENTIAL

27. California Water Code Section 13263.6(a) requires that "the regional board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRA) indicate as discharged into the POTW, for which the State Board or the regional board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective".

    The most recent toxic chemical data report does not indicate any reportable off-site releases or discharges to surface waters for this facility. Therefore, a reasonable potential analysis based on information from EPCRA cannot be conducted. Based on information from EPCRA, there is no reasonable potential to cause or contribute to an excursion above any numeric water quality objectives included within the Basin Plan or in any State Board plan, so no effluent limitations are included in this permit pursuant to CWC Section 13263.6(a).

    However, as detailed elsewhere in this permit, available effluent data indicate that there are constituents present in the effluent that have a reasonable potential to cause or contribute to exceedances of water quality standards and require inclusion of effluent limitations based on federal and state law and regulations.

28. USEPA adopted the *National Toxics Rule* (NTR) on22 December 1992, which USEPA revised on 4 May 1995 and 9 November 1999, and the *California Toxics Rule*(CTR) on 18 May 2000, which USEPA revised on 13 February 2001. These Rules contain water quality standards applicable to this discharge. The State Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan or SIP), which contains policies and procedures for implementation of the *National Toxics Rule* and the *California Toxics Rule.*

29. Federal regulations, at 40 CFR Section 122.44 require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. Water quality standards include the National Toxics Rule, the California Toxics Rule, and Basin Plan water quality objectives. 40 CFR Section 122.44(d) sets forth requirements that apply to the state to implement narrative water quality standards. 40 CFR Section 122.44(d)(vi)(A)-(C) requires the effluent limit to be based on one or more of three options, including using EPA's water quality criteria, a proposed state criterion (i.e., water quality objective), or an explicit state policy interpreting its narrative water quality criteria (i.e., the Regional Board's "Policy for

Application of Water Quality Objectives"). Based on information submitted as part of the application, in studies, and in monitoring reports, the Regional Board finds that the discharge does have a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for aluminum, ammonia, arsenic, chlorine, copper, cyanide, bis(2-ethylhexyl)phthalate, bromodichloromethane, dibromochloromethane, electrical conductivity, iron, manganese, MBAS, mercury, nitrate, nitrite, pH, temperature, total dissolved solids and 2,4,6-trichlorophenol. Final effluent limitations and/or interim performance-based effluent limitations and interim requirements with compliance schedules for the pollutants listed above are included in this Order. In addition, this Order contains provisions that:

a. Require the Discharger to conduct a study to provide information as to whether the levels of dioxins in the discharge cause or contribute to an in-stream excursion above a water quality standard, including Basin Plan numeric or narrative objectives;

b. If the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard, requires the Discharger to submit information to calculate effluent limitations for those constituents; and

c. Allows the Regional Board to reopen this Order and include effluent limitations for those constituents.

On 10 September 2001, the Executive Officer issued a letter, in conformance with California Water Code Section 13267, requiring the Discharger to prepare a technical report assessing water quality. This Order is intended to be consistent with these requirements in requiring sampling for dioxins to determine the full water quality impacts of the discharge. The technical report requirements are intended to be more detailed, listing specific constituents, detection levels, and acceptable time frames and shall take precedence in resolving any conflicts.

30. As stated in the above Finding, the USEPA adopted the NTR and the CTR, which contains water quality standards applicable to this discharge. The SIP contains policies and procedures for implementation of the NTR and CTR. The SIP, Section 2.2.1, requires that if a compliance schedule is granted for a CTR or NTR constituent, the Regional Board shall establish interim requirements and dates for their achievement in the NPDES permit. The interim limitations must be based on current treatment plant performance or existing permit limitations, whichever is more stringent; include interim compliance dates separated by no more than one year, and; be included in the Provisions. The interim limitations in this Order are based on the current treatment plant performance. In developing the interim limitation, where there are ten sampling data points or more, sampling and laboratory variability is accounted for by establishing interim limits that are based on normally distributed data where 99.9% of the data points will lie within 3.3 standard deviations of the mean (*Basic Statistical Methods for Engineers and Scientists, Kennedy and Neville, Harper and Row*). Therefore, the interim limitations in this Order are established as the mean plus 3.3 standard deviations of the available data. Where actual sampling shows an exceedance of the proposed 3.3-standard deviation interim limit, the maximum detected concentration has been established as the interim limitation. When there are less than ten sampling data points available, the *Technical Support Document for Water Quality*

Based Toxics Control ((EPA/505/2-90-001) TSD) recommends a coefficient of variation of 0.6 be utilized as representative of wastewater effluent sampling. The TSD recognizes that a minimum of ten data points is necessary to conduct a valid statistical analysis. The multipliers contained in Table 5-2 of the TSD are used to determine a maximum daily limitation based on a long-term average objective. In this case, the long-term average objective is to maintain, at a minimum, the current plant performance level. Therefore, when there are less than ten sampling points for a constituent, interim limitations are based on 3.11 times the maximum observed sampling result to obtain the daily maximum interim limitation (TSD, Table 5-2). The Regional Board finds that the Discharger can undertake source control and treatment plant measures to maintain compliance with the interim limitations included in this Order. Interim limitations are established when compliance with NTR- and CTR-based effluent limitations cannot be achieved by the existing discharge. Discharge of constituents in concentrations in excess of the final effluent limitations, but in compliance with the interim effluent limitations, can significantly degrade water quality and adversely affect the beneficial uses of the receiving stream on a long-term basis. The interim limitations, however, establish an enforceable ceiling concentration until compliance with the effluent limitation can be achieved.

31. **Dilution:** As discussed in the information sheet, the Discharger developed a model to assess dilution and mixing zones. The accuracy of the model results are questionable due to a lack of site data to calibrate and validate the model, the lack of accounting for tidal cycles and recirculation, and the lack of accounting for the Brown Sand, Inc. discharge adjacent to the outfall. However, because there is no in-stream flow meter in the vicinity of the discharge to provide real-time data, this Order relies on flow information from the Vernalis monitoring station, as well as some of the model information as it is available. This Order also requires the Discharger to install a flow monitoring station in the vicinity of the outfall to provide real-time data to better assess available dilution.

In the immediate vicinity of the outfall, little dilution is available for the side-bank discharge. In addition, the dilution is reduced due to the added discharge from the Brown Sand impoundment immediately downstream. No dilution is available for the acute aquatic criteria due to the limited mixing of the side-bank discharge near the outfall, the commingling with an adjacent NPDES discharge, the 1-hour exposure interval that the acute criteria are intended to protect, and the periods of slack tide that can occur at low river flows.

The SIP requires that a mixing zone not dominate or compromise the integrity of the entire water body and shall be as small as practicable. The thermal modeling, while not proven to be accurate, as discussed in the information sheet, presented a spatial definition to the changes in temperature that occur in the receiving water. This was used to define a mixing zone for constituents subject to chronic aquatic criteria and dilution to be determined at the edge of this mixing zone. As discussed further in the information sheet, the mixing zone will be restricted to the surface layer of the water column in a plume hugging the eastern shore of the river and extending to 450 feet downstream of the outfall. Temperature differences at the edge of this mixing zone indicate that a 4:1 dilution exists at the edge of this mixing zone. Therefore, for constituents subject to chronic aquatic criteria, a 4:1 dilution will be applied. This mixing zone

will provide protection to the benthic community and minimize the impacts of the discharge to the river.

The overlap of the plumes from the City of Manteca and the Brown Sand impoundment will limit the extent of a mixing zone for arsenic, a constituent of mutual concern between these discharges. Additionally, the receiving water monitoring shows an average arsenic concentration of 3.0 ug/l, exceeding the USEPA recommended water quality criterion for protection of human health. The receiving water lacks assimilative capacity for arsenic. There is no dilution available for arsenic under these conditions.

The assimilative capacity of the receiving water is dependent on the background concentration of the receiving water. Data collected in 2002 indicates that the receiving water has no assimilative capacity, and therefore no dilution can be granted for aluminum, electrical conductivity, iron, manganese, and mercury.

Human health-based criteria that are based on safe-exposure levels for lifetime exposure (e.g., cancer risk estimates) utilize the harmonic mean flow to represent the receiving water flow. A steady state analysis utilizing the harmonic mean flow at Vernalis provides a dilution of 222:1. The Regional Board is not required to grant a mixing zone or allocate the full assimilative capacity of the receiving water. For limitations based on these human health criteria, dilution is limited to the amount required to maintain compliance. Where the ambient background concentrations are lower than the applicable human health criterion, the dilution credits determined in Table 12 of the Information Sheet apply for the determination of effluent limitations for carcinogens.

PRIORITY POLLUTANTS

32. **Copper:** The Report of Waste Discharge submitted by the Discharger indicates the presence of copper at levels that exceed the numeric water quality objective for copper contained in the Basin Plan (Table III-1). Based on twelve effluent samples, the maximum reported copper value is 13 ug/l, which is within a range that may cause the receiving stream to exceed the water quality objective for copper. Copper toxicity is hardness dependent and data submitted by the Discharger indicates a worst-case effluent hardness concentration of 170 mg/l as $CaCO_3$. Based on a hardness of 170 mg/l, the calculated hardness dependent copper effluent limitations are 7.9 ug/l as a monthly average and 10.4 ug/l as a daily maximum. Effluent limitations for copper are included in this Order for the protection of freshwater species, and are based on the Basin Plan objective. The determination of the final effluent limitations, which are hardness dependent, are summarized in Table 11 of the Information Sheet.

33. **Cyanide:** The Report of Waste Discharge submitted by the Discharger indicates the presence of cyanide at levels that exceed the water quality objective for cyanide contained in the Basin Plan (Table III-1). Based on twelve effluent samples, the maximum reported cyanide value is 31 ug/l, which may cause the receiving stream to exceed the Basin Plan objective of 0.01 mg/l. Effluent limitations for cyanide are included in this Order based on the Basin Plan objective and

calculations outlined in the TSD. The calculated effluent limitations for cyanide are 3.7 ug/l as a monthly average and 10.0 ug/l as a daily maximum (see Table 11 of the Information Sheet).

34. **Arsenic:** Arsenic is an inorganic priority pollutant that produces human health effects and is considered a carcinogen. Data, submitted by the discharger between January 2002 and December 2002, indicates arsenic is present in the effluent at levels that exceed the water quality objective for arsenic contained in the Basin Plan (Table III-1). The Basin Plan numeric objective for the San Joaquin-Sacramento Delta is 10 ug/l. Also, the new USEPA Primary MCL for arsenic is 10 ug/l. The maximum concentration in the effluent is 14 ug/l. The Regional Board finds that there is a reasonable potential for the discharge to cause or contribute to an excursion above the numeric water quality objective for arsenic. An effluent limitation for arsenic is included in this Order based on the Basin Plan numeric objective and the calculations outlined in Section 5.4.4 of the TSD. The effluent limitation for arsenic is 10 ug/l as a monthly average (see Table 11 of the Information Sheet).

35. **Total Trihalomethanes and Chloroform:** Information submitted by the Discharger indicate that the effluent contains trihalomethanes (THMs) and chloroform. The Basin Plan contains the "Chemical Constituent" objective that requires, at a minimum, that waters with a designated MUN use not exceed California MCLs. In addition, the Chemical Constituent objective prohibits chemical constituents in concentrations that adversely affect beneficial uses. The California's Drinking Water Standard primary MCL for total THMs is 100 ug /l. The USEPA primary MCL for total THMs is 80 ug/l, which was effective on 1 January 2002 for surface water systems that serve more than 10,000 people. Pursuant to the Safe Drinking Water Act, DHS must revise the current total THMs MCL in Title 22 CCR to be as low or lower than the USEPA MCL. The State Board, in WQO No 2003-0002, stated that the Drinking Water Standard primary MCL for total THMs, which includes chloroform, of 80 ug/l could be applied to address chloroform in the discharge regulated in that Order. In addition, the Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA) has published the Toxicity Criteria Database, which contains cancer potency factors for chemicals, including chloroform, that have been used as a basis for regulatory actions by the regional boards, departments and offices within Cal/EPA. This cancer potency factor is equivalent to a concentration in drinking water of 1.1 ug/l (ppb) at the 1-in-a-million cancer risk level with the consumption of the drinking water over a 70-year lifetime. This risk level is consistent with that used by the Department of Health Services (DHS) to set *de minimis* risks from involuntary exposure to carcinogens in drinking water in developing MCLs and Action Levels and by OEHHA to set negligible cancer risks in developing Public Health Goals for drinking water. The one-in-a-million cancer risk level is also mandated by USEPA in applying human health protective criteria contained in the National Toxics Rule and the California Toxics Rule to priority toxic pollutants in California surface waters.

Municipal and domestic supply is a designated beneficial use of the receiving water. However, there are no known drinking water intakes on the San Joaquin River within several miles downstream of the discharge, and chloroform is a non-conservative pollutant. Therefore, to protect the MUN use of the receiving waters, the Regional Board finds that, in this specific circumstance, application of the USEPA MCL for total THMs for the effluent is appropriate, as

long as the receiving water does not exceed the OEHHA cancer potency factor's equivalent receiving water concentration at a reasonable distance from the outfall (e.g., before reaching the drinking water intakes). A review of effluent data collected from January 2002 through December 2002 showed total THMs with a maximum concentration of 17 ug/l and an average concentration of 10 ug/l. Chloroform data collected over the same period showed a maximum concentration of 12 ug/l and an average concentration of 8 ug/l. Data is not available regarding the constituent concentrations in the receiving water. Considering the available dilution based on the harmonic mean flow of the San Joaquin River, the discharge does not have a reasonable potential to cause or contribute to an in-stream excursion above the water quality objective for MUN use by causing exceedance of the USEPA primary MCL for total THMs or the chloroform OEHHA cancer potency factor's equivalent receiving water concentration. Therefore, effluent limitations for total THMs and chloroform are not included in this Order.

36. **Bromodichloromethane (BDCM) and dibromochloromethane (DBCM):** Based on information included in analytical laboratory results submitted by the Discharger, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for BDCM and DBCM. The CTR includes standards for the protection of human health based on a one-in-a-million cancer risk for these organic constituents. The criteria for waters from which both water and organisms are consumed are 0.56 ug/l and 0.41 ug/l for BDCM and DBCM, respectively. The maximum observed effluent concentrations for BDCM and DBCM are 3.5 ug/l and 1.2 ug/l, respectively. Effluent limitations for BDCM and DBCM are included in this Order based on the CTR criteria for the protection of human health. The Discharger is able to comply with the limitations.

37. **Trichlorophenol:** Based on information included in analytical laboratory results submitted by the Discharger, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for 2,4,6-trichlorophenol. The CTR includes standards for the protection of human health. The 2,4,6-trichlorophenol criteria for the protection of human health based on a one-in-a-million cancer risk for waters from which both water and aquatic organisms are consumed is 2.1 ug/l. The maximum observed effluent 2,4,6-trichlorophenol concentration is 11 ug/l. 2,4,6-trichlorophenol has not been detected in the upstream receiving water. Effluent Limitations for 2,4,6-trichlorophenol are included in this Order based on the CTR standard for the protection of human health. The Discharger is able to comply with the effluent limitations.

38. **Bis(2-ethylhexyl)phthalate:** Based on information included in analytical laboratory results submitted by the Discharger, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for bis(2-ethylhexyl)phthalate. The CTR includes a standard for the protection of human health based on a one-in-a-million cancer risk for bis(2-ethylhexyl)phthalate of 1.8 ug/l. The maximum observed effluent bis(2-ethylhexyl)-phthalate concentration is 7 ug/l. Bis(2-ethylhexyl)phthalate has not been detected in the upstream receiving water. Effluent Limitations for bis(2-ethylhexyl)phthalate are included in this Order based on the CTR criteria for the protection of human health. The Discharger is able to comply with the effluent limitations,

39. **Mercury:** Based on information submitted by the Discharger, the discharge contains mercury. The Delta waterways are listed in accordance with Clean Water Act Section 303(d) as impaired for mercury based on bioaccumulation of this pollutant in fish tissue. The CTR contains criteria for mercury. The CTR criteria, however, do not address bioaccumulation in the river. The WQCF effluent contains detectable levels of mercury below CTR priority pollutant criteria. Since the CTR criteria are not based on bioaccumulation, the discharge was evaluated based on the Basin Plan's narrative toxicity objective. Any loading of mercury from the discharge may have the reasonable potential to cause or contribute to an excursion above the narrative toxicity objective by causing bioaccumulation in fish tissue. Health advisories by the Department of Health Services remain in effect for human consumption of fish in the Delta, including the San Joaquin River at Manteca, due to excessive concentrations of mercury in fish flesh. These current warnings and available fish tissue data confirm that there is currently no assimilative capacity for mercury. Therefore, water quality based effluent limitations for mercury that properly address bioaccumulation are required. A TMDL for mercury is scheduled to be completed by December 2005. For situations like this, the SIP recommends that limiting mass loading of the bioaccumulative pollutant should be considered in the interim at representative, current levels pending development of the TMDL. A mass load limit for mercury is included in this Order. If the Regional Board determines that a mercury offset program is feasible for Dischargers subject to a NPDES permit, then this Order may be reopened to reevaluate the interim mercury mass loading limitation(s) and the need for a mercury offset program for this Discharger.

NONPRIORITY POLLUTANTS

40. **Temperature:** The State Board Water Quality Control Plan for Control of Temperatures in Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (the Thermal Plan) is applicable to this discharge. For the purposes of compliance with the Thermal Plan, the discharger is considered to be an existing discharger of elevated temperature waste. Monitoring by the discharger indicates that the 20 ^{o}F limitation of Objective 5.A.(1)a of the Thermal Plan is occasionally exceeded in winter months when the receiving water is at its lowest temperatures. Modeling conducted by Resource Management Associates (RMA), subject to the model limitations discussed in the information sheet, indicates that the current and the expanded flows with continuous discharge also exceed both the 1 degree and 4 degree requirements of Objectives 5.A.(1)b and 5.A.(1)c of the Thermal Plan. The modeling also demonstrates that a timed discharge, that is, discharging only on the outgoing tide, for the increased flow exceeds only the 4 degree requirement, not the 1 degree requirement. The Discharger has requested an exception to the 4 degree requirement of Objective 5.A.(1)c of the Thermal Plan which requires that the discharge shall not cause a surface water temperature rise greater than 4 ^{o}F above the natural temperature of the receiving waters at any time or place and has also requested a one month averaging period to meet the 20 degree limit of Objective 5.A.(1)a. The Discharger has not yet implemented measures necessary to meet conditions for any exception, including installation of an in-stream real-time flow monitor in the vicinity of the outfall or construction of storage basins to provide for effluent discharges on out-going tides. Therefore, effluent and receiving water limitations are included to achieve compliance with the Thermal Plan. This Order requires that the discharger comply with the Thermal Plan and implement the necessary

mitigations, such as discharging during the outgoing tide, to bring the existing discharge into compliance and maintain compliance when increasing its effluent discharge rate. This Order may be reopened to include alternative limitations for temperature if a resolution is adopted in the future that provides exceptions for particular objectives of the Thermal Plan.

41. Studies by the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, the University of California at Davis, et. al., have identified the Central Valley Chinook Salmon and the Central Valley Steelhead as sensitive species that are affected by elevated temperatures in the San Joaquin River. There are four runs of salmon in the Central Valley that results in there being adults and juveniles in portions of the Delta every month of the year. Generally, adults would be moving upstream in the fall, and fry and smolt moving downstream in the winter and spring. River temperatures above 68 °F are unsuitable for supporting salmonoids. Migration of adults is usually delayed when river temperatures reach this level. In a Department of Water Resources Study, adult salmon will cease migration if water temperatures are above 70 °F. At 77 °F, adult mortality may occur. The Thermal Plan does not protect aquatic life from high temperature wastewater being discharged to an elevated temperature river. However, the Thermal Plan limits incremental increases in temperature. Discharge from the wastewater treatment plant of treated effluent with an elevated temperature may affect salmon and other migrating fish in the San Joaquin River. In so far as elevated temperature is deleterious to Chinook salmon, effluent temperature must be limited so as not to cause the receiving water to be harmful to the salmon. When the assimilative capacity of the river is diminished, effluent temperature must be held to the water quality criteria. The CALFED Bay-Delta Program target is to maintain water temperatures below 68 °F in migratory routes of anadromous fish in the spring and fall. This Order requires the Discharger to study the potential impacts to the fishery associated with a discharge of effluent with elevated temperature.

42. **pH:** The Discharger requested in a 17 October 2002 letter that the effluent pH range for discharges to the San Joaquin River be restricted to pH 6.5 to 8.0. The reason for restricting the pH of the discharge is to facilitate less restrictive ammonia effluent limitations for the discharge to the San Joaquin River. These pH limits are included in this Order.

43. **Ammonia-Nitrogen:** Treated and untreated domestic wastewater, including the discharge from the WQCF, contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. Wastewater treatment plants commonly use nitrification to remove ammonia from the waste stream. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. The USEPA has developed Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life, recommending acute criteria for ammonia that are pH-dependent and chronic criteria that are pH- and temperature-dependent. The WQCF effluent has a reasonable potential to cause or contribute to an in-stream excursion above USEPA acute and chronic water quality criteria for ammonia. Consistent with 40 CFR section 122.44(d)(vi)(A) and the Basin Plan "Policy for Application of Water Quality Objectives", this Order implements the Basin Plan

narrative toxicity objective by applying USEPA's Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life for ammonia. This Order includes effluent limitations for ammonia, based on the narrative toxicity objective and the USEPA's Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life.

Because of the seasonal variation in pH and temperature of the receiving water and the sensitivity of the ammonia criteria to these conditions, seasonal limitations are established. For the warm weather months from 1 June to 30 September, the maximum permitted monthly average effluent pH is 8.0, the maximum historical monthly average receiving water pH is 9.1, the maximum historical monthly average effluent temperature is 27.2 F, and the maximum historical monthly average receiving water temperature is 25.7 F. The pH and temperature at the edge of a 4:1 mixing zone were estimated utilizing the USEPA DESCON program. These estimations are utilized in Table 8 of the Information Sheet to calculate effluent limitations that maintain compliance with chronic aquatic criterion in the receiving water outside of the mixing zone. Effluent limitations compliant with acute criteria for conditions at the end-of-pipe are also determined, but the more restrictive chronic criteria determine the final effluent limitations. Table 8 provides a daily maximum effluent limitation of 4.4 mg/l ammonia as N and a 30-day average effluent limitation of 2.1 mg/l. As defined by the 1999 criteria, the 4-day average CCC ammonia concentration shall not exceed 2.5 times the value of the 30-day CCC. However, considering the maximum daily limitation is less than 2.5 times the CCC in all cases, the 4-day average cannot exceed the maximum daily limitation.

For the cool weather months from 1 October to 31 May, the maximum permitted monthly average effluent pH is 8.0, the maximum historical monthly average receiving water pH is 8.5, the maximum historical monthly average effluent temperature is 25.2 F, and the maximum historical monthly average receiving water temperature is 19.6 F. The pH and temperature at the edge of a 4:1 mixing zone were estimated utilizing the USEPA DESCON program. These estimations are utilized in Table 8 to calculate effluent limitations that maintain compliance with chronic aquatic criterion in the receiving water outside of the mixing zone. Effluent limitations compliant with acute criteria for conditions at the end-of-pipe are also determined. In this case, the more restrictive acute criteria determine the final effluent limitations. Table 8 show that the acute criteria using the maximum permitted effluent pH of 8.0 provides a daily maximum effluent limitation of 5.6 mg/l ammonia as N and a 30-day average effluent limitation of 2.8 mg/l.

44. **Nitrite and Nitrate-Nitrogen:** Nitrate and nitrite are known to cause adverse health effects in humans. The Basin Plan's chemical constituents water quality objective prohibits chemical constituents in concentrations that exceed drinking water Maximum Contaminant Levels (MCLs) published in Title 22 of the California Code of Regulations or that adversely affect beneficial uses. Municipal and domestic water supply is a beneficial use of the San Joaquin River. The California Department of Health Services (DHS) has adopted Primary Maximum Contaminant Levels (MCLs) for the protection of human health for nitrite and nitrate that are equal to 1 mg/l and 10 mg/l (measured as nitrogen), respectively. Title 22 CCR, Table 64431-A, also includes a primary MCL of 10,000 ug/l for the sum of nitrate and nitrite, measured as nitrogen. The discharge from the WQCF has a reasonable potential to cause or contribute to an

in-stream excursion above water quality standards for nitrite and nitrate because of the nitrification and denitrification processes. Effluent limits for nitrite and nitrate are based on the MCLs. Effluent Limitations for nitrite and nitrate are included in this Order to assure the treatment process adequately nitrifies and denitrifies the waste stream to protect the beneficial uses of municipal and domestic supply.

45. **Salinity:** The discharge contains total dissolved solids (TDS), chloride and electrical conductivity. These are water quality parameters that are typically indicative of the salinity of the water. Their presence in water can be growth limiting to certain agricultural crops and can affect the taste of the water for human consumption. There are no USEPA water quality criteria for protection of aquatic organisms for these constituents. The Basin Plan "Chemical Constituent" objective incorporates state MCLs, contains a narrative objective, and contains numeric water quality objectives for electrical conductivity. The secondary California maximum contaminant level (MCL) for TDS is 500 mg/l as a recommended level, 1000 mg/l as an upper level, and
1500 mg/l as a short-term maximum. The recommended agricultural water quality goal for TDS, that would implement the narrative "Chemical Constituent" objective, is 450 mg/l as a long-term average based on *Water Quality for Agriculture,* Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). The recommended agricultural water quality goal for chloride, that would implement the narrative "Chemical Constituent" objective, is 106 mg/l based on *Water Quality for Agriculture,* Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). The Basin Plan water quality objectives for electrical conductivity for the South Delta are 700 umhos/cm (from 1 April to 31 August) and 1000 umhos/cm (from 1 September to 31 March). State Board Decision 1641 (D-1641) requires that the 1000 umhos/cm objective be met year round until 1 April 2005 at which time the seasonal objectives will be effective.

A review of the Discharger's monitoring reports from January 1998 through December 2002 indicates an annual average TDS effluent concentration of 634 mg/l, a lowest monthly average of 540 mg/l, and a highest monthly average of 727 mg/l. These concentrations exceed the applicable objectives. Limited TDS data collected at receiving water sample location R1 from January 2002 through December 2002 showed a TDS concentration range from 210 mg/l to 1300 mg/l with an average of 500 mg/l in 12 sampling events. The Regional Board report *Total Maximum Daily Load for Salinity and Boron in the Lower San Joaquin River (January 2002)* presented monthly average TDS data for the San Joaquin River at Vernalis from October 1976 through September 1997. The Vernalis data showed a maximum monthly average TDS of 1024 mg/l with 57 of 252 months having monthly averages greater than 500 mg/l. This data indicates that the receiving water frequently exceeds water quality objectives to protect its beneficial uses and lacks assimilative capacity for TDS. As water exported from the Delta by the State Water Project is, in part, mixed with Colorado River water to provide municipal water supply with an acceptable TDS, any increase in salt concentration effectively reduces the available water supply in Southern California (*Metropolitan Water District of Southern California, Salinity Management Study, 1998*).

Chloride concentrations in the effluent ranged from 100-230 mg/l with an average of 138 mg/l based on 16 samples collected during 2002. Background concentrations in the San Joaquin River ranged from 51-170 mg/l with an average of 98 mg/l based on results from eleven samples collected during 2002. Both the receiving water and the effluent exceed the water quality objective of 106 mg/l based on the narrative objective.

Electrical conductivity (EC) shows reasonable potential to exceed water quality objectives in both the effluent and in the receiving water. A review of the Discharger's monitoring reports from January 1998 through December 2002 shows the annual average effluent EC is 1099 umhos/cm, the lowest monthly average is 819 umhos/cm, and the highest monthly average is 1300 umhos/cm. These levels exceed the applicable objectives. EC data collected at receiving water sample location R1 from January 2002 through December 2002 show that the conductivity in the receiving water ranged from 380 umhos/cm to 1100 umhos/cm and averaged 686 umhos/cm in 12 sampling events. Hourly EC data collected at the Department of Water Resources (DWR) Mossdale monitoring station (RSAN087) from December 2000 through September 2002 show that the conductivity in the San Joaquin River ranged from 299 umhos/cm to 1131 umhos/cm and averaged 721 umhos/cm. San Joaquin River monitoring for electrical conductivity at Vernalis between 1985 and 1998 showed frequent exceedances of the EC water quality objectives (Reference Figure 1-3, *Total Maximum Daily Load for Salinity and Boron in the Lower San Joaquin River (January 2002*)). These data show that the receiving water frequently has no assimilative capacity for EC. An Effluent Limitation for electrical conductivity is included in this Order and is based on the Basin Plan water quality objective for electrical conductivity in the South Delta.

The TDS, chloride, and electrical conductivity objectives and recommended levels are all measures of the salt content of the water. Compliance with the Effluent Limitations for electrical conductivity based on the Basin Plan seasonal water quality objectives of 700 umhos/cm and 1000 umhos/cm will be protective of the chloride and TDS recommended levels; therefore, no limitations are included for chloride and TDS.

46. **Aluminum:** Aluminum concentrations in the effluent were detected in the range of 70 ug/L to 350 ug/L in 12 samples collected between January 2002 and December 2002. Aluminum was detected in the receiving water (R-1) in the range of 420 ug/L to 2200 ug/L in 12 samples collected between January 2002 and December 2002. Dissolved concentrations of aluminum in the effluent and the receiving water were significantly less than the totals listed above. The Basin Plan's chemical constituents water quality objective prohibits chemical constituents in concentrations that exceed state MCLs or that adversely affect beneficial uses. MUN is a beneficial use of the San Joaquin River. The Primary and Secondary MCLs for aluminum are 1000 ug/l and 200 ug/l respectively. The Basin Plan contains a narrative toxicity objective. Consistent with 40 CFR 122.44(d), USEPA's ambient Water Quality Criteria for protection of freshwater aquatic life for aluminum expressed as total recoverable are 750 ug/l (1-hour average) and 87 ug/l (4-day average), and are appropriate to implement the narrative toxicity objective. Since both the receiving water and the effluent exceed USEPA's ambient water quality criteria and the secondary MCL, no dilution can be granted. The effluent has reasonable potential to cause or contribute to an in-stream excursion above water quality objectives for aluminum.

Therefore, this Order includes an effluent limitation for aluminum of 71ug/l as a monthly average and 143 ug/l as the daily maximum.

47. **Iron:** Iron concentrations in the effluent ranged from 170 ug/l to 730 ug/l while background concentrations in the San Joaquin River ranged from 780 ug/l to 2800 ug/l based on results from 12 samples collected between January 2002 and December 2002. The Basin Plan chemical constituent objective includes a receiving water objective in Table III-1 for iron of 300 ug/l in the Delta, and the secondary MCL for iron of 300 ug/l. Both the receiving water and the effluent exceed the Basin Plan numeric objective and the secondary MCL. Therefore, effluent limitations are included in this Order based on the Basin Plan chemical constituents objective.

48. **Manganese:** Manganese concentrations in the effluent ranged from 13 ug/l to 120 ug/l while background concentrations in the San Joaquin River ranged from 82 ug/l to 220 ug/l based on results from 11 samples collected between January 2002 and December 2002. The Basin Plan chemical constituent objective includes a receiving water objective in Table III-1 for manganese of 50 ug/l in the Delta, and the secondary MCL for manganese of 50 ug/l. Both the receiving water and the effluent exceed the Basin Plan numeric objective and the secondary MCL. Therefore, effluent limitations are included in this Order based on the Basin Plan chemical constituents objective.

49. **Chlorine:** The Discharger currently uses chlorine for disinfection and has reported that it uses sodium hypochlorite for maintenance. Chlorine is extremely toxic to aquatic organisms. The Discharger uses a sulfur dioxide process to dechlorinate the effluent, but will discontinue this with the installation of the UV disinfection system. Because of the existing chlorine use and the future use of hypochlorite solutions without effluent dechlorination, there is reasonable potential for chlorine to be discharged at toxic concentrations. The Basin Plan contains a narrative toxicity objective. Consistent with 40 CFR 122.44(d), it is appropriate to use the USEPA ambient water quality criteria for chlorine for protection of freshwater aquatic life of 11 ug/l as a 4-day average (chronic) concentration, and 19 ug/l as a 1-hour average (acute) concentration to implement the narrative toxicity objective. Therefore, this Order includes water quality based effluent limitations for chlorine based on the USEPA ambient criteria to protect freshwater aquatic life.

50. **Methylene blue active substances (MBAS):** The effluent contains MBAS at levels that may cause or contribute to exceedances in the receiving waters of water quality objectives in the Basin Plan. The Basin Plan includes the "Chemical Constituents" objective that incorporates state MCLs applicable to waters designated MUN. MUN is a designated beneficial use of the San Joaquin River. The Secondary MCL Consumer Acceptance Limit is 500 ug/l for foaming agents (MBAS). The Basin Plan also includes water quality objectives that water not contain floating material or taste- or odor-producing substances in concentrations that causes nuisance or adversely affect beneficial uses. The Basin Plan identifies non-contact water recreation, which includes aesthetic enjoyment, as a beneficial use of the San Joaquin River. MBAS concentrations in excess of the Secondary MCL-Consumer Acceptance Limit produce aesthetically undesirable froth, taste, and odor. Foam has been observed on the surface of the discharge plume from the WQCF. The maximum observed effluent MBAS concentration is

1800 ug/l. The maximum observed upstream receiving water MBAS concentration is less than 20 ug/l. An Effluent Limitation for MBAS is included in this Order based on of the Basin Plan water quality objectives for chemical constituents, floating material, and tastes and odors.

51. **Molybdenum:** The recommended agricultural water quality goal for molybdenum, that would implement the narrative "Chemical Constituent" objective, is 10 ug/l based on *Water Quality for Agriculture,* Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). Molybdenum was not monitored in the effluent or in the receiving waters. Because of the uncertainty associated with the lack of monitoring, additional studies of this constituent are warranted to more thoroughly evaluate reasonable potential for this constituent to exceed criteria. MRP No. R5-2004-0028 specifies monitoring for this pollutant. If the monitoring shows a reasonable potential to cause or contribute to an exceedance of a water quality objective, this Order may be reopened to consider incorporation of appropriate effluent limitations.

52. **Carbofuran:** Carbofuran was detected in the effluent and receiving water at concentrations greater than the OEHHA criterion of 1.7 ug/l. Because the data was greater than the method detection limit but less than the laboratory's reporting limit, the data was flagged as "detected but not quantified". Additional monitoring is required. If the monitoring shows a reasonable potential to cause or contribute to an exceedance of a water quality objective, this Order may be reopened to consider incorporation of appropriate effluent limitations.

53. **Acute Bioassay:** The new USEPA test procedure for acute bioassays (EPA-821-R-02-012, Fifth Edition, October 2002) constitutes a more stringent acute toxicity limitation. The finding for ammonia indicated that there is a reasonable potential for the RWCF effluent to cause or contribute to an in-stream excursion above acute and chronic water quality standards for ammonia. To comply with the acute toxicity requirement of this Order and to comply with the Basin Plan narrative toxicity objective, the Discharger must reduce effluent ammonia concentrations to comply with the new effluent limitations by 31 March 2004. Monitoring Reporting Program No. R5-2004-0028 allows the bioassay to be modified to eliminate ammonia-related toxicity until 31 March 2004, at which time the Discharger shall be required to implement the test without modifications to eliminate ammonia toxicity. The time schedule is authorized to be included in the Monitoring and Reporting Program based on 40 CFR § 122.47.

54. **Chronic Bioassay:** The Discharger shall conduct the chronic toxicity testing specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger shall initiate a Toxicity Identification Evaluation (TIE) to identify the causes of toxicity. Upon completion of the TIE, the Discharger shall submit a workplan to conduct a Toxicity Reduction Evaluation (TRE) and, after Regional Board evaluation, conduct the TRE. This Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if the State Board adopts a chronic toxicity water quality objective, this Order may be reopened and a limitation based on that objective included.

DISSOLVED OXYGEN ISSUES

55. The dissolved oxygen (DO) objectives applicable to the San Joaquin River are as follows:

    a. The Basin Plan prescribes a minimum DO concentration in the San Joaquin River of 5.0 mg/l. This standard is applicable throughout the year.

    b. The Bay/Delta Plan prescribes a minimum DO concentration of 6.0 mg/l in the San Joaquin River inside the reach from Turner Cut to Stockton during the period 1 September through 30 November. This higher DO concentration was imposed to enhance aquatic conditions during critical migration periods for salmon.

56. The DO objectives are frequently not met in the San Joaquin River, leading to the Clean Water Act section 303(d) listing. In 1998, the Regional Board classified the DO impairment within the San Joaquin River as a Toxic Hot Spot, making it a high priority problem for correction. Since the spring of 1999, the Discharger and other stakeholders have participated in the steering committee for the development of the DO TMDL for the San Joaquin River in the Deep Water Ship Channel (DWSC). A TMDL implementation plan was submitted to the Regional Board in February 2003. Staff has developed and submitted to the USEPA in June 2003 a TMDL report for controlling the problem. The existing low DO conditions in the Stockton DWSC are partially the result of channel morphology, and point and non-point sources that are beyond the control of the Discharger. The Discharger will make a significant reduction in the magnitude of its contribution to the DO problem by implementation of more stringent ammonia and BOD effluent limitations through the construction of nitrification, denitrification, and tertiary coagulation and filtration facilities. These facilities will prevent ammonia toxicity and reduce the nitrogenous and carbonaceous biochemical oxygen demand that is presently exerted on the San Joaquin River.

    Based on the above information, further action by the Discharger to reduce its impact on the San Joaquin River DO concentration, beyond the requirements of this permit, will not be required by the Regional Board until such time as the TMDL for DO has been developed and approved by USEPA. This Order contains a provision to allow for the permit to be reopened to consider modification of effluent limitations after the DO TMDL is finalized.

DISINFECTION/FILTRATION

57. The beneficial uses of the San Joaquin River include municipal supply, water contact recreational uses and agricultural irrigation supply, and there is, at times, less than 20:1 dilution. Recreational uses identified in the immediate vicinity of the WQCF outfall include boating, skiing, swimming, and fishing. A number of agricultural diversions have been identified through a search of the State Board, Water Rights Division database. Within an approximate one-mile radius of the outfall, there are approximately five agricultural diversions identified in the database. One of the agricultural diversions is just downstream and in the immediate vicinity of the outfall.

To protect these beneficial uses, the Regional Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The principal infectious agents (pathogens) that may be present in raw sewage may be classified into three broad groups: bacteria, parasites, and viruses. Tertiary treatment, consisting of chemical coagulation, sedimentation, and filtration, has been found to remove approximately 99.5% of viruses. Filtration is an effective means of reducing viruses and parasites from the waste stream. Filtration is also necessary prior to UV disinfection to prevent any solids from interfering with the performance of the UV disinfection system. The wastewater must be treated to tertiary standards (filtered) to protect contact recreation and food crop irrigation uses and to assure the reliability and effectiveness of UV disinfection.

The California Department of Health Services (DHS) has developed reclamation criteria, CCR, Title 22, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, schoolyards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent **total coliform** levels not exceed 2.2 MPN/100 ml as a 7-day median. Title 22 is not directly applicable to surface waters; however, the Regional Board finds that it is appropriate to apply DHS' reclamation criteria because the San Joaquin River is used for irrigation of agricultural land and for contact recreational purposes. The stringent disinfection criteria of Title 22 are appropriate since the relatively undiluted effluent may be used for the irrigation of food crops. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DHS.

In addition to coliform testing, a **turbidity** effluent limitation has been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is capable of reliably meeting a turbidity limitation of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the filtration system such that virus removal is impaired would normally result in increased particles in the effluent, which would result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations.

The establishment of tertiary limitations has not been previously required for this discharge; therefore, a schedule for compliance with the tertiary treatment requirements is included as a Provision in this Order. This Order provides interim effluent limitations for BOD, TSS, and total coliform, which the Discharger is currently capable of meeting. Full compliance with the final effluent limitations for BOD, TSS, total coliform, and turbidity are not required by this Order until completion of tertiary treatment facilities, or **1 February 2009**, whichever is first. Adequate time is provided for the Discharger to propose alternatives that are still protective of public health and irrigation uses, but at a reduced cost. The permit may be reopened at such time as the Discharger proposes an alternative that is protective of public health and irrigation uses. Alternatives to tertiary treatment, such as expanded land disposal, would require modification of

the permit.

58. This Order contains Effluent Limitations and a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. In accordance with California Water Code, Section 13241, the Regional Board has considered the following:

    a. As stated in the above Findings, the past, present and probable future beneficial uses of the receiving stream include municipal and domestic supply, agricultural irrigation, agricultural stock watering, industrial process water supply, industrial service supply, body contact water recreation, other non-body contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, warm fish migration habitat, cold fish migration habitat, warm spawning habitat, wildlife habitat, and navigation.

    b. The environmental characteristics of the hydrographic unit, including the quality of the available water, will be improved by the requirement to provide tertiary treatment for this wastewater discharge. Tertiary treatment will allow for the reuse of the undiluted wastewater for food crop irrigation and contact recreation activities that would otherwise be unsafe according to recommendations from the California Department of Health Services (DHS).

    c. Fishable and swimmable water quality conditions can be reasonably achieved through the coordinated control of all factors that affect water quality in the area.

    d. The economic impact of requiring an increased level of treatment has been considered. The Discharger has estimated that the increased level of treatment will cost approximately $5.1 million. The current monthly domestic sewer user fee is $ 11.05 (2000). The California average monthly domestic sewer user fee is $19.71 (2000). The loss of beneficial uses within downstream waters, without the tertiary treatment requirement, which includes prohibiting the irrigation of food crops and prohibiting public access for contact recreational purposes, would have a detrimental economic impact. In addition to pathogen removal to protect irrigation and recreation, tertiary treatment may also aid in meeting discharge limitations for other pollutants, such as heavy metals, reducing the need for advanced treatment.

    e. The requirement to provide tertiary treatment for this discharge will not adversely impact the need for housing in the area. The potential for developing housing in the area will be facilitated by improved water quality, which protects the contact recreation and irrigation uses of the receiving water. DHS recommends that, in order to protect the public health, relatively undiluted wastewater effluent must be treated to a tertiary level for contact recreational and food crop irrigation uses. Without tertiary treatment, the downstream waters could not be safely utilized for contact recreation or the irrigation of food crops.

    f. It is the Regional Board's policy, (Basin Plan, page IV-15.00, Policy 2) to encourage the reuse of wastewater. The Regional Board requires Dischargers to evaluate how reuse or land disposal of wastewater can be optimized. The need to develop and use recycled water

is facilitated by providing a tertiary level of wastewater treatment that will allow for a greater variety of uses in accordance with California Code of Regulations, Title 22.

    g. The Regional Board has considered the factors specified in CWC Section 13263, including considering the provisions in CWC Section 13241, in adopting the disinfection and filtration requirements under Title 22 criteria. The Regional Board finds, on balance, that these requirements are necessary to protect the beneficial uses of the San Joaquin River, including water contact recreation and irrigation uses.

STORMWATER

59. Federal Regulations for stormwater discharges are contained in 40 CFR Parts 122, 123, and 124. The regulations require specific categories of facilities, which discharge stormwater associated with industrial activity (stormwater) to obtain NPDES permits and implement Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate industrial stormwater pollution.

60. Regulated stormwater discharges include those from facilities used in storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1 mgd or more, or required to have an approved pretreatment program under 40 CFR Part 403. Not included are farmlands, domestic gardens, or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with Clean Water Act Section 405.

61. The State Board adopted Order 97-03-DWQ (General NPDES Permit No. CAS000001) specifying waste discharge requirements for discharges of stormwater associated with industrial activities, excluding construction activities, and requiring submittal of a Notice of Intent by industries to be covered under the Order. This Order further specified that if an individual Order is adopted for stormwater runoff from a facility, then the General Permit would no longer apply. Since all stormwater that falls on the treatment plant site is collected and pumped to the secondary-treated wastewater storage ponds of the plant, a Stormwater Pollution Prevention Plan has not been made a requirement of this Order.

RECLAMATION

62. Wastewater is currently used to irrigate 210 acres of agricultural land owned by the City of Manteca, and 150 acres of leased land owned by Dutra Farms. DHS has established statewide reclamation criteria in Title 22, California Code of Regulations, Section 60301, et seq. (hereafter Title 22) for the use of reclaimed water, and has developed guidelines for specific uses. This Order requires compliance with applicable Title 22 requirements.

PRETREATMENT

63. Clean Water Act Section 307(b) and Federal Regulations at 40 CFR Part 403 require publicly owned treatment works to develop an acceptable industrial pretreatment program. A pretreatment program is required to prevent the introduction of pollutants that will interfere with treatment plant operations or sludge disposal and prevent pass through of pollutants that exceed water quality objectives, standards, or permit limitations. Federal Regulation (40 CFR 403.8) requires the Discharger to develop and submit for approval by the Regional Board an acceptable industrial pretreatment program.

64. The Discharger submitted a draft pretreatment program to the Regional Board for approval. The Regional Board, in an October 2001 Pretreatment Audit, identified areas of the program that are deficient or not implemented. The Regional Board staff, on 22 January 2003, provided comments to the Discharger identifying provisions of the City's Waste Ordinance and the Interjurisdictional Agreement between the City of Manteca and the Lathrop County Water District that are deficient. This Order provides a compliance schedule for the Discharger to submit a pretreatment program that corrects the deficiencies noted in the October 2001 Pretreatment Compliance Audit and in the 22 January 2003 letter. The Regional Board will reopen this Order to approve the pretreatment program upon submittal of a program that corrects the deficiencies. Certain areas of the pretreatment program have not been fully implemented pending approval of the program. This Order requires full compliance with all pretreatment program requirements by **1 October 2004**.

OTHER

65. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

66. The discharge is presently governed by Waste Discharge Requirements Order No. 5-01-007, adopted by the Regional Board on 26 January 2001. The discharge of biosolids is also presently governed by Waste Discharge Requirements Order No. 92-052, adopted by the Regional Board on 27 March 1992.

67. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.), requiring preparation of an environmental impact report or negative declaration in accordance with Section 13389 of the California Water Code.

68. The City of Manteca has certified a final environmental impact report (EIR) in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.), and the State CEQA Guidelines.

    The Regional Board has considered the EIR and, after review of the available data, finds significant impacts to water quality could occur after the proposed expansion. However, these waste discharge requirements will avoid the significant impacts on water quality by: (a) reducing BOD, TSS, pathogen and metals concentrations with the addition of tertiary level treatment, (b) reducing ammonia, nitrate and nitrite with the additions of nitrification and denitrification treatment, (c) mitigating the thermal impacts by discharging treated wastewater on outgoing tides only, and (d) reducing the salinity of the discharge through the implementation of pollution prevention measures or treatment.

69. The Regional Board has considered the information in the Information Sheet in developing the Findings of this Order. The Information Sheet is included as Attachment A and is a part of this Order.

70. The Regional Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

71. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

72. This Order shall serve as an NPDES permit pursuant to Clean Water Act Section 402, and amendments thereto, and shall take effect upon the date of hearing, provided USEPA has no objections.

IT IS HEREBY ORDERED that Order No. 5-01-007 and Order No. 92-052 are rescinded and the City of Manteca, the City of Lathrop and Dutra Farms, its agents, successors and assigns, in order to meet the provisions contained in California Water Code Division 7 and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of wastewater at a location or in a manner different from that described in the Findings is prohibited.

2. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by Standard Provision A.13. [See attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)"].

3. Neither the discharge nor its treatment shall create a nuisance as defined in California Water Code Section 13050.

B. Effluent Limitations (Discharge to the San Joaquin River):

1. Effective immediately, and through 31 March 2004, the effluent concentrations and mass loadings shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
BOD[1]	mg/l	20[2]	30[2]	---	50[2]
	lb/day[3]	1160	1740	---	2900
Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Total Suspended Solids	mg/l	20[2]	30[2]	---	50[2]
	lb/day[3]	1160	1740	---	2900
Total Coliform	MPN/100ml	---	23[4]	---	500
Settleable Solids	ml/l	0.1	---	---	0.2
Chlorine Residual	mg/l	---	0.01[5]	0.02	---
Oil and Grease	mg/l	10	---	---	15
	lb/day[3]	580	---	---	870
Aluminum[6]	ug/l	71	---	---	140
	lb/day[3]	4.1	---	---	8.1
Electrical Conductivity	umhos/cm	1000	---	---	---
Ammonia (June-Sept)	mg N/l	2.1	---	---	4.4
	lb/day[3]	120	---	---	260
Ammonia (Oct-May)	mg N/l	2.8	---	---	5.6
	lb/day[3]	160	---	---	320
Arsenic	ug/l	10	---	---	---
	lb/day[3]	0.58	---	---	---
Copper	ug/l	7.9	---	---	10.4
	lb/day[3]	0.46	---	---	0.60
Cyanide	ug/l	3.7	---	---	10
	lb/day[3]	0.21	---	---	0.58
Iron	ug/l	300	---	---	---
	lb/day[3]	17	---	---	---
Manganese	ug/l	50	---	---	---
	lb/day[3]	2.9	---	---	---

Methylene blue active substances (MBAS)	ug/l	500	---	---	---
	lb/day[3]	29	---	---	---
Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Nitrate (as N)	mg/l	10	---	---	---
	lb/day[3]	580	---	---	---
Nitrite (as N)	mg/l	1	---	---	---
	lb/day[3]	58	---	---	---
Bis(2-ethylhexyl) phthalate	ug/l	22	---	---	44
	lb/day[3]	1.3	---	---	2.6
Bromodichloromethane	ug/l	5	---	---	8
	lb/day[3]	0.29	---	---	0.46
Dibromochloromethanee	ug/l	1.4	---	---	2.8
	lb/day[3]	0.08	---	---	0.16
Mercury	ug/l	---	---	---	---
	lb/year	0.69	---	---	---
2,4,6-Trichlorophenol	ug/l	34	---	---	69
	lb/day[3]	2	---	---	4

1 5-day, 20°C biochemical oxygen demand (BOD)
2 To be ascertained by a 24-hour composite
3 Based upon a design treatment capacity of 6.95 mgd.
4 Weekly median
5 Expressed as a 4-day average
6 The Discharger may conduct a water effect ratio study to develop a site-specific objective, and upon adoption and approval of a Basin Plan amendment, the permit may be reopened and the aluminum limitation reconsidered.

2. Effective 1 April 2004, and through 31 January 2009, the effluent concentrations and mass loadings shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
BOD[1]	mg/l	20[2]	30[2]	---	50[2]

	lb/day[3]	1350	2030	---	3380
Total Suspended Solids	mg/l	20[2]	30[2]	---	50[2]
	lb/day[3]	1350	2030	---	3380

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Total Coliform	MPN/100ml	---	23[4]	---	500
Settleable Solids	ml/l	0.1	---	---	0.2
Chlorine Residual	mg/l	---	0.01[5]	0.02	---
Oil and Grease	mg/l	10	---	---	15
	lb/day[3]	680	---	---	1010
Aluminum[6]	ug/l	71	---	---	140
	lb/day[3]	4.8	---	---	9.5
Electrical Conductivity (1 April to31 August)	umhos/cm	700[7]	---	---	---
Electrical Conductivity (1 Sept to 31 March)	umhos/cm	1000[7]	---	---	---
Ammonia (June-Sept)	mg N/l	2.1	---	---	4.4
	lb/day[3]	140	---	---	300
Ammonia (Oct-May)	mg N/l	2.8	---	---	5.6
	lb/day[3]	190	---	---	380
Arsenic	ug/l	10	---	---	---
	lb/day[3]	0.68	---	---	---
Copper	ug/l	7.9	---	---	10.4
	lb/day[3]	0.53	---	---	0.70
Cyanide	ug/l	3.7	---	---	10
	lb/day[3]	0.25	---	---	0.68
Iron	ug/l	300	---	---	---
	lb/day[3]	20	---	---	---
Manganese	ug/l	50	---	---	---
	lb/day[3]	3.4	---	---	---

Methylene blue active substances (MBAS)	ug/l	500	---	---	---
	lb/day[3]	34	---	---	---

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Nitrate (as N)	mg/l	10	---	---	---
	lb/day[3]	680	---	---	---
Nitrite (as N)	mg/l	1	---	---	---
	lb/day[3]	68	---	---	---
Bis(2-ethylhexyl) phthalate	ug/l	22	---	---	44
	lb/day[3]	1.5	---	---	3
Bromodichloromethane	ug/l	5	---	---	8
	lb/day[3]	0.34	---	---	0.54
Dibromochloromethanee	ug/l	1.4	---	---	2.8
	lb/day[3]	0.095	---	---	0.19
Mercury	ug/l	---	---	---	---
	lb/year	0.69	---	---	---
2,4,6-Trichlorophenol	ug/l	34	---	---	69
	lb/day[3]	2.3	---	---	4.7

1 5-day, 20°C biochemical oxygen demand (BOD)
2 To be ascertained by a 24-hour composite
3 Based upon a design treatment capacity of 8.11 mgd.
4 Weekly median
5 Expressed as a 4-day average
6 The Discharger may conduct a water effect ratio study to develop a site-specific objective, and upon adoption and approval of a Basin Plan amendment, the permit may be reopened and the aluminum limitation reconsidered.
7 State Water Resources Control Board Decision 1641 requires that the 1000 umhos/cm objective be met year round until 1 April 2005 at which time the seasonal objectives will be effective.

3. Effective 1 February 2009, the effluent concentrations and mass loading shall not exceed the following limits:

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
BOD[1]	mg/l	10[2]	20[2]	---	30[2]
	lb/day[3]	820	1650	---	2470

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Total Suspended Solids	mg/l	10[2]	20[2]	---	30[2]
	lb/day[3]	820	1650	---	2470
Total Coliform	MPN/100ml	---	2.2[4]	---	23/240[5]
Turbidity	NTU	---	---	2[6]	5/10[7]
Settleable Solids	ml/l	0.1	---	---	0.2
Chlorine Residual	mg/l	---	0.01[8]	0.02	---
Oil and Grease	mg/l	10	---	---	15
	lb/day[3]	820	---	---	1230
Aluminum[9]	ug/l	71	---	---	140
	lb/day[3]	5.8	---	---	12
Electrical Conductivity (1 April to31 August)	umhos/cm	700	---	---	---
Electrical Conductivity (1 Sept to 31 March)	umhos/cm	1000	---	---	---
Ammonia (June-Sept)	mg N/l	2.1	---	---	4.4
	lb/day[3]	170	---	---	360
Ammonia (Oct-May)	mg N/l	2.8	---	---	5.6
	lb/day[3]	230	---	---	460
Arsenic	ug/l	10	---	---	---
	lb/day[3]	0.82	---	---	---
Copper	ug/l	7.9	---	---	10.4
	lb/day[3]	0.65	---	---	0.86
Cyanide	ug/l	3.7	---	---	10
	lb/day[3]	0.30	---	---	0.82
Iron	ug/l	300	---	---	---

	lb/day[3]	25	---	---	---
Manganese	ug/l	50	---	---	---
	lb/day[3]	4.1	---	---	---

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Methylene blue active substances (MBAS)	ug/l	500	---	---	---
	lb/day[3]	41	---	---	---
Nitrate (as N)	mg/l	10	---	---	---
	lb/day[3]	820	---	---	---
Nitrite (as N)	mg/l	1	---	---	---
	lb/day[3]	82	---	---	---
Bis(2-ethylhexyl) phthalate	ug/l	22	---	---	44
	lb/day[3]	1.8	---	---	3.6
Bromodichloromethane	ug/l	5	---	---	8
	lb/day[3]	0.41	---	---	0.66
Dibromochloromethane	ug/l	1.4	---	---	2.8
	lb/day[3]	0.12	---	---	0.23
Mercury	ug/l	---	---	---	---
	lb/year	0.69	---	---	---
2,4,6-Trichlorophenol	ug/l	34	---	---	69
	lb/day[3]	2.8	---	---	5.7

1 5-day, 20°C biochemical oxygen demand (BOD)
2 To be ascertained by a 24-hour composite
3 Based upon a design treatment capacity of 9.87 mgd.
4 Weekly median
5 Does not exceed 23 in more than one sample in any 30-day period. No sample shall exceed 240.
6 Does not exceed an average of 2 NTU within a 24-hour period.
7 Does not exceed 5 NTU more than 5 percent of the time within a 24-hour period and 10 NTU at any time.
8 Expressed as a 4-day average
9 The Discharger may conduct a water effect ratio study to develop a site-specific objective, and upon adoption and approval of a Basin Plan amendment, the permit

may be reopened and the aluminum limitation reconsidered.

4. The arithmetic mean of 20°C BOD (5-day) and total suspended solids in effluent samples collected over a monthly period shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).

5. The discharge shall not have a pH less than 6.5 nor greater than 8.0.

6. Effective immediately, the 30-day average dry weather discharge flow shall not exceed 6.95 million gallons per day, less the amount disposed on land at agronomic rates.

7. Effective 31 March 2004, and pursuant to compliance with effluent ammonia limitations, the 30-day average dry weather discharge flow shall not exceed 8.11 million gallons per day, less the amount disposed on land at agronomic rates.

8. Effective 1 February 2009, and in compliance with Provisions 1 and 4, the 30-day average dry weather discharge flow shall not exceed 9.87 million gallons per day, less the amount disposed on land at agronomic rates, and all discharges shall be on out-going tides only.

9. The peak wet weather discharge flow shall not exceed 13 mgd.

10. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

    Minimum for any one bioassay - - - - - - - - - 70%
    Median for any three or more consecutive bioassays - - - - 90%

11. The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than 20°F.

12. The total annual mass discharge of mercury shall not exceed 0.69 lbs per year. This interim performance-based limitation shall be in effect until final TMDL is established for mercury. The procedures for calculating mass loadings are as follows:
    a. The total pollutant mass load for each individual month shall be determined using an average of all concentration data collected that month and the corresponding average monthly flow. All monitoring data collected under the monitoring and reporting program, pretreatment program and any special studies shall be used for these calculations.
    b. In calculating compliance, the Discharger shall count all non-detect measures at one-half of the detection level. If compliance with the effluent limitation is not attained due to the non-detect contribution, the Discharger shall improve and implement available analytical capabilities and compliance shall be evaluated with consideration of the detection limits.

    c. The Discharger shall submit a cumulative total of mass loadings for the most recent twelve months in accordance with the MRP No. R5-2004-0028.

    If mercury is found to be causing toxicity based on acute or chronic toxicity test results, or if a TMDL program is adopted, this Order shall be reopened and the mass effluent limitation shall be modified (higher or lower) or an effluent concentration limitation imposed. If the Regional Board determines that a mercury offset program is feasible for Dischargers subject to a NPDES permit, then this Order may be reopened to reevaluate the interim mercury mass loading limitation(s) and the need for a mercury offset program for the Discharger.

C. Discharge Specifications (Land Disposal):

1. Discharge of recycled water to surface water or surface water drainage courses is prohibited.

2. The discharge shall be kept within the designated reclamation area, as shown on Figure 2, at all times.

3. The use of reclaimed water shall be limited to surface irrigation of fodder, fiber, or seed crops. Irrigated crops shall not be used for human consumption (either direct or indirect). Additional reclamation uses may be approved by the Executive Officer.

4. Reclaimed water use shall meet the criteria contained in Title 22 California Code of Regulations, Division 4, Section 60301 et. seq.

5. Application of reclaimed water shall be at agronomic rates considering the crop, soil, climate, and irrigation management system. The nutrient loading of the disposal area, including the nutritive value of organic and chemical fertilizers, applied biosolids, and of the reclaimed water, shall not exceed the crop demand.

6. Reclaimed water shall be managed to minimize erosion, runoff, and movement of aerosols from the disposal area.

7. Direct or windblown spray shall be confined to the designated disposal area and prevented from contacting drinking water facilities.

8. Objectionable odors originating at this facility shall not be perceivable beyond the limits of the wastewater treatment and disposal areas.

9. The discharge of domestic effluent to the reclamation area shall not exceed the following limits:

Constituent	Units	Monthly Average	Daily Maximum

BOD_5[1]	mg/l	30	45
Settleable Solids	ml/l	0.2	0.5

[1] Five-day, 20° Celsius biochemical oxygen demand.

10. There shall be no standing water in the disposal area 48 hours after wastewater is applied.

11. Public contact with wastewater shall be precluded through such means as fences, signs, and other acceptable alternatives.

12. Areas irrigated with reclaimed water shall be managed to prevent breeding of mosquitoes. More specifically,

    a. Tail water must be returned and all applied reclaimed water and any additional supplement irrigation water must infiltrate completely within a 48-hour period.

    b. Ditches not serving as wildlife habitat should be maintained free of emergent, marginal, and floating vegetation.

    c. Low pressure and unpressurized pipelines and ditches accessible to mosquitoes shall not be used to store reclaimed water.

13. Stormwater runoff from the irrigation field shall not be discharged to any surface water drainage course within 30 days of the last application of reclaimed water.

14. There shall be no irrigation or impoundment of reclaimed water within 150 feet of any domestic water well.

15. All reclaimed water equipment, pumps, piping, valves, and outlets shall be appropriately marked to differentiate them from potable facilities, and these shall be of a type, or secured in a manner, that permits operation by authorized personnel only.

16. Conspicuous warning signs indicating that reclaimed water is in use shall be posted at least every 500 feet, with a minimum of a sign at each corner of the parcels and at access road entrances.

17. Supplementing reclaimed water by connection with a domestic drinking water source or irrigation or industrial wells requires an air gap separation device.

18. Neither the treatment nor the use of reclaimed water shall cause a pollution or nuisance as defined by California Water Code Section 13050.

D. Pond Discharge Specifications (Land Disposal):

1. Objectionable odors originating at the facility shall not be perceivable beyond the limits of the disposal areas or property owned by the Discharger.

2. As a means of discerning compliance with Pond Discharge Specification D.1, the dissolved oxygen content in the upper zone (1 foot) of wastewater in ponds shall not be less than 1.0 mg/l.

3. Ponds shall not have a pH less than 6.5 or greater than 9.0. Subject to approval of the Executive Officer, lined ponds shall not have a pH less than 6.5 or greater than 10.0.

4. Ponds shall be managed to prevent breeding of mosquitoes. In particular,

    a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

    b. Weeds shall be minimized.

    c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

5. Ponds shall have sufficient capacity to accommodate allowable wastewater flow and design seasonal precipitation and ancillary inflow and infiltration during the nonirrigation season. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns. Freeboard shall never be less than two feet (measured vertically to the lowest point of overflow).

E. Biosolids Disposal:

1. Collected screenings, biosolids, and other solids removed from liquid wastes shall be disposed of in a manner approved by the Executive Officer, and consistent with *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste,* as set forth in Title 27 California Code of Regulations, Division 2, Subdivision 1, Section 20005, et seq. Removal for further treatment, disposal, or reuse at sites (i.e., landfill, composting sites, soil amendment sites) operated in accordance with valid waste discharge requirements issued by a regional water quality control board will satisfy this specification.

2. Any proposed change in biosolids use or disposal practice from a previously approved practice shall be reported to the Executive Officer and USEPA Regional Administrator at least **90 days** in advance of the change.

3. Use and disposal of sewage biosolids shall comply with existing Federal and State laws and regulations, including permitting requirements and technical standards included in 40 CFR 503.

If the State Board and the Regional Water Quality Control Boards are given the authority to implement regulations contained in 40 CFR 503, this Order may be reopened to incorporate appropriate time schedules and technical standards. The Discharger must comply with the standards and time schedules contained in 40 CFR 503 whether or not they have been incorporated into this Order.

4. The Discharger is encouraged to comply with the "Manual of Good Practice for Agricultural Land Application of Biosolids" developed by the California Water Environment Association.

5. The discharger shall comply with the attached Monitoring and Reporting Program No. R5-2004-0028 biosolids monitoring requirements.

On-site Biosolids Disposal Limitations:

6. The discharge of tailwater or field runoff within 30 days after application of biosolids is prohibited for application areas where biosolids has not been incorporated into the soil and there is not sufficient vegetation in the application area and along the path of runoff to prevent movement of biosolids particles from the application site.

7. The direct or indirect discharge of biosolids to surface waters or surface water drainage course is prohibited.

8. The discharge of waste classified as "hazardous" or "designated" as defined in Title 23, California Code of Regulations, Section 2521 (a) and Section 2522 (a), is prohibited.

9. The onsite application of biosolids at rates in excess of the nitrogen requirements of the vegetation or at rates that would cause the excess nitrogen or metals to leach to ground water, is prohibited. All sources (wastewater, fertilizers, biosolids) of nitrogen and metals to the application area must be included in the analysis of the total loading rate.

10. The onsite discharge of biosolids with pollutant concentrations greater than those shown below is prohibited:

Constituent	Ceiling Concentration Mg/kg dry weight
Arsenic	75
Cadmium	85
Chromium	3000
Copper	4300
Lead	840
Mercury	57
Nickel	420
Selenium	100
Zinc	7500

11. Biosolids shall not be applied to land subject to erosion during a flood, or having a surface slope in excess of fifteen percent.

12. Biosolids shall comply with either Class A or Class B pathogen reduction standards as listed in 40 CFR 503.

13. Biosolids shall comply with one of the Vector Attraction Reduction standards as listed in 40 CFR 503.33.

14. Biosolids shall not be applied to land in amounts which cause the following lifetime cumulative loading rates to be exceeded:

Cumulative Loading Rates

Constituent	kg/hectare	lbs./acre
Arsenic	41	37
Cadmium	39	35
Chromium	3000	2672
Copper	1500	1336
Lead	300	267
Mercury	17	15
Molybdenum	18	16
Nickel	420	374
Selenium	100	89
Zinc	2800	2494

15. Biosolids shall not be deposited to flooded, frozen or water-saturated ground, or during periods of heavy rainfall.

16. Objectionable odor originating at this facility shall not be perceivable beyond the limits o the property owned or controlled by the discharger.

17. Staging areas and biosolids application shall be at least:

    a. 10 feet from property lines.
    b. 500 feet from domestic water supply wells.
    c. 50 feet from non-domestic water supply wells.
    d. 20 feet from public roads.
    e. 100 feet from surface waters.
    f. 100 feet from residential buildings.

18. After the last application of biosolids in each field, the Discharger shall ensure the following:

    a. For at least 30 days:
        (1) Public access to the application area is restricted;
        (2) Feed and fiber crops are not harvested; and

(3) Animals do not graze on the land.

b. For at least 12 months:
(1) Turf is not harvested if turf is placed on land with a high degree of public exposure: and
(2) If the field is used as pasture, grazing by milking animals is prevented.

c. For at least 14 months:
(1) Food crops with harvested parts that touch the biosolids/soil mixture and are totally above the land surface are not harvested.

d. For at least 38 months:
(1) Food crops with harvested parts below the land surface are not harvested; and
(2) If the field is used as pasture, grazing of milking animals used for producing unpasteurized milk for human consumption is prevented.

Biosolids Storage Specifications

19. Facilities for the storage of Class B biosolids shall be located, designed and maintained to restrict public access to biosolids.

20. Biosolids storage facilities shall be designed and maintained to prevent washout or inundation from a storm or flood with a return frequency of 100 years.

21. Biosolids storage facilities, which contain biosolids, shall be designed and maintained to contain all storm water falling on the biosolids storage area during a rainfall year with a return frequency of 100 years.

22. Biosolids storage facilities shall be designed, maintained and operated to minimize the generation of leachate.

F. Receiving Water Limitations:

Receiving Water Limitations are based upon water quality objectives contained in the Basin Plan. As such, they are a required part of this permit.

The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 5 mg/l. The monthly median of the mean daily dissolved oxygen concentration shall not fall below 85 percent of saturation in the main water mass, and the 95th percentile concentration shall not fall below 75 percent of saturation.

2. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.

3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.

4. Esthetically undesirable discoloration.

5. Fungi, slimes, or other objectionable growths.

6. The turbidity to increase as follows:

   a. More than 1 Nephelometric Turbidity Units (NTUs) where natural turbidity is between 0 and 5 NTUs.

   b. More than 20 percent where natural turbidity is between 5 and 50 NTUs.

   c. More than 10 NTUs where natural turbidity is between 50 and 100 NTUs.

   d. More than 10 percent where natural turbidity is greater than 100 NTUs.

7. The ambient pH to fall below 6.5, exceed 8.5, or the 30-day average ambient pH change by more than 0.5 units.

8. The creation of a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of the river channel at any point.

9. A surface temperature rise greater than 4°F above the natural temperature of the receiving water at any time or place.

10. Deposition of material that causes nuisance or adversely affects beneficial uses.

11. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in Title 22, California Code of Regulations; that harm human, plant, animal or aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

12. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.

13. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.

14. Violation of any applicable water quality standard for receiving waters adopted by the Regional Board or the State Board pursuant to the Clean Water Act and regulations adopted thereunder.

15. Taste or odor-producing substances to impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

G. Groundwater Limitations:

Discharge of waste constituents from any storage, treatment, or disposal component associated with the WQCF shall not, in combination with other sources:

1. Adversely impact beneficial uses of the groundwater or exceed water quality objectives.

2. Cause any waste constituent concentration, when compared with background, to be incrementally increased above the current concentration in down-gradient wells.

3. Cause total coliform organisms to equal or exceed a most probable number of 2.2/100 ml over any seven-day period.

H. Provisions:

1. By **1 February 2009**, wastewater discharged to the San Joaquin River shall be oxidized, coagulated, filtered, and adequately disinfected pursuant to the DHS reclamation criteria, Title 22 California Code of Regulations, Division 4, Chapter 3, (Title 22) or equivalent. The Discharger shall comply with the following time schedule to assure compliance with the limitations for BOD, total suspended solids, total coliform and turbidity contained in Effluent Limitations B.3 of this Order:

Task	Compliance Date	Report Due Date
Submit Annual Status Report		**1 June, annually**
Submit Workplan/Time Schedule		**1 September 2004**
Full Compliance	**1 February 2009**	

The Discharger shall submit to the Regional Board on or before each compliance and report due date, the specified document or, if appropriate, a written report detailing compliance or noncompliance with the specific schedule date and task. If noncompliance is being reported, the reasons for such noncompliance shall be stated; the report shall also include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Board by letter when it returns to compliance with the time schedule.

2. Pursuant to Title 22 Section 60323, the Discharger shall prepare a Title 22 Engineer's Report that reflects the proposed reclamation uses and operation. The report shall be prepared in accordance with DHS guidelines, as listed in Attachment C. The report shall be submitted to DHS and the Regional Board for review and approval. The report shall be completed in conformance with the following schedule.

Task	Compliance Date
Submit Workplan and Time Schedule	**1 May 2004**
Submit Draft Report	**1 August 2005**
Submit Final Report	**1 January 2006**

The Discharger shall submit to the Board, on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Board by letter when it returns to compliance with the time schedule.

3. In accordance with California Business and Professions Code Sections 6735, 7835, and 7835.1, engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. All technical reports specified herein that contain workplans for investigations and studies, that describe the conduct of investigations and studies, or that contain technical conclusions and recommendations concerning engineering and geology shall be prepared by or under the direction of appropriately qualified professional(s), even if not explicitly stated. Each technical report submitted by the Discharger shall contain the professional's signature and/or stamp of the seal.

4. The discharger has requested an expansion of allowable flows being discharged to the San Joaquin River. Effluent limitation B.8 allows the flows to increase to 9.87 mgd pending completion of the following by the Discharger, and approval by the Executive Officer:

   a. The discharger shall install a monitoring station in the receiving water in the vicinity of the outfall adequate to provide real-time monitoring of receiving water flows.
   b. The discharger shall demonstrate the ability to store effluent and discharge to surface waters only on out-going tides. The demonstration shall document adequate storage capacity, and operations procedures to reliably implement this discharge strategy.
   c. The Discharger shall implement adequate measures to comply with Effluent Limitations under B.3.
   d. The discharger shall implement adequate measures to comply with Effluent Limitation B.11 and Receiving Water Limitations F.8 and F.9 or shall have obtained exceptions to the Thermal Plan.

5. There are indications that elevated temperatures in the San Joaquin River may affect migrating Chinook salmon and other fish during portions of the year. Temperature objectives in the Basin Plan and the Thermal Plan may not address the temperature parameters necessary to protect migrating fish. To evaluate the effect of a thermal temperature discharge to migrating fish, the Discharger shall conduct a comprehensive study of the effect of its thermal discharge to migrating fish in the vicinity of the discharge (with particular attention being paid to those periods when River flow is lowest and/or River or effluent temperature are highest). The Discharger shall perform the study in consultation with the Department of Fish and Game, United States Environmental Protection Agency, National Marine Fisheries Service, United States Fish and Wildlife Service, and other interested parties.

   A work plan for this study shall be completed and submitted to the Executive Officer by **1 September 2004**. The work plan shall include a schedule for completing all work in accordance with the work plan within eighteen **(18) months** following work plan approval by the Executive Officer. Also, a progress report shall be submitted every **six (6) months** after approval of the work plan. The permit may be reopened after review of the study to incorporate Regional Board findings and requirements as appropriate.

6. *Pollution Prevention Plan*: The Discharger shall prepare a pollution prevention plan following California Water Code 13263.3(d)(3) for mercury. A work plan and time schedule for preparation of the pollution prevention plan shall be completed and submitted to the Executive Officer for approval by **1 August 2004**. The Pollution Prevention Plan shall be completed and submitted to the Regional Board by **1 August 2005**. A progress report shall be submitted every **six (6) months** after submittal of the work plan. Based on a review of the submitted information, this Order may be reopened for addition and/or modification of limitations and requirements for these constituents.

   The Discharger shall submit to the Regional Board, on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Board by letter when it returns to compliance with the time schedule.

7. *SIP Study*: The discharge may contain dioxins that have a reasonable potential to cause or contribute to an exceedance of water quality objectives. The Discharger shall comply with the following time schedule in conducting a study of these constituents potential effect in surface waters:

Task	Compliance Date
Submit Study Report for Dioxins	**1 November 2004**

   If after review of the study results it is determined that the discharge has reasonable potential to cause or contribute to an exceedance of a water quality objective this Order will be reopened and effluent limitations added for the subject constituents.

   The Discharger shall submit to the Regional Board on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Board by letter when it returns to compliance with the time schedule.

8. To determine compliance with the Groundwater Limitations, the groundwater monitoring network shall include one or more background monitoring wells and a sufficient number of designated monitoring wells downgradient of every treatment, storage, and disposal unit that does or may release waste constituents to groundwater. All monitoring wells shall comply with the appropriate standards as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 94-81* (December 1981), and any more stringent standards adopted by the Discharger or County pursuant to California Water Code Section 13801.

   The Discharger, after one year of monitoring, shall characterize natural background quality of monitored constituents in a technical report, to be submitted by **1 May 2005**. For each groundwater monitoring parameter/constituent identified in the Monitoring and Reporting Program, the report shall present a summary of monitoring data, calculation of the concentration in background monitoring wells, and a comparison of background groundwater quality to that in wells used to monitor the facility. Determination of background quality shall be made using the methods described in Title 27 California Code of Regulations Section 20415(e)(10), and shall be based on data from at least four consecutive quarterly (or more frequent) groundwater monitoring events. For each monitoring parameter/constituent, the report shall compare measured concentrations for compliance monitoring wells with the calculated background concentration.

   If the monitoring shows that any constituent concentrations are increased above background water quality, the Discharger shall submit a technical report describing the evaluations results and critiquing each evaluated component with respect to BPCT and minimizing the discharge's impact on groundwater quality. In no case shall the discharge be allowed to exceed a water quality objective. This Order may be reopened and additional groundwater limitations added.

9. By **31 March 2006**, the Discharger shall submit a *Sanitary Sewer System Operation, Maintenance, Overflow Prevention, and Response Plan* (SSS Plan) that describes the actions designed to prevent, or minimize the potential for sanitary sewer overflows. The Discharger shall maintain the SSS Plan in an up-to-date condition and shall amend the SSS Plan whenever there is a change (e.g. in the design, construction, operation, or maintenance of the sanitary sewer system or sewer facilities) that materially affects the potential for

sanitary sewer overflows, or whenever there is a sanitary sewer overflow. The Discharger shall ensure that the up-to-date SSS Plan is readily available to sewer system personnel at all times and that sewer system personnel are familiar with it. A general order to regulate collection systems may be developed by the Regional Board. If a general order for collection systems is adopted by the Regional Board, the Discharger will be required to seek coverage under the general order. Once the Discharger has obtained a general order for the collection system, this permit may be reopened and these requirements may be removed from this permit.

a. At a minimum, the Operation and Maintenance portion of the plan shall contain or describe the following:

    1. Detailed maps of the sanitary sewer system, identifying sewer mains, manholes, and lift stations;

    2. A detailed listing of elements to be inspected, a description of inspection procedures and inspection frequency, and sample inspection forms;

    3. A schedule for routine inspection and testing of all pipelines, lift stations, valves, and other key system components. The inspection/testing program shall be designed to reveal problems that might lead to accidental spills and ensure that preventive maintenance is completed;

    4. Provisions for repair or replacement of old, worn out, or defective equipment;

    5. Provisions to minimize the need for manual operation of critical systems and provide spill alarms or other "fail safe" mechanisms;

    6. The ability to properly manage, operate and maintain, at all times, all parts of the collection system that the Discharger owns or over which the Discharger has operational control;

    7. The ability to provide adequate capacity to convey base flows and peak flows for all parts of the collection system the Discharger owns or over which the Discharger has operational control; and

    8. How the Discharger will take all feasible steps to stop and mitigate the impact of sanitary sewer overflows in portions of the collection system the Discharger owns or over which the Discharger has operational control.

b. At a minimum, the Overflow Prevention and Response Plan shall contain or describe the following:

    1. Identification of areas of the collection system that historically have overflowed and an evaluation of the cause of the overflow;

    2. Maintenance activities that can be implemented to address the cause of the overflow and means to prevent future overflows. Maintenance activities may include pretreatment of wastewater from industrial dischargers who discharge high concentrations of oil and grease in their wastewater;

    3. Procedures for responding to sanitary sewer overflows designed to minimize the volume of sewer overflow that enters surface waters, and minimize the adverse effects of sewer overflows on water quality and beneficial uses;

    4. Steps to be taken when an overflow or spill occurs, and procedures that will be implemented to ensure that all overflows and spills are properly identified, responded to and reported; and

    5. A public notification plan, in which any posting of areas contaminated with sewage is performed at the direction of the Sacramento County Health Department. All parties with a reasonable potential for exposure to an overflow event shall be notified.

10. The land leased from Dutra Farms may become unavailable for land disposal over the term of this Order. The Discharger shall provide a technical report by **1 August 2004** that assesses the land disposal capacity of City-owned land covered by this Order, to agronomically apply food processing wastewater, biosolids, and a portion of the municipal wastewater in compliance with this Order. If the Discharger cannot demonstrate that adequate capacity is available for, at a minimum, all food processing wastewater and all biosolids, then the report shall include plans and a time schedule to provide adequate capacity or determine an alternative disposal solution (e.g. landfill disposal of biosolids) in the event the lease is terminated.

11. The Discharger shall conduct the three species chronic toxicity testing as specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger shall initiate a Toxicity Identification Evaluation (TIE) to identify the causes of toxicity. Upon completion of the TIE, the Discharger shall submit a workplan to conduct a Toxicity Reduction Evaluation (TRE) and, after Regional Board evaluation, conduct the TRE. This Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if a chronic toxicity water quality objective is adopted by the State Board, this Order may be reopened and a limitation based on that objective included.

12. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

13. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means rainfall, groundwater, cooling waters, and condensates that are essentially free of pollutants.

14. The Discharger shall report to the Regional Board any toxic chemical release data it reports to the State Emergency Response Commission within 15 days of reporting the data to the Commission pursuant to section 313 of the "Emergency Planning and Community Right to Know Act of 1986.

15. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated February 2004, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provisions."

16. The Discharger shall comply with Monitoring and Reporting Program No. R5-2004-0028, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

    When requested by USEPA, the Discharger shall complete and submit Discharge Monitoring Reports. The submittal date shall be no later than the submittal date specified in the Monitoring and Reporting Program for Discharger Self Monitoring Reports.

17. In order to comply with Effluent Limitations and Discharge Specifications for Land Disposal, the Discharger shall submit 120 days in advance of the upgraded plant start-up, a technical report for the maximization of land disposal of wastewater at agronomic rates, which specifies:

    a. Crop types to be used and their associated water and nutrient uptake rates;

    b. Seasonal wastewater and sludge application rates based on hydraulic capacity (monthly water balance), BOD removal capacity, nutrient uptake rates, and heavy metal accumulated rates; and

    c. Application and runoff control techniques.

18. The DO TMDL completion date is anticipated to be in 2004. This Order may be reopened to consider alternative effluent limitations (including but not limited to: BOD, CBOD, ammonia, and TSS) needed to allow the Discharger to meet it's required load allocation that may be specified in the TMDL.

19. This Order expires on 1 March 2009 and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than 180 days in advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.

20. The Discharger shall enforce the Pretreatment Standards promulgated under Sections 307(b), 307(c) and 307(d) of the Clean Water Act. The Discharger shall perform the pretreatment functions required by 40 CFR Part 403 including but not limited to:

    a. Adopting the legal authority required by 40 CFR 403.8(f)(1);

    b. Enforcing the Pretreatment Standards of 40 CFR 403.5 and 403.6;

    c. Implementing procedures to ensure compliance as required by 40 CFR 403.8(f)(2); and

    d. Providing funding and personnel for implementation and enforcement of the pretreatment program as required by 40 CFR 403.8(f)(3).

21. The Discharger shall submit to the Regional Board by **31 May 2004** a revised pretreatment program that corrects, to the satisfaction of the Regional Board, the deficiencies noted in the October 2001 Pretreatment Audit and the 22 January 2003 letter from the Regional Board staff. Upon submittal of an adequate revised pretreatment program, the Regional Board will reopen this Order to approve the pretreatment program. The Discharger shall implement its approved pretreatment program and the program shall be an enforceable condition of this permit. If the Discharger fails to perform the pretreatment functions, the Regional Board, the State Board or the USEPA may take enforcement actions against the Discharger as authorized by the Clean Water Act. The pretreatment program has not previously been fully implemented. The Discharger shall be in full compliance with all pretreatment program requirements by **1 October 2004**, and shall submit a report by **1 November 2004** that outlines actions taken to implement the program.

22. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the necessary legal authorities, programs, and controls to ensure that the following incompatible wastes are not introduced to the treatment system, where incompatible wastes are:

    a. Wastes that create a fire or explosion hazard in the treatment works;

    b. Wastes which will cause corrosive structural damage to treatment works, but in no case wastes with a pH lower than 5.0, unless the works is specially designed to accommodate such wastes;

    c. Solid or viscous wastes in amounts which cause obstruction to flow in sewers, or which cause other interference with proper operation or treatment works;

    d. Any waste, including oxygen demanding pollutants (BOD, etc.), released in such volume or strength as to cause inhibition or disruption in the treatment works, and subsequent treatment process upset and loss of treatment efficiency;

e. Heat in amounts that inhibit or disrupt biological activity in the treatment works, or that raise influent temperatures above 40°C (104°F), unless the Regional Board approves alternate temperature limits;

f. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the treatment works in a quantity that may cause acute worker health and safety problems; and

h. Any trucked or hauled pollutants, except at points predesignated by the Discharger.

23. The Discharger shall implement, as more completely set forth in 40 CFR 403.5, the legal authorities, programs, and controls necessary to ensure that indirect discharges do not introduce pollutants into the sewerage system that, either alone or in conjunction with a discharge or discharges from other sources:

    a. Flow through the system to the receiving water in quantities or concentrations that cause a violation of this Order, or

    b. Inhibit or disrupt treatment processes, treatment system operations, or sludge processes, use, or disposal and either cause a violation of this Order or prevent sludge use or disposal in accordance with this Order.

24. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of, or clearance from the State Board (Division of Water Rights).

25. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

    To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, address and telephone number of the persons responsible for contact with the Regional Board and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 19 March 2004.

_____
THOMAS R. PINKOS, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2004-0028

NPDES NO. CA0081558

FOR
CITY OF MANTECA, CITY OF LATHROP AND DUTRA FARMS
WASTEWATER QUALITY CONTROL FACILITY
SAN JOAQUIN COUNTY

This Monitoring and Reporting Program is issued pursuant to Water Code Sections 13383 and 13267. The Discharger shall not implement any changes to this Program unless and until the Regional Board or Executive Officer issues a revised Monitoring and Reporting Program. Specific sample station locations shall be established under direction of the Regional Board's staff, and a description of the stations shall be attached to this Order.

INFLUENT MONITORING

Samples shall be collected at approximately the same time as effluent samples and should be representative of the influent for the period sampled. Influent monitoring shall include at least the following:

Constituents	Units	Type of Sample	Sampling Frequency
20°C BOD_5	mg/l, lbs/day	24 hr. Composite	Daily
Suspended Solids	mg/l, lbs/day	24 hr. Composite	Daily
Flow	mgd	Meter	Continuous

EFFLUENT MONITORING
(When discharging to Surface Waters)

Effluent samples shall be collected downstream from the last connection through which wastes can be admitted into the outfall. Effluent samples should be representative of the volume and quality of the discharge. Samples collected from the outlet structure of ponds will be considered adequately composited. The date and time of collection of samples shall be recorded. Effluent monitoring shall include at least the following:

Constituents	Units	Type of Sample	Sampling Frequency
Flow	mgd	Meter	Continuous

Constituents	Units	Type of Sample	Sampling Frequency
Temperature[1]	°F	Meter	Continuous
Chlorine Residual[2]	mg/l	Continuous	Continuous
PH	Number	Grab	Daily
Total Coliform Organisms	MPN/l00 ml	Grab	Daily
20°C BOD_5	mg/l, lbs/day	24 hr. Composite	Daily
Suspended Solids	mg/l, lbs/day	24 hr. Composite	Daily
Settleable Solids	ml/l	Grab	Daily
Turbidity	NTU	Grab	Daily
Ammonia[3,4]	mg/l	Grab	Weekly
Nitrate	mg/l	Grab	Weekly
Nitrite	mg/l	Grab	Weekly
Total Dissolved Solids	mg/l	Grab	Monthly
Electrical Conductivity @25°C	umhos/cm	Grab	Monthly
Acute Toxicity[5,6,7]	% Survival	Grab	Monthly
Aluminum, total	ug/l	Grab	Monthly
Arsenic, total[8]	ug/l	Grab	Monthly
Copper, total[8]	ug/l	Grab	Monthly
Cyanide, total[8]	ug/l	Grab	Monthly
Iron, total	ug/l	Grab	Monthly
Manganese, total	ug/l	Grab	Monthly
MBAS	ug/l	Grab	Monthly
Mercury, total[9]	ug/l	Grab	Monthly
Molybdenum	ug/l	Grab	Monthly
Trihalomethanes[8,10]	ug/l	Grab	Monthly
2,4,6-Trichlorophenol[8]	ug/l	Grab	Monthly
Bis(2-ethylhexyl)phthalate[8]	ug/l	Grab	Monthly

Constituents	Units	Type of Sample	Sampling Frequency
Carbofuran	ug/l	Grab	Quarterly
Standard Minerals[11]	mg/l	Grab	Annually
Priority Pollutants[8,12]	mg/l	Grab	Annually

1 Effluent temperature monitoring will be at the outfall location.
2 Chlorine residual must be monitored with a method sensitive to and accurate at the permitted level of 0.01 mg/l.
3 Concurrent with biotoxicity monitoring.
4 Report as total.
5 The acute bioassays samples shall be analyzed using EPA-821-R-02-012, Fifth Edition, or later amendment with Regional Board staff approval. Temperature and pH shall be recorded at the time of bioassay sample collection. Test species shall be fathead minnows (Pimephales promelas), with no pH adjustment unless approved by the Executive Officer.
6 Concurrent with Ammonia Sampling.
7 The bioassay may be modified to eliminate ammonia-related toxicity until 31 March 2004, at which time the Discharger shall be required to implement the test without modifications to eliminate ammonia toxicity.
8 Detection limits will be equal to or less than the lowest minimum level published in Appendix 4 of the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan or SIP).
9 Utilize Method 1631 with a detection limit of 0.0005 ug/l.
10 Trihalomethanes include bromoform, chloroform, bromodichloromethane, and dibromochloromethane.
11 Standard minerals shall include all major cations and anions and include a verification that the analysis is complete (i.e., cation/anion balance).
12 Concurrent with receiving water sampling.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed above, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge. In no event shall the Discharger be required to monitor and record data more often than twice the frequencies listed in the schedule.

EFFLUENT MONITORING OF RECLAMATION WATER

Effluent samples shall be collected downstream from the last connection through which reclaimed water can be admitted into the field distribution system. Effluent samples should be representative of the volume and nature of the discharge. Samples collected from the outlet structure of ponds will be

considered adequately composited. The date and time of collection of a grab sample shall be recorded. The following shall constitute the effluent monitoring program:

Constituent	Units	Type of Sample	Sampling Frequency
Flow	MGD	Continuous	Daily
20°C BOD_5	mg/l	Grab	Twice Monthly
Settleable Matter	ml/l	Grab	Twice Monthly
Total Dissolved Solids	mg/l	Grab	Quarterly
Electrical Conductivity @25°C	umhos/cm	Grab	Twice Monthly
Ammonia (as N)	mg/l	Grab	Twice Monthly
Nitrate (as N)	mg/l	Grab	Twice Monthly
Total Metals[1]	mg/l	Grab	Annually[2]

[1]Total Metals shall include analyses for Cadmium, Chromium, Copper, Lead, Nickel, and Zinc.
[2]Samples shall be collected during the month of August.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed above, with the exception of metals analyses, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge. In no event shall the Discharger be required to monitor and record data more often than twice the frequencies listed in the schedule.

STORAGE POND MONITORING

Constituent	Units	Type of Sample	Sampling Frequency
Dissolved Oxygen	mg/l	Grab	Weekly
pH	pH units	Grab	Weekly

RECEIVING WATER MONITORING

All receiving water samples shall be grab samples. The date and time will be recorded with each sample. Receiving water monitoring shall include at least the following:

Station	Description
R-1	100 feet upstream from the point of discharge
R-2	500 feet downstream from the point of discharge
R-3	1 mile downstream from the point of discharge
R-4	2 mile downstream from the point of discharge

Constituents	Units	Station	Sampling Frequency
River Flow	cfs	Footnote 1	Continuous[1]
Direction of River Flow		Footnote 1	Continuous[1]
Dissolved Oxygen	mg/l	R-l, R-2, R-3, R-4	Bi weekly[2]
pH	Number	R-l, R-2, R-3, R-4	Bi weekly[2]
Turbidity	NTU	R-l, R-2	Bi weekly[2]
Temperature	°F (°C)	R-1 R-2, R-3, R-4	Continuous Bi weekly[2]
Electrical Conductivity @25°C	umhos/cm	R-1, R-2	Bi weekly[2]
Fecal Coliform Organisms	MPN/100 ml	R-1, R-2	Bi weekly[2]
Ammonia[3]	mg/l	R-l, R-2, R-3, R-4	Bi weekly[2]
Nitrate	mg/l	R-l, R-2	Bi weekly[2]
Nitrite	mg/l	R-l, R-2	Bi weekly[2]
Total Chlorine Residual	mg/l	R-1, R-2	Bi weekly[2]
Aluminum, total	ug/l	R-1, R-2	Quarterly
Arsenic, total[4]	ug/l	R-1, R-2	Quarterly
Copper, total[4]	ug/l	R-1, R-2	Quarterly
Iron, total	ug/l	R-1, R-2	Quarterly
Manganese, total	ug/l	R-1, R-2	Quarterly

Constituents	Units	Station	Sampling Frequency
Mercury, total[5]	ug/l	R-1, R-2	Quarterly
Molybdenum	ug/l	R-1, R-2	Quarterly
Trihalomethanes[4,6]	ug/l	R-1, R-4	Quarterly
2,4,6-Trichlorophenol[4]	ug/l	R-1, R-4	Quarterly
Bis(2-ethylhexyl)phthalate[4]	ug/l	R-1, R-4	Quarterly
Standard Minerals[7]	mg/l	R-1, R-4	Yearly
Priority Pollutants[4,8]	mg/l	R-1, R-4	Yearly

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1 The Discharger shall propose an appropriate location and real-time monitoring equipment to be installed near the outfall for Executive Officer approval. Flow and directional monitoring must be initiated by 1 March 2005.
2 Samples shall be collected every two weeks when discharging to the receiving water.
3 Temperature and pH shall be determined at the time of sample collection.
4 Detection limits will be equal to or less than the lowest minimum level published in Appendix 4 of the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan).
5 Utilize Method 1631 with a detection limit of 0.0005 ug/l.
6 Trihalomethanes include bromoform, chloroform, bromodichloromethane, and dibromochloromethane.
7 Standard minerals shall include all major cations and anions and include a verification that the analysis is complete (i.e., cation/anion balance).
8 Concurrent with effluent sampling.

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions throughout the reach bounded by Stations R-l and R-2. Attention shall be given to the presence or absence of:

a. Floating or suspended matter
b. Discoloration
c. Bottom deposits
d. Aquatic life
e. Visible films, sheens or coatings
f. Fungi, slimes, or objectionable growths
g. Potential nuisance conditions

Notes on receiving water conditions shall be summarized in the monitoring report.

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing toxicity to the San Joaquin River. The testing shall be conducted as specified in EPA/821-R-02-013, *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, October 2002, or later amendment with Regional Board staff approval. Chronic toxicity samples shall be taken at the effluent monitoring location specified in this Monitoring and Reporting Program. Twenty-four hour composite samples shall be representative of the volume and quality of the discharge. Adequate sample volumes shall be collected to provide renewal water to complete the test in the event that the discharge is intermittent. Time of sample collection shall be recorded. The receiving water control shall be obtained immediately upstream of the discharge from an area unaffected by the discharge in the receiving waters. The sensitivity of the test organisms to a reference toxicant shall be determined concurrently with each bioassay and reported with the test results. Both the reference toxicant and effluent test must meet all test acceptability criteria as specified in the chronic manual. If the test acceptability criteria are not achieved, then the Discharger must re-sample and re-test within 14 days.

Chronic toxicity monitoring shall include the following:

Species: *Pimephales promelas, Ceriodaphnia dubia,* and *Selenastrum capricornutum*

Frequency: Quarterly

Dilution Series:

	Dilutions (%)					Controls	
	100	50	25	12.5	6.25	Receiving Water	Lab Water
% WWTP Effluent	100	50	25	12.5	6.25	0	0
% Dilution Water[1]	0	50	75	87.5	93.75	0	100
% Receiving Water	0	0	0	0	0	100	0

[1] Dilution water shall be standard laboratory control water due to intermittent receiving water toxicity.

BIOSOLIDS MONITORING

A composite sample of biosolids shall be collected in accordance with USEPA's POTW Biosolids Sampling and Analysis Guidance Document, August 1989, (or most recent edition) and tested for the following constituents:

Constituent	Units	Sample Type	Frequency
Quantity	Dry Tons	--------	Quarterly
Solids Content	% percentage	Composite	Quarterly
Disposal Location	--------	--------	Quarterly
Arsenic	mg/kg	Composite	Quarterly
Cadmium	mg/kg	Composite	Quarterly
Chromium	mg/kg	Composite	Quarterly
Copper	mg/kg	Composite	Quarterly
Lead	mg/kg	Composite	Quarterly
Mercury	mg/kg	Composite	Quarterly
Molybdenum	mg/kg	Composite	Quarterly
Nickel	mg/kg	Composite	Quarterly
Selenium	mg/kg	Composite	Quarterly
Zinc	mg/kg	Composite	Quarterly
Oil and Grease	mg/kg	Composite	Quarterly
Nitrogen	mg/kg (dry)	Composite	Quarterly
Ammonia	mg/kg (dry)	Composite	Quarterly
Nitrate	mg/kg (dry)	Composite	Quarterly
Total Kjeldahl Nitrogen	mg/kg (dry)	Composite	Quarterly
Fecal Coliform	MPN/gram total solids	Composite	See Footnote 1
Priority Pollutants	---	Composite	See Footnote 2

[1] The Discharger shall collect seven composite samples over a two week period each quarter, and analyze the samples for fecal coliform (report as MPN/gm total solids). Results for each sample shall be reported along with the geometric mean of the results.

[2] **Within 90 days of the effective date of this Order, and annually thereafter**, the Discharger shall submit results of chemical analysis for the priority pollutants listed in 40 CFR 122 Appendix D, Tables II and III (excluding total phenols). Suggested methods for analysis of biosolids are provided in USEPA publications titled "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods" and "Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater". Other guidance is available in USEPA's POTW Biosolids Sampling and Analysis Guidance Document, August 1989 (or most recent edition).

Results of monitoring shall be reported in compliance with the Reporting Section. The biosolids monitoring report shall include a statement concerning compliance with 40 CFR Part 503 biosolids

disposal requirements. The report shall include, but is not limited to, an assessment of cumulative metals and nitrogen loadings from all sources, type of crop grown, nitrogen demand, and setback and runoff compliance, as well as compliance with pathogen reduction and vector attraction reduction standards.

Discharger shall submit annually a description of disposal methods, including the following information related to the disposal methods used at the facility. If more than one method is used, include the percentage of annual biosolids production disposed by each method.

a. For **landfill disposal**, include (1) the Regional Board's WDR numbers that regulate the landfill(s) used, (2) the present classifications of the landfill(s) used, and (3) the names and locations of the receiving facility(ies).

b. For **land application,** include (1) location of the site(s), (2) the Regional Board's WDR numbers that regulate the site(s), (3) the application rate in lbs/year (specify wet or dry), and (4) subsequent uses of the land.

c. For **incineration**, include (1) name and location of the site(s) where sludge incineration occurs, (2) the Regional Board's WDR numbers that regulate the site(s), (3) the disposal method of the ash, and (4) the names and locations of facilities receiving ash (if applicable).

d. For **composting**, include (1) name and location of the site(s) where sludge composting occurs, and (2) the Regional Board's WDR numbers that regulate the site(s).

SOIL PROFILE MONITORING

A minimum of four representative locations shall be established for soil profile sampling of the fields where effluent and sludge are applied. The following shall constitute the monitoring program:

Measurement	Units	Soil Profile	Sampling Frequency
Nitrate Nitrogen	mg/kg	4 feet[1]	Annually[2]
Kjeldahl Nitrogen	mg/kg	4 feet[1]	Annually[2]
Soluble Salts[3]	mg/kg	4 feet[1]	Annually[2]
Total Metals[4]	mg/kg	4 feet[1]	Annually[2]

[1]Samples shall be collected at 1-foot increments.

[2]Each location shall be sampled during the month of April.

[3]Soluble salts shall be determined using test methods described in Methods of Soil Analysis, Part 2, Chemical and Microbiological Properties, Second Edition, Edited by Page, Miller and Keeney; American Society of Agronomy, Inc., Soil Science Society of America, Inc.: 1982 Page 168 et seq., or other acceptable test methods with prior approval by the Executive Officer. Analytical results shall report the soil/water ratio.

[4]Total Metals shall include analyses for Cadmium, Chromium, Copper, Lead, Nickel, and Zinc.

GROUNDWATER MONITORING

Prior to construction, plans and specifications for ground water monitoring wells shall be submitted to Regional Board staff for review and approval. Wells shall comply with requirements of the Department of Water Resources. Prior to sampling, the groundwater elevations shall be measured and the wells shall be purged of at least three well volumes until pH and electrical conductivity have stabilized. Samples shall be collected using standard USEPA methods. Groundwater monitoring shall include, at a minimum:

Constituent	Units	Type of Sample	Sample Frequency
Depth to Groundwater[1]	Feet	Measurement	Quarterly
Groundwater Elevation[1]	Feet	Measurement	Quarterly
Total Dissolved Solids	mg/l	Grab	Quarterly
Ammonia, as Nitrogen	mg/l	Grab	Quarterly
Nitrate, as Nitrogen	mg/l	Grab	Quarterly
PH	pH Units	Grab	Quarterly
Electrical Conductivity[2] @ 25°C	umhos/cm	Grab	Quarterly
Total Coliform Organisms	MPN/100 ml	Grab	Quarterly
Title 22 Metals	mg/l	Grab	Quarterly

[1] Groundwater elevation shall be used to calculate the direction and gradient of groundwater flow. Elevations shall be measured to the nearest one-hundredth of a foot from mean sea level. The groundwater elevation shall be measured prior to purging the wells.

[2] A hand-held field meter may be used, provided the meter utilizes a USEPA-approved algorithm/method and is calibrated and maintained in accordance with the manufacturer's instructions.

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the municipal water supply can be obtained. The following shall constitute the water supply monitoring program.

Constituents	Units	Sampling Frequency
Standard Minerals[1]	mg/l	Yearly
Electrical Conductivity[2] @ 25°C	umhos/cm	Yearly
Total Dissolved Solids	mg/l	Yearly

[1] Standard minerals shall include all major cations and anions, including calcium, magnesium, hardness, sodium, potassium, alkalinity, sulfate, chloride, boron, and nitrate, and verification that the analysis is complete (i.e., cation/anion balance).

[2] If the water supply is from more than one source, the EC shall be reported as a weighted average and include copies of supporting calculations.

REPORTING

Monitoring results shall be submitted to the Regional Board by the **first day** of the second month following sample collection. Quarterly and annual monitoring results shall be submitted by the **first day of the second month following each calendar quarter, semi-annual period, and year**, respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements. The highest daily maximum for the month, monthly and weekly averages, and medians, and removal efficiencies (%) for BOD and Suspended Solids, should be determined and recorded.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting

of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

By **30 January** of each year, the Discharger shall submit a written report to the Executive Officer containing the following:

a. The names, certificate grades, and general responsibilities of all persons employed at the WWTP (Standard Provision A.5).

b. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.

c. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.6).

d. A statement certifying whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last revised and last reviewed for adequacy.

The Discharger may also be requested to submit an annual report to the Regional Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

All reports submitted in response to this Order shall comply with the signatory requirements of Standard Provision D.6.

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

19 March 2004

MWK

1 Introduction

The City of Manteca and City of Lathrop are currently governed by Order No. 5-01-007, NPDES No. CA0081558, adopted 26 January 2001. The City of Manteca has submitted a Report of Waste Discharge for renewal of this Order and for expansion of the wastewater quality control facility (WQCF).

The City of Manteca owns and operates the WQCF that receives wastewater flows from the City of Manteca and some areas of the City of Lathrop. The City of Manteca is responsible for the operation and discharge from the treatment plant, while the City of Lathrop is only responsible for its portion of the wastewater collection system. The City of Manteca leases 150 acres of land from Dutra Farms for application of treated wastewater, therefore Dutra Farms is named in this permit and is responsible for the proper application and management of the wastewater on its land. The City of Manteca, City of Lathrop, and Dutra Farms are hereafter Discharger.

The City's treatment process consists of raw influent bar screening, flow metering, and grit removal, followed by primary sedimentation, biofiltration, conventional activated sludge and secondary sedimentation. Secondary effluent is spread over agricultural fields and the excess flows are chlorinated, dechlorinated and discharged to the San Joaquin River.

The City of Manteca currently discharges an average of 2.0 mgd of treated domestic and industrial wastewater at agronomic rates to 210 acres of farmland owned by the City adjacent to the treatment plant, and 150 additional acres leased by the city with the excess flows discharged to the San Joaquin River. The flows to agricultural land are required to be maximized to limit the discharges to surface waters. Surface water discharges average 4.89 mgd.

The treatment system capacity will be expanded through the addition of primary and secondary treatment units that will be similar to and parallel to the existing units. In addition, nitrification, denitrification, tertiary filtration, and UV disinfection will be added to improve the effluent quality. Only the wastewater that will be discharged to the San Joaquin River will receive tertiary filtration and UV disinfection. The expansion will also include additional sludge digestion and dewatering units, as well as improvements to buildings, pump stations, ponds, and chemical handling. Food processing waste will also be delivered, treated, and land applied separately from the municipal waste collection and treatment system.

2 Dilution

The City of Manteca utilizes a side-bank outfall on the eastern bank of the San Joaquin River. The flow in the San Joaquin River can be estimated from the Vernalis gaging station which is approximately 15 miles upstream of the Manteca outfall. There are agricultural diversions and returns between the Vernalis station and the outfall, which will affect flow and water quality. Additionally, Brown Sand discharges approximately 10 cfs of wastewater made up of primarily groundwater infiltrate from the Oakwood Lake impoundment just 50 feet downstream via a side-bank outfall on the same side of the San Joaquin River as that of Manteca's outfall.

2.1 Available Receiving Water Flow Data

DWR collects daily average flow data for the San Joaquin River near Vernalis at station RSAN112. Evaluation of this data for the period 1980 to 2002 provided a 1Q10 value of 567 cfs, a 7Q10 value of 620 cfs, and a 30Q10 value of 680 cfs. This period was selected because all current flow control structures on the San Joaquin River and its tributaries were in place by 1980. However, the data set may not accurately represent historical critical low flow periods. Table 2 summarizes the flow data and calculations. Stage data collected at the Vernalis station does not indicate any tidal flows this far upstream. Downstream, DWR collects stage data near Mossdale at station RSAN087, near the Manteca outfall. Stage data fluctuated about 0.5 feet daily implying that the tidal flow is present.

Under critical low flow conditions, upstream flows occur on the flood tide, no flow during the slack tide, and downstream flows during the ebb tide. Multiple dosing of the receiving water with effluent may occur as the tide moves the water column upstream and downstream past the outfall. The complex dynamics of the stream flow, the tidal flows, and the intermittent side bank discharges from the City of Manteca and the Brown Sand impoundment must be considered in an evaluation of the available dilution in the immediate area of these side-bank outfalls.

2.2 Available Hydrodynamic/Water Quality Models

Hydrodynamic and water quality models were utilized for the analysis of the water quality impacts of the proposed expansion of the City of Manteca wastewater discharge to the San Joaquin River. Resource Management Associates (RMA) performed the modeling that was published in the *Analysis of the Fate and Water Quality Impacts of the City of Manteca Discharge, Resource Management Associates, October 10, 2000*. Larry Walker Associates utilized the modeling data developed by RMA to generate the *Water Quality Analysis of Surface Water Discharge, Larry Walker Associates, October 2000*. Both of these documents are included in the appendices of the *Draft Environmental Impact Report for the Manteca WQCF Phase III/IV Expansion Project, October 2000*.

The near-field analysis was performed using the RMA-10 model which performed the hydrodynamic simulation and the temperature and ammonia evaluations. The near-field analysis was based on the assumptions that:

1. Minimum daily flows in the San Joaquin River at Vernalis since 1983 were used.
2. Discharge to the river would be only during the out-going tide.
3. Ambient water conditions for temperature and ammonia were based on the DWR-D-1485 site at Mossdale.

The far-field water quality analysis was performed using a link-node hydrodynamic model of the San Joaquin River and Delta. The link-node tidally averaged water quality model simulates the long-term fate and transport of a discharge to the Delta. A total of three Delta configurations were considered for the parameters of dissolved oxygen, total organic carbon, and total dissolved solids. A tracer simulation was utilized to determine the potential influence of the treated effluent on downstream intakes. The model predicts very small changes to downstream locations as a result of the discharge.

The EIR concludes that these small changes are insignificant. The EIR does not evaluate the cumulative impacts of the Manteca discharge.

However, there are concerns about the accuracy of the modeling. The biggest concern is with the lack of a demonstrated calibration of the near-field RMA-10 modeling. Without comparison to field data (e.g. dye or temperature), there is no assurance that plume dimensions or in-stream dilutions are accurate for the Manteca discharge. Dilution and plume dimensions were not determined under critical conditions that have occurred at the outfall. The timed discharge modeling did not appear to be run for an adequate time period to allow the tidal cycles and their recirculation effects to be fully accounted for in the plume development. The Brown Sand, Inc. discharge was not taken into account to determine its effects on plume development.

2.3 Regulatory Guidance for Dilution Credits and Mixing Zones

The Clean Water Act directs states to adopt water quality standards to protect the quality of their waters. USEPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 CFR §122.44 and §122.45). The USEPA allows states to have broad flexibility in designing their mixing zone policies. Primary guidance on determining mixing zone and dilution credits is provided by the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (State Implementation Policy or SIP), the *USEPA Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)* (TSD), and the Basin Plan. For NPDES permits in California, the SIP guidance supercedes the USEPA guidance for priority pollutants, to the extent that it addresses a particular procedure. The SIP does not apply to non-priority pollutants, in which case the more stringent of the Basin Plan or USEPA guidance applies.

The allowance of mixing zones by the Regional Board is discussed in the Basin Plan, Policy for Application of Water Quality Objectives, which states in part, "*In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's Water Quality Standards Handbook and the TSD. Pursuant to EPA guidelines, mixing zones designated for acute aquatic life objectives will generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge.*"

Section 1.4.2 of the SIP states that, "*with the exception of effluent limitations derived from TMDLs, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may grant mixing zones and dilution credits to dischargers ... The applicable priority pollutant criteria and objectives are to be met throughout a*

water body except within any mixing zone granted by the Regional Board. The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis. The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit issued by the Regional Board."

Section 1.4.2.1 of the SIP defines a dilution credit as, "*a numerical value associated with the mixing zone that accounts for the receiving water entrained into the discharge. The dilution credit is a value used in the calculation of effluent limitations. Dilution credits may be limited or denied on a pollutant-by-pollutant basis, which may result in a dilution credit for all, some or no priority pollutants in a discharge.*"

In allowing mixing zones for constituents governed by the SIP, a mixing zone shall be as small as practicable and shall not:

- Compromise the integrity of the entire water body;
- Cause acutely toxic conditions to aquatic life passing through the mixing zone;
- Restrict the passage of aquatic life;
- Adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;
- Produce undesirable or nuisance aquatic life;
- Result in floating debris, oil, or scum;
- Produce objectionable color, odor, taste, or turbidity;
- Cause objectionable bottom deposits;
- Cause nuisance;
- Dominate the receiving water body or overlap a mixing zone from different outfalls; or
- Be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water. To the extent of any conflict between this determination and the Sources of Drinking Water Policy (SWRCB Resolution No. 88-63), this SIP supersedes the provisions of that policy.

2.4 Evaluation of Available Dilution for Acute Criteria

The Technical Support Document (TSD) states that: *"The CMC should be met within a distance of five times the local water depth in any horizontal direction from any discharge outlet. This restriction will prevent locating the discharge in very shallow environments or very close to shore, which would result in significant surface and bottom concentrations."* The outfall is located on the shore, which, by the TSD guidance, will greatly restrict the horizontal range that the acute criteria may be exceeded in the receiving water. Only a limited amount of water depth data was available around the outfall, but it appears to drop to about 4 feet within 10 feet of the bank. By the TSD, this provides about a 20-foot radius around the outfall for compliance with the CMC. The temperature modeling shows the discharge to remain concentrated on the surface of the receiving water and disperse horizontally and vertically as it moves downstream. With the spatial restrictions recommended by the TSD for compliance with acute criteria and the lack of dilution indicated by the temperature modeling at the outfall, no dilution is available for the acute aquatic criteria.

2.5 Evaluation of Available Dilution for Chronic Criteria

The TSD states that:
"Concentrations above the chronic criteria are likely to prevent sensitive taxa from taking up long-term residence in the mixing zone. In this regard, benthic organisms and territorial organisms are likely to be of greatest concern. The higher the concentration occurring within the isopleth, the more taxa are likely to be excluded, thereby affecting the structure and function of the ecological community. It is thus important to minimize the overall size of the mixing zone and the size of elevated concentration isopleths within the mixing zone."

The temperature model, while subject to the limitations discussed in section 2.2, provides information used as a basis to establish available dilution for compliance with chronic criteria to protect aquatic life. The model concludes that, for the timed discharge, the four degree F differential would reach a maximum area of 0.3 acre and would be contained in a shallow (less than one foot in depth) plume that hugs the east river bank until dissipating 450 feet downstream. The model also shows that significant vertical mixing does not occur until about 500 feet downstream at which point there will be contact with the benthic community. This is illustrated in Figure 8 of the Resource Management Associates, 2000, analysis. Using the conclusions of the temperature model, a 4 degree temperature differential downstream where the effluent and receiving water have a 15°F initial difference indicates that mixing in the near field is small and does not reach 4:1 until nearly 450 feet downstream and 15:1 at 1300 feet downstream. Complete mixing, which is defined in the SIP as not more than a 5 percent difference in the concentration of a pollutant across a transect of the water body, would not occur until over 1000 feet downstream. The SIP requires that a mixing zone not dominate or compromise the integrity of the entire water body and shall be as small as practicable. The thermal modeling presented a spatial definition to the changes in temperature that occur in the receiving water as discussed in the previous paragraph. This allowed a mixing zone to be defined and dilution to be determined at the edge of this mixing zone. The mixing zone will be restricted to the surface layer of the water column in a plume hugging the eastern shore of the river and extending to 450 feet downstream of the outfall. Temperature differences at the edge of this mixing zone indicate that a 4:1 dilution exists at the edge of this mixing zone. For constituents subject to chronic aquatic criteria, a 4:1 dilution will be applied. This mixing zone will provide protection to the benthic community and minimize the impacts of the discharge to the river.

2.6 Evaluation of Available Dilution for Specific Constituents

The overlap of the plumes from the City of Manteca and the Brown Sand impoundment will limit the extent of a mixing zone for arsenic, a constituent of mutual concern between these discharges. Additionally, the receiving water monitoring shows an average arsenic concentration of 3.0 ug/l, exceeding the USEPA recommended water quality criterion for protection of human health at the 1-in-a-million risk level. Therefore, the receiving water lacks assimilative capacity for arsenic, and there is no dilution available.

The assimilative capacity of the river is dependent on the background concentration of the receiving water. Data collected in 2002 indicates that the receiving water has no assimilative capacity, and therefore no dilution can be granted for aluminum, electrical conductivity, iron, manganese, and mercury.

2.7 Evaluation of Available Dilution for Priority Pollutant Human Carcinogen Criteria

The human health-based criteria for carcinogens, other than arsenic, are based on safe levels for lifetime exposure and utilize the harmonic mean flow to represent the receiving water flow. The harmonic mean flow at Vernalis is 1976 cfs. The current annual average discharge rate is 5.72 mgd (8.9 cfs). A steady state analysis utilizing the harmonic mean flow provides a dilution of 222:1. The Regional Board is not required to grant a mixing zone or allocate the full assimilative capacity of the receiving water. For limitations based on human health criteria, dilution is limited to that required to maintain compliance. Where the ambient background concentrations are lower than the applicable human health criterion, the dilution credits determined in Table 12 of the Information Sheet apply for the determination of effluent limitations for carcinogens.

3 Biosolids Management

The City of Manteca currently discharges biosolids that has been dewatered in drying beds to City-owned farmland adjacent to the treatment plant at agronomic rates, as described in the Order. New limitations on metal concentrations in sludge/soil mixtures and new conditions for sludge use as a soil amendment have been established. This new permit requires the City to reevaluate the sludge and effluent application rates to land and submit a land application plan.

4 Pretreatment Program

The Discharger submitted a draft pretreatment program to the Regional Board for approval. The Regional Board, in an October 2001 Pretreatment Audit, identified areas of the program that were deficient or not implemented. The Regional Board staff, on 22 January 2003, provided comments to the Discharger identifying provisions of the City's Waste Ordinance and the Interjurisdictional Agreement between the City of Manteca and the Lathrop County Water District that are deficient. This Order provides a compliance schedule for the Discharger to submit a pretreatment program that corrects the deficiencies noted in the October 2001 Pretreatment Compliance Audit and in the 22 January 2003 letter. The Regional Board will reopen this Order to approve the pretreatment program upon submittal of a program that corrects the deficiencies. This Order requires full compliance with all pretreatment program requirements by **1 October 2004**.

5 Ground Water

Domestic wastewater contains constituents such as total dissolved solids (TDS), specific conductivity, pathogens, nitrates, organics, and metals. The Discharger's use of unlined ponds and the application of wastewater to land may result in an increase in the concentration of these constituents in groundwater. The increase in the concentration of these constituents in groundwater must be consistent with Resolution 68-16. Any increase in pollutant concentrations in groundwater must be shown to be necessary to allow wastewater service necessary to accommodate housing and economic expansion in the area and must be consistent with maximum benefit to the people of the State of California. Some degradation of groundwater by the Discharger is consistent with Resolution 68-16 provided that:

a. The degradation is confined to a specified area;

b. The degradation after effective source control, treatment, and control is limited to waste constituents typically encountered in municipal wastewater as specified in the groundwater limitations in this Order;
c. The Discharger minimizes the degradation by fully implementing, regularly maintaining, and optimally operating best practicable control technology (BPCT) measures; and
d. The degradation does not result in water quality less than that prescribed in the Basin Plan, e.g., does not exceed water quality objectives.

Monitoring of the groundwater must be conducted to determine if the discharge has caused an increase in constituent concentrations, when compared to background. The monitoring must, at a minimum, require a complete assessment of groundwater impacts including an assessment of all wastewater-related constituents which may have migrated to groundwater, the vertical and lateral extent of any degradation, and an analysis of whether additional or different methods of treatment or control of the discharge are necessary to provide best practicable treatment or control to comply with Resolution 68-16. Economic analysis is only one of many factors considered in determining best practicable treatment. If monitoring indicates that the discharge has incrementally increased constituent concentrations in groundwater above background, this permit may be reopened and modified. Until groundwater monitoring is sufficient, this Order contains Groundwater Limitations that allow groundwater quality to be degraded for certain constituents when compared to background groundwater quality, but not to exceed water quality objectives or standards. If groundwater quality is shown to have been degraded by the wastewater treatment processes or the discharge, the incremental change in pollutant concentration (when compared with background) may not be increased. This Order may also be reopened and specific numeric limitations established.

The discharge authorized herein and the treatment and storage facilities associated with the discharge of treated municipal wastewater, except for discharges of residual sludge and solid waste, are exempt from the requirements of Title 27, CCR, Section 20005 et seq. (hereafter Title 27). The exemption, pursuant to Title 27, CCR, Section 20090(a), is based on the following:

a. The waste consists primarily of domestic sewage and treated effluent;

b. The waste discharge requirements are consistent with water quality objectives; and

c. The treatment and storage facilities described herein are associated with a municipal wastewater treatment plant.

This Order requires the Discharger to prepare technical and monitoring reports as authorized by California Water Code (CWC) Section 13267. This Order also requires that the Discharger conduct groundwater monitoring and includes a regular schedule of groundwater monitoring in the attached Monitoring and Reporting Program. The groundwater monitoring reports are necessary to evaluate impacts to waters of the State to assure protection of beneficial uses and compliance with Regional Board plans and policies, including Resolution 68-16, and to assure compliance with this Order.

6 Thermal Limitations

The State Water Resources Control Board (State Board) Water Quality Control Plan for Control of Temperatures in Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (the Thermal Plan) is applicable to this discharge. The Thermal Plan requires that such a discharge:

(a) shall not exceed the receiving water temperature by more than 20 °F;

(b) shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature which exceeds 25 % of the cross sectional area of the River at any point; and,

(c) shall not cause a temperature rise greater than 4 °F above the natural temperature of the receiving waters at any time or place.

For the purposes of compliance with the Thermal Plan, the Discharger is considered to be an existing discharger of elevated temperature waste. Monitoring by the Discharger indicates that the 20 degree °F limitation of Objective 5.A.(1)a of the Thermal Plan is occasionally exceeded in winter months when the receiving water is at its lowest temperatures. Modeling conducted by RMA, subject to the limitations discussed below, indicates that the current and the expanded flows with continuous discharge exceed both the 1 degree and 4 degree requirements of Objectives 5.A.(1)b and 5.A.(1)c of the Thermal Plan. The modeling also demonstrates that a timed discharge, that is, discharging only on the outgoing tide, for the increased flow exceeds only the 4 degree requirement, but not the 1 degree requirement. The Discharger has requested an exception to the 4 degree requirement of Objective 5.A.(1)c of the Thermal Plan which requires that the discharge shall not cause a surface water temperature rise greater than 4 °F above the natural temperature of the receiving waters at any time or place and has also requested a one month averaging period to meet the 20 degree limit of Objective 5.A.(1)a. An exception cannot be authorized at this time due to a number of factors. First, the accuracy of the temperature model results which are the basis for the receiving water limitation violations are questionable due to a lack of site data to calibrate and validate the model, the lack of accounting for atmospheric heat gains and loss from the proposed holding pond and the river, the lack of accounting for tidal cycles and recirculation from the limited model run time, and the lack of accounting for the Brown Sand, Inc. discharge adjacent to the City's discharge. Second, the Discharger has not conducted regular monitoring of temperature at the outfall as required in its previous permit, and the available information is based on a limited data set which correlates the temperature at the plant site and at the outfall. Third, the Discharger has not provided adequate evidence that a 30-day averaging period for Effluent Limitation B.11. will not cause adverse impacts to aquatic life. Finally, the Discharger does not currently have the capability to implement a timed discharge on out-going tides.

Effluent Limitations and Receiving Water Limitations are included to require compliance with the Thermal Plan. If adequate information is developed to support exceptions to the Thermal Plan, this Order may be reopened to modify limitations for Thermal Plan compliance.

Studies by the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, the University of California at Davis, et. al., have identified the Central Valley Chinook Salmon and the Central Valley Steelhead as sensitive species that are affected by elevated temperatures in the San Joaquin River. There are four runs of salmon in the Central Valley that results in there being adults and juveniles in portions of the Delta every month of the year (Moyle, 2000). Generally, adults would be moving upstream in the fall, and fry and smolt moving downstream in the winter and spring. River temperatures above 68 °F are unsuitable for supporting salmonoids (Draft EIR, 2000). Migration of adults is usually delayed when river temperatures reach this level. In a Department of Water Resources Study, adult salmon will cease migration if water temperatures are above 70 °F. At 77 °F, adult mortality may occur (Myrick, Cech, 2001). The Thermal Plan does not protect aquatic life from high temperature wastewater being discharged to an elevated temperature river. However, the Thermal Plan limits incremental increases in temperature. Discharge from the wastewater treatment plant of treated effluent with an elevated temperature may affect salmon and other migrating fish in the San Joaquin River. In so far as elevated temperature is deleterious to Chinook salmon, effluent temperature must be limited so as not to cause the receiving water to be harmful to the salmon. When the assimilative capacity of the river is diminished, effluent temperature must be held to the water quality criteria. The CALFED Bay-Delta Program target is to maintain water temperatures below 68 °F in migratory routes of anadromous fish in the spring and fall (CALFED, 2000). This Order requires the Discharger to study the thermal impacts to the receiving water associated with a discharge of treated effluent with elevated temperatures.

7 Antidegradation Analysis

The Regional Board must consider antidegradation pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16 and find that the permitted discharge is consistent with those provisions. With regard to surface water, the receiving water may exceed applicable water quality objectives for certain constituents as described in this Order. However, this Order requires the discharger, in accordance with specified compliance schedules, to meet requirements that will result in the use of best practicable treatment or control of the discharge and will result in compliance with water quality objectives. Table 1 of the information sheet provides an analysis of the mass loading to the receiving water for a number of constituents based on current operations and for an expanded discharge flow following plant upgrades. This Order requires compliance with technology-based standards and more stringent water quality-based standards. In developing effluent limitations, this Order allows the use of some of the assimilative capacity of the receiving water based on the current performance of the discharger and is consistent with the SIP. Where assimilative capacity is available in the receiving water, this Order does not authorize the full use of the assimilative capacity. This Order is consistent with California Water Code section 13263(b). Any further use of the assimilative capacity would not be consistent with Resolution 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The impact on existing water quality will be insignificant. The total allowable discharge to surface water of 9.87 mgd has been increased from 6.95 mgd from the previous Order. The discharge is consistent with Resolution 68-16 and 40 CFR section 131.12 because this Order requires the discharger to meet requirements that will result in best practicable treatment or control to assure that pollution or nuisance will not occur prior to allowing flows to increase.

With regard to groundwater, domestic wastewater contains constituents such as total dissolved solids (TDS), specific conductivity, pathogens, nitrates, organics, and metals. The Discharger's use of unlined ponds and the application of wastewater and sludge to land may result in an increase in the concentration of these constituents in groundwater. Some degradation of groundwater by the Discharger is consistent with Resolution 68-16 provided that:

a. The degradation is limited in extent;
b. The degradation after effective source control, treatment, and control is limited to waste constituents typically encountered in municipal wastewater as specified in the groundwater limitations in this Order;
c. The Discharger minimizes the degradation by fully implementing, regularly maintaining, and optimally operating best practicable control technology (BPCT) measures; and
d. The degradation does not result in water quality less than that prescribed in the Basin Plan, e.g., does not exceed water quality objectives.

The discharge to land authorized by this Order must comply with groundwater limitations, ground water monitoring requirements and a schedule to evaluate whether the Discharger is implementing best practicable treatment or control of the discharge. Compliance with this Order will result in use of best practicable treatment or control and will not further degrade the groundwater.

8 Acute Toxicity

Order No. 97-115 prescribed stricter acute toxicity test procedures than the Discharger's previous permit. Specifically, the acute toxicity bioassay parameters were revised to require compliance with the latest testing procedures contained in EPA/600/4-90/027F. The new USEPA procedure requires the use of larval stage (0 to 14 days old) fathead minnows or golden shiners instead of the previous method of using juveniles (15 to 30 days old). Larvae are much more sensitive to ammonia levels than the juvenile species. The new USEPA procedure for the acute bioassay test constitutes a more stringent acute toxicity limitation. This Order allows the Discharger to remove ammonia prior to conducting acute toxicity tests until 1 April 2004, when facilities are required to be operational to fully nitrify the wastewater.

9 Non-priority pollutants

9.1 Residual Chlorine

The Discharger currently uses chlorine for disinfection and has reported that it uses sodium hypochlorite for maintenance. Chlorine is extremely toxic to aquatic organisms. The Discharger uses a sulfur dioxide process to dechlorinate the effluent, but will discontinue this with the installation of the UV disinfection system. Because of the existing chlorine use and the future use of hypochlorite solutions without effluent dechlorination, there is reasonable potential for chlorine to be discharged at toxic concentrations. The Basin Plan contains a narrative toxicity objective. Consistent with 40 CFR 122.44(d), it is appropriate to use the USEPA ambient water quality criteria for chlorine for protection of freshwater aquatic life of 11 ug/l as a 4-day average (chronic) concentration, and 19 ug/l as a 1-hour

average (acute) concentration to implement the narrative toxicity objective. Therefore, this Order includes water quality based effluent limitations for chlorine based on the USEPA ambient criteria to protect freshwater aquatic life.
The WQCF outfall is a side bank discharge to the San Joaquin River. The chlorine residual limitations required in this Order are protective of aquatic organisms in the undiluted discharge. Because of this, the Regional Board does not anticipate residual chlorine impacts to benthic organisms if compliance is maintained.

9.2 Salinity

The discharge contains total dissolved solids (TDS), chloride and electrical conductivity. These are water quality parameters that are typically indicative of the salinity of the water. Their presence in water can be growth limiting to certain agricultural crops and can affect the taste of the water for human consumption. There are no USEPA water quality criteria for protection of aquatic organisms for these constituents. The Basin Plan "Chemical Constituent" objective incorporates state MCLs, contains a narrative objective, and contains numeric water quality objectives for electrical conductivity. The secondary California maximum contaminant level (MCL) for TDS is 500 mg/l as a recommended level, 1000 mg/l as an upper level, and 1500 mg/l as a short-term maximum. The recommended agricultural water quality goal for TDS, that would implement the narrative "Chemical Constituent" objective, is 450 mg/l as a long-term average based on *Water Quality for Agriculture,* Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). *Water Quality for Agriculture* evaluates the impacts of salinity levels on crop tolerance and yield reduction, and establishes water quality goals that are protective of sensitive agricultural uses. The recommended agricultural water quality goal for chloride, that would implement the narrative "Chemical Constituent" objective, is 106 mg/l based on *Water Quality for Agriculture,* Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). The Basin Plan water quality objectives for electrical conductivity for the South Delta are 700 umhos/cm (from 1 April to 31 August) and 1000 umhos/cm (from 1 September to 31 March). State Board Decision 1641 (D-1641) (water rights) requires that the 1000 umhos/cm objective be met year round until 1 April 2005 at which time the seasonal objectives will be effective.

A review of the Discharger's monitoring reports from January 1998 through December 2002 indicates an annual average TDS effluent concentration of 634 mg/l, a lowest monthly average of 540 mg/l, and a highest monthly average of 727 mg/l. These concentrations exceed the applicable objectives. Limited TDS data collected at receiving water sample location R1 from January 2002 through December 2002 showed a TDS concentration range from 210 mg/l to 1300 mg/l with an average of 500 mg/l in 12 sampling events. The Regional Board report *Total Maximum Daily Load for Salinity and Boron in the Lower San Joaquin River (January 2002)* presented monthly average TDS data for the San Joaquin River at Vernalis from October 1976 through September 1997. The Vernalis data showed a maximum monthly average TDS of 1024 mg/l with 57 of 252 months having monthly averages greater than 500 mg/l. These data indicate that the receiving water frequently exceeds water quality objectives to protect its beneficial uses and lacks assimilative capacity for TDS. As water exported from the Delta by the State Water Project is, in part, mixed with Colorado River water to

provide municipal water supply with an acceptable TDS, any increase in salt concentration effectively reduces the available water supply in Southern California (*Metropolitan Water District of Southern California, Salinity Management Study, 1998*).

Chloride concentrations in the effluent ranged from 100-230 mg/l with an average of 138 mg/l based on 16 samples collected during 2002. Background concentrations in the San Joaquin River ranged from 51-170 mg/l with an average of 98 mg/l based on results from eleven samples collected during 2002. Both the receiving water and the effluent exceed the agricultural use-protective water quality limit of 106 mg/l, based on the narrative objective.

Electrical conductivity (EC) shows reasonable potential to exceed water quality objectives in both the effluent and in the receiving water. A review of the Discharger's monitoring reports from January 1998 through December 2002 shows the annual average effluent EC is 1099 umhos/cm, the lowest monthly average is 819 umhos/cm, and the highest monthly average is 1300 umhos/cm. These levels exceed the applicable objectives. EC data collected at receiving water sample location R1 from January 2002 through December 2002 show that the conductivity in the receiving water ranged from 380 umhos/cm to 1100 umhos/cm and averaged 686 umhos/cm in 12 sampling events. Hourly EC data collected at the Department of Water Resources (DWR) Mossdale monitoring station (RSAN087) from December 2000 through September 2002 show that the conductivity in the San Joaquin River ranged from 299 umhos/cm to 1131 umhos/cm and averaged 721 umhos/cm. San Joaquin River monitoring for electrical conductivity at Vernalis between 1985 and 1998 showed frequent exceedances of the EC water quality objectives (Reference Figure 1-3, *Total Maximum Daily Load for Salinity and Boron in the Lower San Joaquin River (January 2002)*). These data show that the receiving water frequently has no assimilative capacity for EC. An Effluent Limitation for electrical conductivity is included in this Order and is based on the Basin Plan water quality objective for electrical conductivity in the South Delta.

The TDS, chloride, and electrical conductivity objectives and recommended levels are all measures of the salt content of the water. Compliance with the Effluent Limitations for electrical conductivity based on the Basin Plan seasonal water quality objectives of 700 umhos/cm and 1000 umhos/cm will be protective of the chloride and TDS recommended levels; therefore, no limitations are included for chloride and TDS.

9.3 Aluminum

Aluminum concentrations in the effluent were detected in the range from 70 ug/l to 350 ug/l in sampling conducted in 2002. Aluminum was detected in the receiving water (R-1) in the range from 420 ug/l to 2200 ug/l in 12 samples collected between January 2002 and December 2002. Dissolved concentrations of aluminum in the effluent and the receiving water were significantly less than the totals listed above. The Basin Plan's chemical constituents water quality objective prohibits chemical constituents in concentrations that exceed state MCLs or that adversely affect beneficial uses. MUN is a beneficial use of the San Joaquin River. The Primary and Secondary MCLs for aluminum are 1000 ug/l and 200 ug/l respectively. The Basin Plan contains a narrative toxicity objective. Consistent with 40 CFR 122.44(d), USEPA's Ambient Water Quality Criteria for protection of freshwater aquatic life

for aluminum expressed as total recoverable are 750 ug/l (1-hour average) and 87 ug/l (4-day average), and are appropriate to implement the narrative toxicity objective. Since both the receiving water and the effluent exceed USEPA's ambient water quality criteria and the secondary MCL, no dilution can be granted. The effluent has the reasonable potential to cause or contribute to an in-stream excursion above water quality objectives for aluminum. Therefore, this Order includes an effluent limitation for Aluminum of 71 ug/l as a 30-day average and 143 ug/l as the daily maximum. The monitoring data are included in Table 3 and the effluent limitation calculations are included in Table 6.

9.4 Iron

Iron concentrations in the effluent ranged from 170-730 ug/l while background concentrations in the San Joaquin River ranged from 780-2800 ug/l based on results from 12 samples collected between January 2002 and December 2002. The Basin Plan chemical constituents objective includes a receiving water objective in Table III-1 for iron of 300 ug/l in the Delta, and the secondary MCL for iron of 300 ug/l. Both the receiving water and the effluent exceed the Basin Plan numeric objective and the secondary MCL. Water quality based effluent limitations are included in this Order based on the Basin Plan chemical constituents objective. The data are included in Table 3 and the effluent limitation calculations in Table 6.

9.5 Manganese

Manganese concentrations in the effluent ranged from 13-120 ug/l while background concentrations in the San Joaquin River ranged from 82-220 ug/l based on results from 11 samples collected between January 2002 and December 2002. The Basin Plan chemical constituents objective includes a receiving water objective in Table III-1 for manganese of 50 ug/l in the Delta, and the secondary MCL for manganese of 50 ug/l. Both the receiving water and the effluent exceed the Basin Plan numeric objective and the secondary MCL. Water quality-based effluent limitations are included in this Order based on the Basin Plan chemical constituents objective. The data is included in Table 3 and the effluent limitation calculations in Table 6.

9.6 Methylene blue active substances (MBAS)

The effluent contains MBAS at levels that may cause or contribute to exceedances in the receiving waters of water quality objectives in the Basin Plan. The Basin Plan includes the "Chemical Constituents" objective that incorporates state MCLs that applies to waters designated MUN. MUN is a designated beneficial use of the San Joaquin River. The Secondary MCL Consumer Acceptance Limit is 500 ug/l for foaming agents (MBAS). The Basin Plan also includes water quality objectives that water not contain floating material or taste- or odor-producing substances in concentrations that causes nuisance or adversely affect beneficial uses. The Basin Plan identifies non-contact water recreation, which includes aesthetic enjoyment, as a beneficial use of the San Joaquin River. MBAS concentrations in excess of the Secondary MCL produce aesthetically undesirable froth, taste, and odor. Foam has been observed on the surface of the discharge plume from the WQCF. MBAS was detected in an effluent sample collected 13 June 2002 at a concentration of 1,800 ug/l. The maximum observed upstream receiving water MBAS concentration is less than 20 ug/l. These data were used in

calculating Effluent Limitations for MBAS (see Table 6). Because of the observed foaming at the outfall, no dilution is available for MBAS. An Effluent Limitation for MBAS is included in this Order and is based on the Basin Plan water quality objectives for chemical constituents, floating material, and tastes and odors.

9.7 Molybdenum

The recommended agricultural water quality goal for molybdenum, that would implement the narrative "Chemical Constituent" objective, is 10 ug/l based on *Water Quality for Agriculture,* Food and Agriculture Organization of the United Nations—Irrigation and Drainage Paper No. 29, Rev. 1 (R.S. Ayers and D.W. Westcot, Rome, 1985). Molybdenum was not monitored in the effluent or in the receiving waters. Because of the uncertainty associated with the lack of monitoring, additional studies of this constituent are warranted to more thoroughly evaluate reasonable potential for this constituent to exceed criteria. MRP No. R5-2004-0028 specifies monitoring for this pollutant. If the monitoring shows a reasonable potential to cause or contribute to an exceedance of a water quality objective, this Order may be reopened for addition of appropriate effluent limitations.

9.8 Carbofuran

The Basin Plan contains a narrative objective for toxicity that prohibits concentrations of toxic substances that could produce detrimental physiological responses in humans. Public Health Goals published by OEHHA provide a measure of an amount of a toxic substance that, if exceeded could contribute to toxicity in humans who consume the water for municipal or domestic supply (MUN). MUN is a designated beneficial use of the receiving water. Carbofuran was detected in the effluent and receiving water at concentrations greater than the Public Health Goalof 1.7 ug/l. Because the data were greater than the method detection limit but less than the laboratory's reporting (quantitation) limit, the data were flagged as "detected but not quantified". Additional monitoring is required. If the monitoring shows a reasonable potential to cause or contribute to an exceedance of a water quality objective, this Order may be reopened to consider incorporation of appropriate effluent limitations.

9.9 Nitrate and Nitrite

Nitrate and nitrite are known to cause adverse health effects in humans. The Basin Plan's chemical constituents water quality objective prohibits chemical constituents in concentrations that exceed drinking water Maximum Contaminant Levels (MCLs) published in Title 22 of the California Code of Regulations or that adversely affect beneficial uses. Municipal and domestic water supply is a beneficial use of the San Joaquin River. The California Department of Health Services (DHS) has adopted Primary Maximum Contaminant Levels (MCLs) for the protection of human health for nitrite and nitrate that are equal to 1 mg/l and 10 mg/l (measured as nitrogen), respectively. Title 22 CCR, Table 64431-A, also includes a primary MCL of 10,000 ug/l for the sum of nitrate and nitrite, measured as nitrogen. The discharge from the WQCF has a reasonable potential to cause or contribute to an in-stream excursion above water quality standards for nitrite and nitrate because of the nitrification and denitrification processes. Effluent limits for nitrite and nitrate are based on the MCLs. Effluent Limitations for nitrite and nitrate are included in this Order to assure the treatment process

adequately nitrifies and denitrifies the waste stream to protect the beneficial uses of municipal and domestic supply.

10 Ammonia-Nitrogen

This section provides a detailed discussion and evaluation of ammonia in the effluent.

A review of the Discharger's monitoring reports from January 1998 through December 2002 shows an average ammonia effluent concentration of 18 mg/l, a minimum concentration of less than 0.1 mg/l, and a maximum concentration of 43 mg/l. The data indicate very little seasonal fluctuation. Receiving water monitoring (R-1) was conducted from January 2002 through December 2002 (see Table 4). The receiving water data showed an average of 0.2 mg/l with a minimum of less than 0.01 mg/l and a maximum of 1.4 mg/l.

10.1 Toxicity Criteria

The USEPA 1999 Update of Ambient Water Quality Criteria for Ammonia provides the applicable water quality criteria for this pollutant. Ammonia is not a priority pollutant; therefore, USEPA guidance, rather than the SIP, is applicable for reasonable potential and effluent limitation calculations. Section 4.3.3 of the TSD allows the consideration of exposure duration in evaluating toxicity to organisms passing through a mixing zone. When evaluating either an acute or chronic mixing zone for ammonia, the pH of the mixture of effluent and receiving water should be used to determine appropriate criteria to be applied within that mixing zone. The pH in the mixing zone will be a function of the effluent pH and the ambient dilution water pH being mixed together. The pH is an important factor because toxicity of ammonia increases logarithmically as pH increases.

10.2 Consideration of Aquatic Organisms

The most stringent acute ammonia criteria are applied when salmonoids are present within the water column. The San Joaquin River at Manteca is a migratory path for salmon, and they are likely to be present in the river at any time of the year. The chronic ammonia criteria are most stringent when early life stages (ELS) of aquatic species are present. In response to a request for information regarding the time of year ELS of fish are present in the San Joaquin River near the Deep Water Ship Channel (DWSC), a Department of Fish and Game memorandum, dated
27 February 2001, states ELS of multiple fish and invertebrates species are present in the San Joaquin River year-round. Therefore, both acute and chronic ammonia toxicity are based on the assumption that both salmonoids and ELS of fishes are present in the San Joaquin River near the Manteca WQCF outfall year-round.

10.3 Reasonable Potential Evaluation

The reasonable potential evaluation shows that the WQCF effluent has reasonable potential to cause or contribute to an in-stream excursion above USEPA acute and chronic water quality criteria for ammonia. This has been demonstrated by determining reasonable potential based on critical

conditions that are a combination of worst-case observations[1] using effluent data and using receiving water data (see Table 7). Consistent with 40 CFR section 122.44(d)(vi)(A) and the Basin Plan "Policy for Application of Water Quality Objectives", this Order implements the Basin Plan narrative toxicity objective by applying USEPA's Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life for ammonia. This Order includes effluent limitations for ammonia, based on the narrative toxicity objective and the USEPA's Ambient Water Quality Criteria for the Protection of Freshwater Aquatic Life.

The acute criterion or criteria maximum concentration (CMC) for ammonia is a function of receiving water pH and is stated as a 1-hour average concentration. A worst-case scenario occurs when there is little to no dilution of the effluent by the receiving water. This was discussed in the previous dilution section. Therefore, for the acute criteria, water quality objectives need to be achieved in the effluent at the end-of-pipe. As allowed by the TSD, this Order calculates the CMC using critical conditions that are a combination of worst-case observations. The acute criterion for ammonia is determined by evaluating the maximum effluent pH at the end of the pipe. The maximum allowable effluent pH is 8.0. The calculated CMC for this condition is 5.6 mg/l ammonia as N. The maximum effluent concentration, measured on 15 August 2001, was 42.8 mg/l ammonia as N. This exceeds the calculated ammonia CMC value. Even using the mean effluent ammonia concentration of 17.7 mg/l exceeds the CMC value under worst-case pH conditions. This scenario shows that there is reasonable potential for acute water quality objectives to be exceeded by effluent ammonia concentrations.

The receiving water pH and ammonia concentrations were also evaluated to determine if there is reasonable potential to cause acute ammonia toxicity, based upon concentrations found in the receiving water. The acute criterion is determined using the receiving water pH. In July 2002, the receiving water reached a maximum pH of 9.3, as recorded by the City at the R-1 monitoring site. The receiving water ammonia concentrations determined by the discharger's monitoring during 2002 indicated a maximum concentration of 1.4 mg/l with an average of 0.2 mg/l. As determined by the TSD approach, the receiving water at times may exceed the CMC for ammonia.

The chronic criterion, or criteria continuous concentration (CCC), for ammonia is a function of both pH and temperature. For ammonia, the CCC is stated as a 30-day average concentration, with the highest 4-day average within the 30-day average not to exceed 2.5 times the CCC. As allowed by the TSD, the CCC is calculated using critical conditions that are a combination of worst-case observations. The highest receiving water 30-day average pH was 9.1, observed during June/July 1992 at the DWR Mossdale monitoring station. The maximum 30-day average temperature of 25.7 C (78.3 F) was observed during July 2002 at the DWR Mossdale monitoring station. The calculated CCC for this condition is 0.21 mg/l ammonia-N. The effluent 30-day average ammonia concentration during that same period was 14.1 mg/l ammonia as N and
17.7 mg/l averaged over the past 5 years. The calculated CCC is exceeded which demonstrates that the effluent has the reasonable potential to cause or contribute to chronic ammonia toxicity in the receiving water.

[1] EPA Technical Support Document, March 1991, Chapter 3

The monthly average receiving water pH and temperature from the Mossdale monitoring station, and ammonia concentrations collected from the R-1 sample location during 2002 were evaluated to determine if concentrations have been observed in the receiving water above the chronic criteria. The TSD method demonstrated a reasonable potential for the receiving water to exceed the chronic ammonia toxicity. The maximum ammonia concentration of 1.4 mg/l also demonstrates that there are times when there is no assimilative capacity in the receiving water for additional ammonia.

10.4 Effluent Ammonia Limits

Based on the above discussion of reasonable potential, daily and monthly effluent ammonia limitations are required to protect aquatic organisms from ammonia toxicity. The USEPA TSD recommends that statistical permit limit derivations be used to develop chemical specific limitations for NPDES permits. Effluent limitations are calculated as shown in Table 8. Because of the seasonal variation in pH and temperature of the receiving water and the sensitivity of the ammonia criteria to these conditions, seasonal limitations are established.

For the warm weather months from 1 June to 30 September, the maximum permitted monthly average effluent pH is 8.0, the maximum historical monthly average receiving water pH is 9.1, the maximum historical monthly average effluent temperature is 27.2 F, and the maximum historical monthly average receiving water temperature is 25.7 F. The pH and temperature at the edge of a 4:1 mixing zone were estimated utilizing the USEPA DESCON program. These estimations are utilized in Table 8 to calculate effluent limitations that maintain compliance with chronic aquatic criterion in the receiving water outside of the mixing zone. Effluent limitations compliant with acute criteria for conditions at the end-of-pipe are also determined, but the more restrictive chronic criteria determine the final effluent limitations. Table 8 provides a daily maximum effluent limitation of 4.4 mg/l ammonia as N and a 30-day average effluent limitation of 2.1 mg/l. As defined by the 1999 criteria, the 4-day average CCC ammonia concentration shall not exceed 2.5 times the value of the 30-day CCC. However, considering the maximum daily limitation is less than 2.5 times the CCC in all cases, the 4-day average cannot exceed the maximum daily limitation.

For the cool weather months from 1 October to 31 May, the maximum permitted monthly average effluent pH is 8.0, the maximum historical monthly average receiving water pH is 8.5, the maximum historical monthly average effluent temperature is 25.2 F, and the maximum historical monthly average receiving water temperature is 19.6 F. The pH and temperature at the edge of a 4:1 mixing zone were estimated utilizing the USEPA DESCON program. These estimations are utilized in Table 8 to calculate effluent limitations that maintain compliance with chronic aquatic criterion in the receiving water outside of the mixing zone. Effluent limitations compliant with acute criteria for conditions at the end-of-pipe are also determined. In this case, the more restrictive acute criteria determine the final effluent limitations. Table 8 show that the acute criteria using the maximum permitted effluent pH of 8.0 provides a daily maximum effluent limitation of 5.6 mg/l ammonia as N and a 30-day average effluent limitation of
2.8 mg/l.

The Clean Water Act requires publicly owned treatment works to comply with the secondary treatment and applicable water quality standards existing prior to 1 July 1977. USEPA's regulations state that any NPDES compliance schedule may not extend beyond an applicable Clean Water Act statutory deadline. Therefore, a compliance schedule that extends the date for compliance with water quality standards that existed prior to 1 July 1977 may not be included in the Order.

11 Priority Pollutants

This section and its subsections discuss how priority pollutants are evaluated against criteria and how limitations and interim requirements are developed.

For priority pollutants, guidance for determining reasonable potential, effluent limitations, and compliance schedules is provided by the SIP, adopted in March 2000 by the SWRCB. USEPA promulgated the numeric water quality criteria for priority pollutants with the adoption of the CTR in May 2000. Table 10 summarizes the priority pollutants of concern and their respective criteria.

Priority pollutant constituents were analyzed in the effluent and the receiving water (location R-1) from January 2002 to December 2002. The results of these analyses were evaluated for their reasonable potential to exceed Basin Plan, CTR, or other applicable criteria. Section 1.3 of the SIP establishes the guidance for reasonable potential analysis. Table 10 summarizes the reasonable potential analysis of the detected constituents.

11.1 Inorganic Priority Pollutants

The inorganic pollutants **arsenic**, **copper** and **cyanide** were found to have a reasonable potential to cause or contribute to an exceedance of the applicable Basin Plan objectives. Effluent limitations are therefore required for arsenic, copper, and cyanide.

Based on the information received from the Discharger, the use of the steady-state model described in Section 1.4B of the SIP was utilized for calculating effluent limitations. Dilution credits are provided to the degree indicated in the dilution evaluation (see section 2). The acute and chronic criteria for copper are a function of hardness. In general, lower hardness values provide more stringent criteria. The hardness value expected to occur at the point in the receiving water where the standard applies, is considered the design hardness. San Joaquin River hardness data is available at Vernalis, Mossdale, and at the Manteca outfall (R-1). The data sets have similar values. There is more river hardness data available over a longer period at Vernalis, therefore, the Vernalis data were used to evaluate receiving water hardness. In determining design hardness, the Regional Board analyzed the receiving water hardness measured at Vernalis during periods when critical low flow was probable (i.e. San Joaquin River flow at Vernalis ranging from 800 cfs to 1,200 cfs). The effluent hardness was also utilized for the acute criteria calculations where dilution is not available.

Receiving water hardness is generally flow-related with lower flows providing higher hardness values. To determine the design hardness, receiving water hardness and flow data collected from the USGS monitoring station at Vernalis from 1950 through 1999 were evaluated. The dataset was filtered for

hardness under design flow conditions (see Figure 1). The minimum flow at Vernalis is approximately 1000 cfs which is the flow that the U.S. Bureau of Reclamation maintains at Vernalis to meet the 1995 Water Quality Control Plan salinity objective of 1000 umhos/cm. Hardness data was then evaluated in the range of 800 to 1,200 cfs. The receiving water hardness generally ranged from 150 to 250 mg/l as $CaCO_3$ with the lowest observed receiving water hardness under these conditions being 108 mg/l $CaCO_3$. At a hardness of 108 mg/l, the chronic criterion, or criterion continuous concentration (CCC), for copper is 9.6 ug/l.

Effluent hardness values ranged from 170 mg/l to 190 mg/l during the period from March 2002 to December 2002. Because no dilution is allowed for effluent limitations based on acute criteria, the minimum effluent hardness value of 170 mg/l was used for calculating effluent limitations. Using the minimum effluent hardness, the acute criterion, or criterion maximum concentration (CMC), for copper is 22.2 ug/l as dissolved, based on the SIP. However, the hardness dependent SIP criterion exceeds the Basin Plan site-specific objective of 10 ug/l as dissolved. Therefore, the copper effluent limits were calculated using a CMC of 10 ug/l as dissolved. Effluent limitations, which are expressed as total recoverable, are somewhat higher after the application of a 0.96 translator. There have been no approved studies by the Discharger to evaluate discharge-specific metal translators for copper; therefore, the default USEPA translators within the CTR were used in the calculation of the final effluent limitations.

The final effluent limitations were calculated using a steady-state model method described in Section 1.4 of the SIP. Section 5.4.4 of the TSD was utilized to determine the monthly average limit for arsenic. Water quality-based effluent limitations are included in this Order based on the Basin Plan chemical constituents objective. The data are included in Table 9 and the effluent limitation calculations in Table 11.

11.2 Human Carcinogens

There were five (5) human carcinogenic compounds present in the WQCF effluent. As summarized in Table 10, dibromochloromethane, bromodichloromethane, 2,4,6-trichlorophenol, and bis(2-ethylhexyl)phthalate were determined to present reasonable potential to exceed a one-in-a-million incremental human cancer risk criteria for water and/or organism consumption. Chloroform does not show reasonable potential to exceed the primary MCL. None of these constituents were detected in the receiving water.

11.2.1 Total Trihalomethanes and Chloroform

Information submitted by the Discharger indicate that the effluent contains trihalomethanes (THMs) including chloroform. The Basin Plan contains the "Chemical Constituent" objective that requires, at a minimum, that waters with a designated MUN use not exceed California MCLs. In addition, the Chemical Constituent objective prohibits chemical constituents in concentrations that adversely affect beneficial uses. The California's Drinking Water Standard primary MCL for total THMs is 100 ug /l. The USEPA primary MCL for total THMs is 80 ug/l, which was effective on 1 January 2002 for surface water systems that serve more than 10,000 people. Pursuant to the Safe Drinking Water Act,

DHS must revise the current total THMs MCL in Title 22 CCR to be as low or lower than the USEPA MCL. Total Trihalomethanes (THMs) include bromoform, bromodichloromethane, chloroform, and dibromochloromethane. Chloroform does not have promulgated CTR criteria. The State Board, in WQO No 2003-0002, stated that the Drinking Water Standard primary MCL for Total THMs of 80 ug/l could be applied to address chloroform in the discharge regulated in that Order. In addition, the Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA) has published the Toxicity Criteria Database, which contains cancer potency factors for chemicals, including chloroform, that have been used as a basis for regulatory actions by the boards, departments and offices within Cal/EPA. This cancer potency factor is equivalent to a concentration in drinking water of 1.1 ug/l (ppb) at the 1-in-a-million cancer risk level with the consumption of the drinking water over a 70-year lifetime. This risk level is consistent with that used by the Department of Health Services (DHS) to set *de minimis* risks from involuntary exposure to carcinogens in drinking water in developing MCLs and Action Levels and by OEHHA to set negligible cancer risks in developing Public Health Goals for drinking water. The one-in-a-million cancer risk level is also mandated by USEPA in applying human health protective criteria contained in the National Toxics Rule and the California Toxics Rule to priority toxic pollutants in California surface waters.

MUN is a designated beneficial use of the receiving water. However, there are no known drinking water intakes on the San Joaquin River within several miles downstream of the discharge, and chloroform is a non-conservative pollutant. Therefore, to protect the MUN use of the receiving waters, the Regional Board finds that, in this specific circumstance, application of the USEPA MCL for total THMs for the effluent is appropriate, as long as the receiving water does not exceed the OEHHA cancer potency factor's equivalent receiving water concentration at a reasonable distance from the outfall (e.g., before reaching the drinking water intakes). Effluent samples collected from January 2002 through December 2002 indicated that THMs were present with a maximum concentration of 17 ug/l and an average concentration of 10 ug/l. Chloroform samples collected over the same period contained a maximum concentration of 12 ug/l and an average concentration of 8 ug/l. Considering the available dilution based on the harmonic mean flow of the San Joaquin River, the discharge does not have a reasonable potential to cause or contribute to an in-stream excursion above the water quality objective for MUN use by causing an exceedance of the USEPA primary MCL for total THMs or the chloroform OEHHA cancer potency factor's equivalent receiving water concentration. Therefore, effluent limitations for total THMs and chloroform are not included in this Order.

11.2.2 Effluent Limitations for Human Carcinogenic Priority Pollutants

The effluent limitation calculation procedures in Section 1.4 of the SIP allow for the granting of a dilution credit which, in this case, is 222-fold based on the harmonic mean flow of the San Joaquin River at Vernalis and the average discharge flow. However, the Regional Board finds that granting of this dilution credit would allocate an unnecessarily large portion of the River's assimilative capacity for these constituents and could violate the Antidegradation Policy. Instead, effluent limitations have been developed based on the amount of dilution that would be required, such that receiving water concentrations for these constituents would be met when effluent concentrations are at estimated maximum levels as determined by taking the mean plus 3.3-standard deviations or the maximum observed concentration, which ever is larger, for data sets with 10 or more values. For data sets with

less than 10 values, the maximum effluent concentration and a 3.11 multiplier (from Table 5-2 of the TSD) provides the estimated maximum levels. The calculations of the allowed dilution are shown in Table 12 which: (1) summarizes the monitoring data for the human carcinogens that have reasonable potential to exceed human carcinogen criteria; (2) summarizes the statistics used in calculating the estimated maximum concentration; and, (3) determines the amount of dilution that would be required to meet the applicable human-carcinogen criteria. Final effluent limitations are calculated and summarized in Table 13.

11.2.3 Ability to Meet Effluent Limitations and Interim Requirements

Based on historical effluent data, the WQCF can meet the effluent limitations for dibromochloromethane, bromodichloromethane, 2,4,6-trichlorophenol, and bis(2-ethylhexyl)phthalate. Additionally, because the plant will install a UV disinfection system by 1 February 2009, the THM constituents are expected to decrease significantly.

Section 1.4.2.2.B of the SIP requires, among other things, that when a mixing zone/dilution credit is granted, the permit must specify the point in the receiving water where the applicable criteria/objectives must be met. The Discharger has not performed such an analysis over a variety of flow conditions. However, considering the long-term averaging period for human carcinogens, the infrequency of critical conditions and worst-case effluent concentrations, and the fact that there are no drinking water intakes for numerous miles down- or up-stream of the discharge, the Regional Board finds the lack of a detailed mixing zone study is not significant enough to postpone the imposition of final effluent limitations for dibromochloromethane, bromodichloromethane, 2,4,6-trichlorophenol and bis (2-ethyhexyl)phthalate.

11.2.4 Receiving Water Monitoring for Human Carcinogen Priority Pollutants

Receiving water monitoring of human carcinogens is required to provide assurance that water quality criteria are being met downstream of the discharge and that the beneficial use of municipal supply is being protected. Although a mixing zone analysis has not been performed to delineate the specific boundaries of the mixing zone for human carcinogens, the samples collected at the existing R-1 and R-4 receiving water monitoring locations should provide adequate information to demonstrate compliance with water quality criteria.

11.3 Bioaccumulatives

Based on information submitted by the Discharger, the Regional Board concludes that the discharge contains **mercury**. The Delta waterways are listed in accordance with Clean Water Act Section 303(d) as impaired for mercury based on bioaccumulation of this pollutant in fish tissue. The CTR contains criteria for mercury. The CTR criteria, however, do not address bioaccumulation in the river. The WQCF effluent contains detectable levels of mercury below CTR priority pollutant criteria. However, the bioaccumulation rates in fish tissue used to calculate the CTR water quality criteria are based only on a laboratory derived bioconcentration factor that considers organism uptake from water only and does not consider the contribution from the organism's food source. Therefore, the CTR criteria are

not protective of actual bioaccumulation conditions in the River. Health advisories by the Department of Health Services remain in effect for human consumption of fish in the Delta, including the San Joaquin River at Manteca, due to excessive concentrations of mercury in fish tissue. These current warnings and available fish tissue data confirm that there is currently no assimilative capacity in the Delta for mercury.

Group A organo-chlorine pesticides, which include lindane, endrin aldehyde and DDT are also on the 303(d) listing. The Basin Plan sets forth a water quality objective that requires that organo-chlorine pesticides not be present in the water column in detectable concentrations. The SIP designates acceptable minimum laboratory detection levels for lindane, endrin aldehyde and DDT at 0.02 ug/l, 0.01 ug/l and 0.01 ug/l, respectively. The organo-chlorine pesticide effluent concentrations and corresponding reporting levels are at or below the SIP minimum levels and meet the Basin Plan objective. Based on these considerations, effluent limitations for Group A pesticides are not required in this Order.

Effluent samples collected from January 2002 to December 2002 contained mercury concentrations ranging from 0.013 ug/l to 0.028 ug/l. Receiving water monitoring for mercury over the same period provided results ranging from 0.0036 ug/l to 0.0093 ug/l. Table 14 summarizes the mercury data and statistics associated with the mercury results.

The effluent and receiving water have also been monitored for Group A pesticides and PCBs on four occasions during 2002. Dioxin (2,3,7,8-TCDD) was monitored twice during 2002. These constituents were not detected in the effluent or receiving water samples. Detection limits for DDT, PCB and the 2,3,7,8-TCDD were not adequate to determine compliance with the water quality criteria, therefore continued monitoring is required in this Order. Table 10 summarizes these results.

11.3.1 Interim Requirements - Bioaccumulative Priority Pollutants

The SIP recommends that the Regional Board consider whether the mass loading of bioaccumulative pollutants should be limited in the interim to "*representative current levels*" pending development of applicable water quality standards or TMDL allocation. The intent is, at a minimum, to prevent further impairment while a TMDL for a particular bioaccumulative constituent is being developed. Any increase in loading of mercury to an already impaired water body would further degrade water quality.

An interim effluent mass limitation for mercury has been determined using the WQCF design flow of 8.11 mgd and the maximum observed concentration. The data and calculation, as summarized in Table 14, provided an interim yearly mass limitation for mercury of 0.69 pounds/year (as total recoverable).

To track the Discharger's compliance with the interim mass limitation, the Discharger is required to calculate a 12-month consecutive running average of the mass loading for mercury. Starting on the 12th month after adoption of this permit, and for every month thereafter, the total mass pollutant loading for the previous twelve months will be reported in the monthly discharge monitoring reports and compared against the interim mass limitation calculated in the previous section. In addition to the

numeric interim mass-based limitation for mercury, this Order requires the Discharger to prepare a pollutant prevention plan in compliance with CWC 13263.3(d)(3) for mercury.

The final effluent limitations (mass load allocations) for mercury in the WQCF effluent will come from the TMDL. If the Regional Board determines that a mercury offset program is feasible for Dischargers subject to a NPDES permit, then this Order may be reopened to reevaluate the interim mercury mass loading limitation(s) and the need for a mercury offset program for this Discharger.

MWK

INFORMATION SHEET ORDER NO. R5-2004-0028 ATTACHMENT A
CITY OF MANTECA, CITY OF LATHROP
AND DUTRA FARMS
WASTEWATER QUALITY CONTROL FACILITY
SAN JOAQUIN COUNTY

FIGURES AND TABLES

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Table 14 Mercury Loading

F gu e

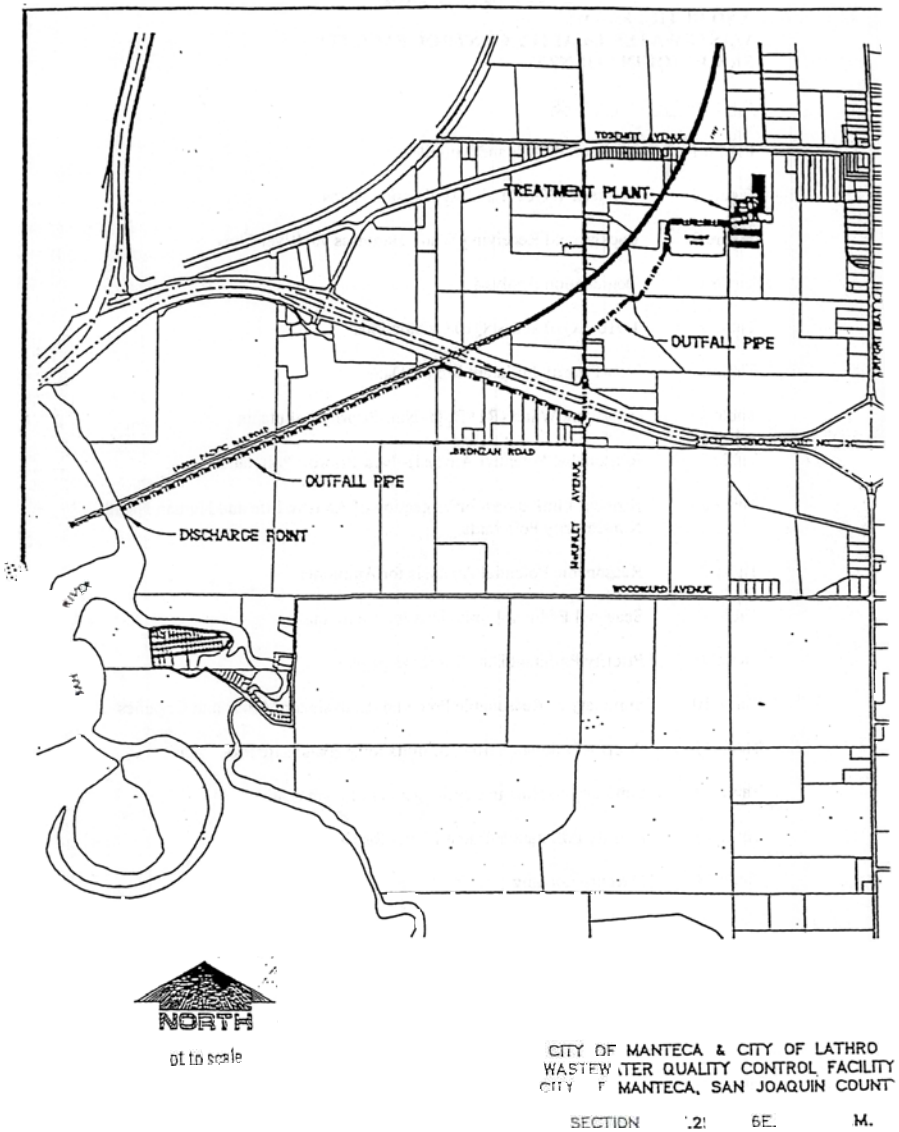

Figure 2

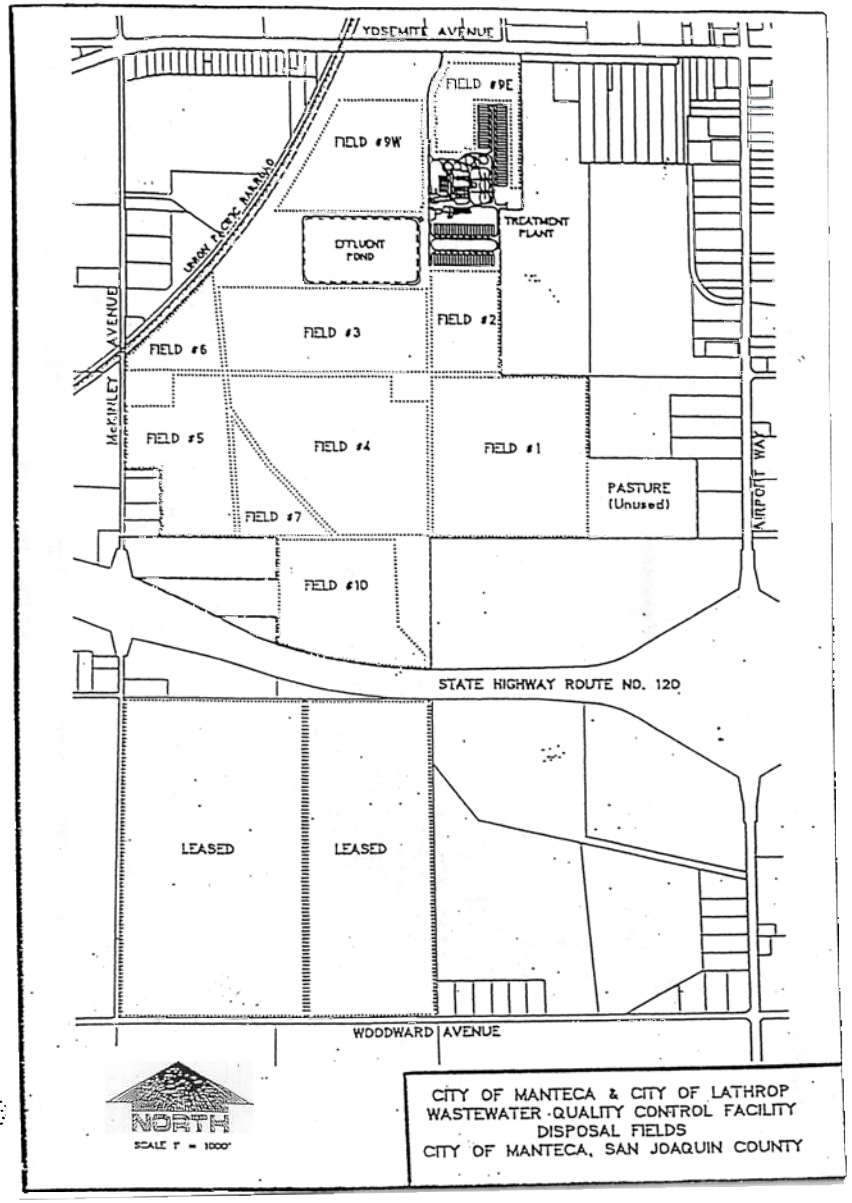

FIGURE 3

BACKGROUND RECEIVING WATER HARDNESS VS. RIVER FLOW

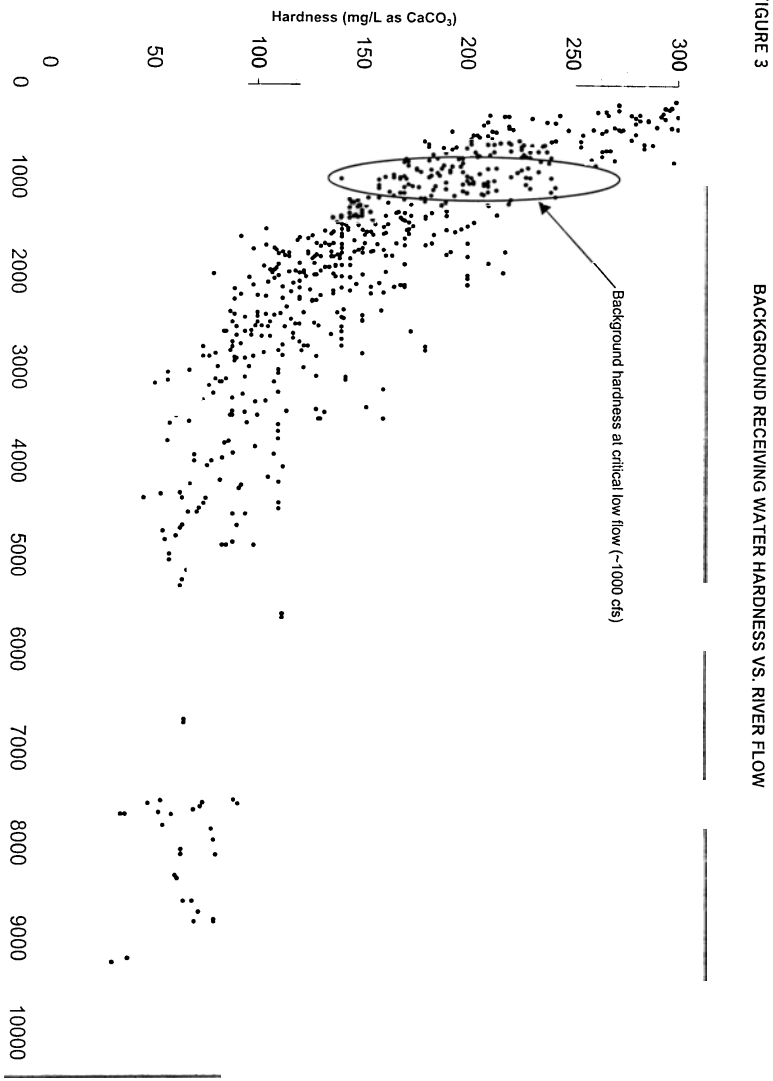

TABLE 1

DEGRADATION ANALYSIS
(for discharge to the San Joaquin River)

Compound	Units	Average Background Concentration	Monthly Average Discharge Concentration[4]	Mass (lb/day)[2]	Monthly Average Permit Limit	Mass (lb/day)[3]	% change
NUTRIENT LOAD							
BOD	mg/L		20	1,200	10	820	-32
TSS	mg/L		20	1,200	10	820	-32
Coliform	mpn/100 ml		23		2.2		
INORGANICS[1]							
Ammonia	mg/L	0.21	17.7	1,000	2.8	230	-77
EC	umhos	686	1099		1000		
Aluminum	ug/L	968	150	8.7	71	5.8	-33
Iron	mg/L	1.64	0.43	25	0.3	25	0
Manganese	ug/L	147	43	2.5	50	4.1	65
Arsenic	ug/L	3	13	0.75	10	0.82	9
Copper	ug/L	3	9	0.52	7.9	0.65	25
Cyanide	ug/L	1.4	7	0.41	3.7	0.30	-25
HUMAN HEALTH							
Dibromochloromethane	ug/L	0.3	0.47	0.03	1.4	0.12	320
Bromodichloromethane	ug/L	0.2	1.98	0.11	5	0.41	260
2,4,6-Trichlorophenol	ug/L	0.2	3.28	0.19	34	2.8	1400
Bis(2-ethylhexyl)phthalate	ug/L	0.3	3.48	0.20	22	1.8	800
BIOACCUMULATIVES							
Mercury	ug/L	0.006	0.019	0.0011		0.0019	70

Note:
1 Unless noted otherwise, all inorganic concentrations are expressed as total recoverable.
2 At 6.95 mgd, the maximum permitted flow before improvements are completed.
3 At 9.87 mgd, the maximum permitted flow after improvements are completed. Mercury is calculated at 8.11 mgd, the maximum current permitted flow.
4 BOD, TSS, and coliform reflect permit limitations from Order # 5-01-007. The remaining constituents are calculated from monitoring data.

TABLE 2 **1Q10, 7Q10, AND 30Q10 CALCULATIONS**

Vernalis 1Q10, 7Q10, and 30Q10 (1980-2002)

Unit of flow is cubic feet per second (CFS)

Year	Yearly Daily Avg. Min. Flow	Log10	Yearly 7-day Avg. Min. Flow	Log10	Yearly Monthly Avg. Min. Flow	Log10
1980	1760	3.245512668	1814	3.258637283	1969	3.294245716
1981	1030	3.012837225	1080	3.033423755	1181	3.072249898
1982	2460	3.390935107	3146	3.497758718	3889	3.589837943
1983	8010	3.903632516	8264	3.917190309	9035	3.955928157
1984	1710	3.23299611	1783	3.251151343	1904	3.279666944
1985	1280	3.10720997	1443	3.159266331	1748	3.242541428
1986	1740	3.240549248	1916	3.282395505	2060	3.31386722
1987	1120	3.049218023	1144	3.058426024	1278	3.106530854
1988	994	2.997386384	1042	3.017867719	1127	3.051923916
1989	984	2.992995098	1051	3.021602716	1169	3.067814511
1990	685	2.835690571	785	2.894869657	876	2.942504106
1991	436	2.639486489	500	2.698970004	537	2.729974286
1992	390	2.591064607	432	2.635483747	447	2.650307523
1993	1000	3	1147	3.059563418	1510	3.178976947
1994	743	2.870988814	783	2.893761762	867	2.938019097
1995	1310	3.117271296	1486	3.172018809	2250	3.352182518
1996	1790	3.252853031	1819	3.259832699	2034	3.308350949
1997	1560	3.193124598	1623	3.21031852	1756	3.244524512
1998	1810	3.257678575	1940	3.28780173	3290	3.517195898
1999	1790	3.252853031	1889	3.276231958	1688	3.227372442
2000	1519	3.181557774	1626	3.211120541	1954	3.290924559
2001	1171	3.068556895	1264	3.101747074	1340	3.127104798
2002	1000	3	1073	3.030599722	1150	3.06069784
n		23		23		23
Std. Dev.	1489	0.263033168	1547	0.25950094	1734	0.273646727
Mean	1578	3.105843393	1698	3.140436493	1959	3.197510525
CS1		0.745408359		0.787609079		0.55253052
CS2		0.939862713		0.993072317		0.696668917
K		1.339		1.34		1.333
Y10		2.753641981		2.792705234		2.832739438
	1Q10 =	567	7Q10 =	620	30Q10 =	680

Notes:

CS1	Skewness (see eqn. 3.40 on page 181 Hydrology and Flood Plain Analysis, Second Edition, Bedient & Huber)
CS2	Skewness correction to be used for Pearson Type 3 distribution (see eqn. 3.41, Bedient & Huber)
K	Frequency Factor for log Pearson Type 3 Distributions (Table 3.4, pgs. 204-205, Bedient & Huber)
Y10	e.g. log 30Q10

TABLE 3 **NON-PRIORITY POLLUTANT METALS DATA**

Date	Hardness, mg/L		pH		Aluminum, total, ug/L		Aluminum, diss, ug/L		Iron, ug/L		Manganese, ug/L	
	effluent	R-1	effluent	R-1	effluent	R-1	effluent	R-1	effluent	R-1	effluent	R-1
09-Jan-02			6.9	7.6	90	2200			600	2800	24	180
07-Feb-02			7.2	7.7	90	600	30	<10	400	1100	13	110
13-Mar-02	170	210	7.5	8.1	110	1000	30	<10	460	1600	16	130
16-Apr-02	180	80	7.2	8.1	350	700			590	1200	100	90
14-May-02	180	94	7.1	7.8	130	900	50	<20	350	1300	120	82
13-Jun-02	190	190	7.3	9.2	140	420	20	<10	730	780	25	96
09-Jul-02	190	220	7.5	9	70	1300	<50	<10	520	2200	48	220
06-Aug-02	200	200	6.9	8.8	90	1000			330	1700		
03-Sep-02	190	170	6.8	8.6	250	800			170	1900	51	200
01-Oct-02	188	172	6.8	7.5	80	600			240	1300	33	140
12-Nov-02	180	160	6.5	6	120	1400			320	2600	19	230
11-Dec-02	210	240	6.6	7.4	280	700			420	1200	21	140
Max	210	240	7.5	9.2	350	2200	50	20	730	2800	120	230
Min	170	80	6.5	6	70	420	20	10	170	780	13	82
Average	188	174	7	8	150	968	33		428	1640	43	147
Median	189	181	7	7.95	115	850	30	10	410	1450	25	140
St.Dev	11	52	0.3	2.11	91	483	13		161	625	36	53
N	10	10	12	12	12	12	5	5	12	12	11	11

TABLE 3 **NON-PRIORITY POLLUTANT METALS DATA**

TABLE 4

RECEIVING WATER (R1)
Non-Priority Pollutants

Date	Ammonia as N	Chloride	EC	MBAS	Nitrate as N	Nitrite as N	TDS	Sulfate	pH		Temperature	
									R1	R2	R1	R2
Units	mg/L	mg/L	umhos/cm	ug/L	mg/L	mg/L	mg/L	mg/L	unit	unit	F	F
Detection Limit	0.01	10	10	20	0.2	0.03	20	5				
1/7/2002	0.33		380						7.33		54.5	
1/8/2002									7.3	7.6	53.4	52.5
1/9/2002	0.3	90	670	<20	2.1	0.03	400	89	7.6			
1/9/2002	0.25		583						7.32		50.2	
1/11/2002	0.39		556						7.33		52.2	
1/14/2002	<0.01		742						7.47		51.8	
1/23/2002									7.2	7.5	52.2	47.8
2/5/2002									7.8	7.9	51.8	51.3
2/7/2002	0.2	110	990	<20	4.7	<0.002	560	100	7.7			
2/19/2002									7.5	7.7	55.2	55
3/11/2002									7.69	7.56	60.4	58.6
3/13/2002	0.3	110	1100	<20	4	<0.002	580	130	8.1			
3/26/2002									7.97	8.09	63.5	61.2
4/2/2002									8.44	8.52	72	70.2
4/8/2002	0.18											
4/10/2002	<0.01											
4/12/2002	<0.01											
4/16/2002	<0.01								7.93	8.02	60.8	64.6
4/16/2002	<0.04	56	490	<20	1.5	<0.002	300	57	8.1			
5/7/2002									7.8	7.8	68.9	67.1
5/14/2002	<0.04	51	380	<20	2.2	<0.002	210	53	7.8			
5/21/2002									7.6	7.7	63	62.8
6/5/2002									8.2	8.2	77	75.7
6/13/2002	0.1	120	830	<20	2.2	<0.002	490	90	9.2			
6/19/2002									8.78	8.83	76.1	80.8
7/8/2002	0.25		645						9		73	
7/9/2002			702						9.01	8.87	77.7	77.4
7/9/2002	0.3	90	680	<20	2.9	0.04	410	110	9			
7/10/2002	<0.01		581						9.17		79.5	
7/12/2002	<0.01		565						9.27		77.7	
8/6/2002	0.08		779	<20		<0.002			8.86		79	
8/6/2002			830						8.82	9.82	74.8	75.2
8/16/2002									8.7	8.52	80.8	80.4
9/3/2002	0.2	95	758	<20	3.4	<0.002	420	77	8.56	8.73	78.8	78.3
9/17/2002									7.34	7.92	74.1	72.3
10/1/2002	0.2	100	720	<20	4.7	<0.002	440	87	8.1			
10/1/2002			687						7.51	7.17	66.2	66.6
10/15/2002									7.25	7.56	66.7	65.1
10/29/2002									6.59	6.85	60.3	58.3
11/12/2002	0.2	90	595	<20	1.5	<0.002	390	73	7.33	7.37	60.1	59
11/12/2002	0.68		469						7.85			
11/14/2002			927						7.46			
11/16/2002	1.36		587						7.35			
11/18/2002	<0.01		743						7.82			
11/20/2002	0.25		783						7.91			
11/22/2002	<0.01		514						7.73			
11/25/2002									7.31	7.44	58.5	56.5
12/11/2002	<0.04	170	922	<20	2.2	<0.002	1300	160	7.14	7.12	51.1	50.9
12/11/2002									7.4			
12/23/2002									6.87	7.33	50.9	49.8
1/7/2003									7.32	7.31	51.8	52.3
1/21/2003									6.5	7.1	50.7	50.5
Count	28	11	28	12	11	12	11	11	49	26	34	26
Minimum	0.01	51	380	20	1.5	<0.002	210	53	6.50	6.85	50.2	47.8
Maximum	1.36	170	1100	20	4.7	0.040	1300	160	9.27	9.82	80.8	80.8
Average	0.21	98	686	20	2.9	0.008	500	93	7.86	7.87	64.0	63.1

TABLE 5

REASONABLE POTENTIAL ANALYSIS
Non-Priority Pollutants

Effluent data collected from January 1998 through December 2002

	Chloride	EC	MBAS	Nitrate as N	Nitrite as N	TDS	Sulfate
Units	mg/l	umhos/cm	ug/l	mg/l	mg/l	mg/l	mg/l
Detection Limit	10	10	20	0.2	0.03	20	5
Count	16	18	12	245	12	36	16
Concentrations							
Minimum	100.0	819.0	120.0	0.0	0.1	540.0	58.0
Maximum	230.0	1300.0	1800.0	19.0	1.8	727.0	130.0
Mean	137.7	1098.8	618.3	2.5	0.7	634.2	83.9
Stand. Deviation	32.3	118.6	450.9	3.2	0.6	40.8	20.5
CV	0.23	0.11	0.73	1.28	0.79	0.06	0.24
RP factor 99%	1.4	1.2	3.4	4.5	3.7	1.2	1.5
Dilution Ratio	1	1	1	1	1	1	1
RWC	322.0	1560.0	6120.0	85.5	6.7	872.4	195.0
Temp. max, C							
pH max							
Criteria							
CMC, mg/l	860						
CCC, mg/l	230						
Other	106(ag)	1000	500	10	1	450/500	250
Reasonable Potential?	yes	yes	yes	yes	yes	yes	no

Notes:

CV	Coefficient of Variation = standard deviation/mean
RP factor 99%	Reasonable Potential Multiplying Factors: 99% Confidence Level and 99% Probability Basis [Reference: EPA Technical Support Document, Table 3-1]
RWC	Receiving water concentration using mass balance equation = ((max effluent conc.x RP factor)+(dilution ratio-1) x upstream conc.)/dilution ratio [Reference: EPA Technical Support Document, Section 3.3.2 and Box 3-2]
CMC/CCC	Criteria Maximum Concentration/Criteria Continuous Concentration

TABLE 6
Non-Priority Pollutant Effluent Limitations for Protection of Aquatic Life and Human Health

Description	Aluminum		Iron		Manganese		MBAS	
Effluent Concentrations								
Sample Dates - Begin	Jan-02		Jan-02		Jan-02		Jan-02	
Sample Dates - End	Dec-02		Dec-02		Dec-02		Dec-02	
Sample Count	12		12		11		12	
Reporting Limits (ug/l)	10		50		5		20	
Maximum Reported Concentration (ug/l)	350.0		730.0		120.0		1800	
Mean (ug/l)	150.00		428.00		43.00		618	
Std. Deviation (ug/l)	91.00		161.00		36.00		451	
Coefficient of Variation (CV)	0.61		0.38		0.84		0.73	
Background Concentrations (R-1)								
Sample Dates - Begin	Jan-02		Jan-02		Jan-02		Jan-02	
Sample Dates - End	Dec-02		Dec-02		Dec-02		Dec-02	
Sample Count	12		12		11		12	
Count Above Reporting Limits	12		12		11		0	
Reporting Limits (ug/l)	10		100		5		20	
Maximum Reported Concentration (ug/l)	2200.0		2800.0		230.0		< 20	
Mean (ug/l)	968		1640		147		< 20	
Criteria (1)	acute	chronic	health		health		health	
Criteria (ug/l)	750	87	300		50		500	
Effluent Limit Calculations (7)								
Dilution Credit	0	0	0		0		0	
Effluent Concentration Allowance (2) (ug/l)	750.00	87.00	300.00		50		500	
σ^2 and σ_4^2	0.313	0.088	0.132	0.035	0.531	0.161	0.427	0.125
σ_{30}^2 (3)	--	0.0122	0.0047		0.0231		0.0176	
ECA Multiplier (4)	0.32	0.52						
Long-Term Average (5)	238.6	45.60						
AMEL Multiplier (6)	*	1.56	1.34		1.79		1.68	
Average Monthly Effluent Limit (ug/l)	*	**71**	**300**		**50**		**500**	
MDEL Multiplier (6)	*	3.14						
Max. Daily Effluent Limit (ug/l)	*	**143**						

General Note: Unless noted otherwise, all concentrations given as mg/l Ammonia-Nitrogen.
(1) Using CMC and CCC values for Al; Basin Plan and secondary MCLs for the health based constituents.
(2) Allows for dilution consideration, and is similar to the approach in Section 1.4.B, Step 2 of SIP.
(3) Calculated considering daily sampling frequency, Section 5.4.1 of EPA Technical Support Document.
(4) Acute and Chronic ECA Multiplier calculated at 99th percentile level per Sections 5.4.1 and 5.5.4 of TSD.
(5) LTA_c modified to meet 1999 Update recommendation.
(6) The probability basis for AMEL is 95th percentile level and for MDEL is 99th percentile level per Section 5.5.4 of TSD.
(7) Calculated per Section 5.4.1 of TSD for aquatic life protection and Section 5.4.4 of TSD for the protection of human health.
* = Not applicable as other criteria LTA is more stringent.

TABLE 7 REASONABLE POTENTIAL ANALYSIS FOR AMMONIA

Effluent data collected from January 1998 through December 2002

	Effluent ammonia data		Receiving Water ammonia data	
Time	Past 5 years		2002	
Detection Limit	0.1 mg/L		0.01 mg/L	
Count	516		28	
Concentrations (NH3-N)				
Minimum, mg/l	0.0		0.01	
Maximum, mg/l	42.8		1.4	
Mean, mg/l	17.7		0.2	
Stand. Deviation, mg/l	7.4		0.3	
CV	0.42		1.3	
RP factor 99%	1.8		4.5	
	acute	chronic	acute	chronic
Dilution Ratio	1	4	1	1
RWC, mg/l	77.0	20.3	6.1	6.1
Temperature max, C		25.7 (3)		25.7 (3)
pH max	8 (1)	9.1 (3)	9.3 (2)	9.1 (3)
Criteria				
CMC, mg/l	5.6		0.58	
CCC, mg/l		0.21		0.21
Reasonable Potential	yes	yes	yes	yes

Notes:

CV	Coefficient of Variation = standard deviation/mean
RP factor 99%	Reasonable Potential Multiplying Factors: 99% Confidence Level and 99% Probability Basis [Reference: EPA Technical Support Document, Table 3-1]
RWC	Receiving water concentration using mass balance equation = ((max effluent conc.x RP factor)+(dilution ratio-1) x upstream conc.)/dilution ratio [Reference: EPA Technical Support Document, Section 3.3.2 and Box 3-2]
CMC	Criteria Maximum Concentration
CCC	Criteria Continuous Concentration
(1)	Maximum permitted effluent concentration
(2)	Maximum receiving water pH at R-1 (See Table 4)
(3)	Maximum monthly average pH and temperature at Mossdale Landing DWR monitoring station

TABLE 8 SEASONAL EFFLUENT LIMITATIONS FOR AMMONIA

Description	Ammonia		Ammonia	
Season	June 1 to September 30		October 1 to May 31	
Effluent Concentrations (NH3-N)				
Sample Dates - Begin	Jan-98		Jan-98	
Sample Dates - End	Dec-02		Dec-02	
Sample Count	516		516	
Reporting Limits (mg/l)	0.1		0.1	
Maximum Reported Concentration (mg/l)	42.8		42.8	
Mean (mg/l)	17.70		17.70	
Std. Deviation (mg/l)	7.40		7.40	
Coefficient of Variation (CV)	0.42		0.42	
Background Concentrations (R-1)				
Sample Dates - Begin	Jan-02		Jan-02	
Sample Dates - End	Jan-03		Jan-03	
Sample Count	28		28	
Count Above Reporting Limits	17		17	
Reporting Limits (mg/l)	0.01		0.01	
Maximum Reported Concentration (mg/l NH3-N)	1.4		1.4	
Mean (mg/l NH3-N))	0.21		0.21	
Criteria (2)	acute	chronic	acute	chronic
pH (1)	8.0	8.4	8.0	8.2
Temperature ^{0}C	N/A	26	N/A	20.7
Criteria (mg/l ammonia as N)	5.62	0.62	5.62	1.2
Effluent Limit Calculations (9)				
Dilution Credit	0	4	0	4
Effluent Concentration Allowance (3) (mg/l)	5.62	2.24	5.62	5.18
σ^2 and σ_4^2	0.161	0.043	0.161	0.043
σ_{30}^2 (4)	--	0.0058	--	0.0058
ECA Multiplier (5)	0.43	0.84	0.43	0.84
Long-Term Average (7)	2.4	1.88	2.4	4.35
AMEL Multiplier (8), (6)	*	1.13	1.19	*
Average Monthly Effluent Limit (mg/l)	*	**2.1**	**2.8**	*
MDEL Multiplier (8)	*	2.35	2.35	*
Max. Daily Effluent Limit (mg/l)	*	**4.4**	**5.6**	*

General Note: Unless noted otherwise, all concentrations given as mg/l Ammonia-Nitrogen.
(1) Acute pH = maximum permitted effluent pH. Chronic pH = pH at edge of 4:1 mixing zone as calculated by USEPA DESCON program utilizing maxiumum permitted effluent pH and the maximum monthly average pH from Mossdale monitoring station (DWR-ESO-D1485C, RSAN087) for Jan. 1984 to Sept. 2002.
(2) Using CMC and CCC values.
(3) Allows for dilution consideration, and is similar to the approach in Section 1.4.B, Step 2 of SIP.
(4) Calculated considering daily sampling frequency, Section 5.4.1 of EPA Technical Support Document.
(5) Acute and Chronic ECA Multiplier calculated at 99th percentile level per Sections 5.4.1 and 5.5.4 of TSD.
(6) Assumes sampling frequency is 30 times per month.
* = Not applicable as other criteria LTA is more stringent.
(7) LTA_c modified to meet 1999 Update recommendation.
(8) The probability basis for AMEL is 95th percentile level and for MDEL is 99th percentile level per Section 5.5.4 of TSD.
(9) Calculated per Section 5.4.1 of TSD for aquatic life protection.

TABLE 9 **PRIORITY POLLUTANT DATA TABLES**

Date	Hardness effluent	Hardness R-1	pH effluent	pH R-1	Cu, total effluent	Cu, total R-1	Cu, diss effluent	Cu, diss R-1	Cyanide effluent	Cyanide R-1
Units	mg/L	mg/L	unit	unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
09-Jan-02			6.9	7.6	7.4	6.1			6	3
07-Feb-02			7.2	7.7	8.3	2.7	7.6	1.6	6	5
13-Mar-02	170	210	7.5	8.1	8.6	3.5	7.4	1.8	3	< 0.6
16-Apr-02	180	80	7.2	8.1	10	2.8	9	< 2	1.5 (<3)	< 0.6
14-May-02	180	94	7.1	7.8	9.1	2.7	8.1	1.3	5	< 0.6
13-Jun-02	190	190	7.3	9.2	12	2.6	11	1.8	6	< 0.8
09-Jul-02	190	220	7.5	9	8.9	4.2	8	4.7	10	< 0.8
06-Aug-02	200	200	6.9	8.8	7.6	3.6	7.3	1.9	31	< 0.9
03-Sep-02	190	170	6.8	8.6	12	3	9.7	1.9	1.7 J	1.4 J
01-Oct-02	188	172	6.8	7.5	8.5	2.7	7.6	1.8	3	< 0.9
12-Nov-02	180	160	6.5	6	8	4.8	6.8	2.2	3	< 0.9
11-Dec-02	210	240	6.6	7.4	13	2.9	12	1.7	5	< 0.9
Max (1)	210	240	7.5	9.2	13	6.1	12	4.7	31	5
Min	170	80	6.5	6	7.4	2.6	6.8	1.3	1.5	0.6
Mean (2)	188	174	7	8	9	3	9	2	7	1.4
St.Dev	11	52	0.33	0.87	1.88	1.08	1.66	0.90	7.99	1.32
Coeff. Var.	0.060	0.298	0.047	0.109	0.199	0.311	0.194	0.438	1.180	0.965
N	10	10	12	12	12	12	11	11	12	12

(1) Maximum of Background (R-1) calculated per Section 1.4.3.1, Step 2 of the SIP
(2) Arithmetic mean of Background (R-1) calculated per Section 1.4.3.2, Step 2 of the SIP

TABLE 9 **PRIORITY POLLUTANT DATA TABLES**

Date	Arsenic, total effluent	Arsenic, total R-1	Arsenic, diss effluent	Arsenic, diss R-1	Chloroform effluent	Chloroform R-1	Dibromochloromethane effluent	Dibromochloromethane R-1	Bromodichloromethane effluent	Bromodichloromethane R-1
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
09-Jan-02	13	2.9			4	< 0.3	0.7	< 0.3	2.2	< 0.2
07-Feb-02	11	2	11	2	4.5	< 0.3	< 0.3	< 0.3	1.3	< 0.2
13-Mar-02	11	2.6	12	1.9	6.1	< 0.3	< 0.3	< 0.3	1	< 0.2
16-Apr-02	13	1.9	14	0.003	7	< 0.3	< 0.3	< 0.3	1	< 0.2
14-May-02	14	1.9	14	1.3	8.3	< 0.3	0.5	< 0.3	2.8	< 0.2
13-Jun-02	14	3	13	2.3	11	< 0.3	0.3 J	< 0.3	2.3	< 0.2
09-Jul-02	13	3	13	2.8	7.5	< 0.3	1.2	< 0.3	3.5	< 0.2
06-Aug-02	12	3.5	13	3.1	8.1	< 0.3	0.4 J	< 0.3	2.2	< 0.2
03-Sep-02	13	3.1	13	2.9	12	< 0.3	< 0.3	< 0.3	1.4	< 0.2
01-Oct-02	12	2.7	13	1.9	5.7	< 0.3	< 0.3	< 0.3	1.7	< 0.2
12-Nov-02	12	2.8	12	1.5	8.5	< 0.3	< 0.3	< 0.3	1.4	< 0.2
11-Dec-02	12	2.6	12	1.5	7.8	< 0.3	0.7	< 0.3	3	< 0.2
Max (1)	14	3.5	14	3.1	12	0.3	1.2	0.3	3.5	0.2
Min	11	1.9	11	0.003	4	0.3	0.28	0.3	1	0.2
Mean (2)	13	3	13	2	8	0.3	0.5	0.3	2.0	0.2
St.Dev	1.00	0.51	0.90	0.88	2.36	0.00	0.28	0.00	0.82	0.00
Coeff. Var.	0.080	0.189	0.071	0.455	0.313		0.599		0.412	
N	12	12	11	11	12	12	12	12	12	12

(1) Maximum of Background (R-1) calculated per Section 1.4.3.1, Step 2 of the SIP
(2) Arithmetic mean of Background (R-1) calculated per Section 1.4.3.2, Step 2 of the SIP

TABLE 9 **PRIORITY POLLUTANT DATA TABLES**

Date	2,4,6-Trichlorophenol effluent	2,4,6-Trichlorophenol R-1	Carbofuran effluent	Carbofuran R-1	Bis(2-ethylhexyl)phthalate effluent	Bis(2-ethylhexyl)phthalate R-1
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
09-Jan-02	< 0.6	< 0.2	2.9 J		2.0 J	< 0.3
07-Feb-02						
13-Mar-02						
16-Apr-02	11	< 0.8	2.7 J	2.5 J	7	< 0.3
14-May-02						
13-Jun-02						
09-Jul-02	0.9 J	< 0.6	0.7 (<1.3)	0.7 (<1.3)	4	< 0.8
06-Aug-02						
03-Sep-02						
01-Oct-02	< 0.6	< 0.6	0.7 (<1.3)	0.7 (<1.3)	0.9 J	< 0.8
12-Nov-02						
11-Dec-02						
07-Jan-03			0.7 (<1.3)	1.84		
Max (1)	11	0.2	2.9	2.5	7	0.3
Min	0.6	0.2	0.65	0.65	0.9	0.3
Mean (2)	3.3	0.2	1.5	1.4	3.5	0.3
St.Dev	5.15	0.25	1.17	0.91	2.68	0.29
Coeff. Var.	1.573		0.780	0.649	0.771	
N	4	4	5	5	4	4

(1) Maximum of Background (R-1) calculated per Section 1.4.3.1, Step 2 of the SIP
(2) Arithmetic mean of Background (R-1) calculated per Section 1.4.3.2, Step 2 of the SIP

TABLE 10 **SUMMARY OF REASONABLE POTENTIAL ANALYSIS FOR METALS AND ORGANICS**

Compound	Units	MEC	B	CMC	CCC	Water & Org	Org. Only	BP/MCL (1)	Special Cond.	Reasonable Potential?
INORGANICS										
Aluminum	ug/L	350	2200	750	87			200(mcl)	60(3)	**Yes**, MEC>C & B > C
Chromium(VI)	ug/L	0.6	0.4	16	11			50(mcl)	0.2(3)	No
Iron	mg/L	0.73	2.8					0.3(mcl)		**Yes**, MEC>C & B > C
Manganese	ug/L	120	230				100	50(mcl)		**Yes**, MEC>C & B > C
Silver	ug/L	3.2	0.02	8.6(2)				10/100(mcl)		No
Zinc	ug/L	42	9	48(2)	49(2)			100		No
Lead	ug/L	1.3	1.2	180(2)	170(2)			15 (mcl)	2 (3)	No
Arsenic	ug/L	14	3.5	340	150			10/10(mcl)	0.023 (3)	**Yes**, MEC > C
Copper	ug/L	13	6.1	22	7.4	1300		10 4(4)		**Yes**, MEC > C
Cyanide	ug/L	31	5	22	5.2	700	220,000	10		**Yes**, MEC > C
HUMAN HEALTH										
1,4-Dichlorobenzene	ug/L	0.8	<0.5	--	--	400	2,600	5(mcl)		No
Toluene	ug/L	0.7	<0.5	--	--	6,800	200,000	150 (mcl)		No
Chloroform	ug/L	12	<0.3	--	--			80(mcl)	1.1 (3)	No
Chloromethane	ug/L	1.7	<0.5	11,000					3	No
Dichloromethane	ug/L	0.6	<0.5	--	--	4.7	1,600	5 (mcl)	4 (3)	No
Dibromochloromethane	ug/L	1.2	<0.3	--	--	0.41	34	80(mcl)	0.37 (3)	**Yes**, MEC > C
Bromodichloromethane	ug/L	3.5	<0.2	--	--	0.56	46	80(mcl)	0.27 (3)	**Yes**, MEC > C
Trihalomethane	ug/L	16.7	0.3					80(mcl)		No
2,4,6-Trichlorophenol	ug/L	11	<0.2	--	--	2.1	6.5		0.5(3)	**Yes**, MEC > C
MTBE	ug/L	0.7	<0.5	--	--			5 (mcl)	19(3)	No
Carbofuran	ug/L	2.9 J	2.5 J	--	--			18(mcl)	1.7(3)	**Yes**, MEC>C & B > C
Bis(2-ethylhexyl)phthalate	ug/L	7	<0.3	--	--	1.8	5.9	4 (mcl)		**Yes**, MEC > C
BIOACCUMULATIVES										
Mercury	ug/L	0.028	0.0093	reserved	reserved	0.05	0.051	2 (mcl)	1.2(3), 303d	No
Endrin Aldehyde	ug/L	<0.02	<0.01	0.086 (5)	0.036 (5)	0.76	0.81	2 (mcl), ND	BP objective	No
Lindane	ug/L	<0.02	<0.01	0.95	--	0.019	0.063	0.2 (mcl), ND	BP objective	No
4,4'-DDT	ug/L	<0.02	<0.01	1.1	0.001	0.00059	0.00059	ND	BP objective	No
PCBs	ug/L	<0.1	<0.1	--	0.014	0.00017	0.00017	0.5 (mcl)	303d	No
2,3,7,8-TCDD	pg/L	<0.8	<0.6	--	--	0.013	0.014		303d	No

General Note: Unless noted otherwise, all inorganic concentrations are given as total revoverable.
MEC = Maximum Effluent Concentration (lowest detection level or maximum reported concentration).
B = Background (lowest detection level or maximum reported concentration).
C = Criterion (From California Toxics Rule unless otherwise noted)
NS = Not Sampled
BP = Basin Plan
J = Detected but not quantified. Detection limit = 5 ug/L.
(1) = Basin Plan Objective unless designated as MCL as (mcl).
(2) = concentration expressed as **dissolved** metals
(3) = California OEHHA Public Health Goal for Drinking Water
(4) = Concentration converted to total recoverable using EPA default translator (0.96)
(5) = Criteria as Endrin.

TABLE 11
Priority Pollutant Effluent Limitations

Description	copper		cyanide		arsenic		
Effluent Concentrations							
Sample Dates - Begin	Jan-02		Jan-02		Jan-02		
Sample Dates - End	Dec-02		Dec-02		Dec-02		
Sample Count	12		12		12		
Count Above Reporting Limits	12		11		12		
% of Samples Above Reporting Limits	100.0		91.7		100.0		
Reporting Limits (µg/l)	0.5		3		0.5		
Maximum Reported Concentration (µg/l)	13		31.0		14.0		
Mean (µg/l)	9.0		7.0		12.5		
Std. Deviation (µg/l)	1.9		8.0		1.0		
Coefficient of Variation (CV) (µg/l)	0.20		1.18		0.08		
Background Concentrations							
Sample Dates - Begin	Jan-02		Jan-02		Jan-02		
Sample Dates - End	Dec-02		Dec-02		Dec-02		
Sample Count	12		12		12		
Count Above Reporting Limits	12		3		12		
Reporting Limits (µg/l)	0.5		0.6		0.5		
Maximum Reported Concentration (µg/l)	6.1		5.0		3.5		
Mean (µg/l)	3.0		1.0		3.0		
Criteria	acute	chronic	acute	chronic	acute	chronic	health
Hardness (mg/l as $CaCO_3$)	170.0	108.0	----	----	----	----	
CTR Criteria(1) (µg/l)	22.2	9.6	22	5.2	750	340	
Basin Plan Objective (µg/l)(2)	10		10				10
Translator (3)	0.96	0.96	n/a	n/a	n/a	n/a	n/a
Criteria (µg/l, total recoverable)(4)	10.4	10.0	10	5.2	750	340	10
Effluent Limit Calculations							
Dilution Credit	0	4	0	4	0	0	0
Effluent Concentration Allowance (5) (µg/l)	10.4	25.4	10.00	6.00	750.00	340.00	10
σ^2 and σ_4^2	0.04	0.01	0.87	0.30	0.006	0.002	
ECA Multiplier (6)	0.64	0.80	0.18	0.33	0.83	0.91	
Long-Term Average	6.7	20.3	1.8	2.0	624.8	310.1	
AMEL Multiplier (7)(8)	1.2	*	2.1	*	*	*	
Average Monthly Effluent Limit	**7.9**	*	**3.7**	*	*	*	**10.0**
MDEL Multiplier (9)	1.6	*	5.7	*	*	*	
Max. Daily Effluent Limit	**10.4**	*	**10.0**	*	*	*	

General Note: Unless noted otherwise, all concentrations given as total recoverable.
(1) Cu and As criteria are dissolved concentrations. Cyanide criteria are total concentrations.
(2) Metals are expressed as dissolved concentrations. Cyanide is expressed as total concentration.
(3) EPA Translators used as default.
(4) The total recoverable criteria is based on either the Basin Plan Objective or CTR, whichever is lower.
(5) ECA calculated per Section 1.4.B, Step 2 of SIP. This allows for the consideration of dilution.
(6) Acute and Chronic ECA Multiplier calculated at 99th percentile per Section 1.4.B, Step 3 of SIP or per Sections 5.4.1 and 5.5.4 of the TSD.
(7) Assumes sampling frequency n=>4.
(8) The probability basis for AMEL is 95th percentile per Section 1.4.B, Step 5 of SIP or Section 5.5.4 of the TSD.
(9) The probability basis for MDEL is 99th percentile per Section 1.4.B, Step 5 of SIP or Section 5.5.4 of the TSD.
* = Not applicable as other criteria LTA is more stringent.

TABLE 12 SUMMARY OF HUMAN CARCINOGENIC POLLUTANT STATISTICS

Sample Date (Concentations in ug/l)	Dibromochloromethane	Bromodichloromethane	2,4,6-Trichlorophenol	bis(2-ethylhexyl)phthalate
09-Jan-02	0.7	2.2	< 0.6	2.0 J
07-Feb-02	< 0.3	1.3		
13-Mar-02	< 0.3	1		
16-Apr-02	< 0.3	1	11	7
14-May-02	0.5	2.8		
13-Jun-02	0.3 J	2.3		
09-Jul-02	1.2	3.5	0.9 J	4
06-Aug-02	0.4 J	2.2		
03-Sep-02	< 0.3	1.4		
01-Oct-02	< 0.3	1.7	< 0.6	0.9 J
12-Nov-02	< 0.3	1.4		
11-Dec-02	0.7	3		

Sample Count	12	12	4	4
Max. Concentration (µg/l)	1.20	3.50	11.00	7.00
Mean (µg/l)	0.47	1.98	3.28	3.48
Median (ug/l)	0.3	1.95	0.75	3
Std. Dev.	0.28	0.82	5.15	2.68
CV	0.60	0.41	0.60	0.60
Factor (99th percentile)(1)			3.11	3.11
Estimated Max. Concentration (µg/l)(2)	1.38	4.68	34.21	21.77
Human Health Criteria	0.41	0.56	2.1	1.8
Mean of Reported Background (µg/l) (3)	< 0.3	< 0.2	< 0.2	< 0.3
Needed Dilution Credit(4)	**8.9**	**11.5**	**16.9**	**13.3**

(1) See USEPA TSD Table 5-2.
(2) For 10 samples or more, the estimated maximum concentration is the mean plus 3.3 standard deviations. For less than 10 samples, the estimated maximum concentration is the maximum observed concentration times the factor from Table 5-2.
(3) MDL utilized for receiving water detection limit.
(4) Dilution = (Est. max. conc.- HH Criteria)/(HH criteria - background conc.)

TABLE 13
PRIORITY POLLUTANT EFFLUENT LIMITATIONS FOR HUMAN HEALTH

Description	Dibromochloromethane		Bromodichloromethane		2,4,6-Trichlorophenol		Bis(2-ethylhexyl)phthalate	
Effluent Concentrations								
Sample Dates - Begin	Jan-02		Jan-02		Jan-02		Jan-02	
Sample Dates - End	Dec-02		Dec-02		Oct-02		Oct-02	
Sample Count	12		12		4		4	
Count Above Reporting Limits	6		12		2		4	
% of Samples Above Reporting Limits	50.0		100.0		50.0		100.0	
Reporting Limits (µg/l)	0.3		0.2		0.6		0.3	
Maximum Reported Concentration (µg/l)	1.2		3.5		11.0		7.0	
Mean [1] (µg/l)	0.5		2.0		3.3		3.5	
Std. Deviation [1] (µg/l)	0.28		0.82		5.2		2.7	
Coefficient of Variation [1] (CV) (µg/l)	0.60		0.41		0.60		0.60	
Background Concentrations								
Sample Dates - Begin	Jan-02		Jan-02		Jan-02		Jan-02	
Sample Dates - End	Dec-02		Dec-02		Oct-02		Oct-02	
Sample Count	12		12		4		4	
Count Above Reporting Limits	0		0		0		0	
Reporting Limits (µg/l)	0.3		0.2		0.2		0.3	
Maximum Reported Concentration (µg/l)	< 0.3		< 0.2		< 0.2		< 0.3	
Arithmetic mean (µg/l)[2]	< 0.3		< 0.2		< 0.2		< 0.3	
Criteria	health		health		health		health	
Basin Plan Objective (µg/l, dissolved)								
Translator [3]	n/a		n/a		n/a		n/a	
Criteria (µg/l, total recoverable)[4]	0.41		0.56		2.1		1.8	
Effluent Limit Calculations								
Dilution Credit[5]	8.9		11.5		16.9		13.3	
Effluent Concentration Allowance [6] (µg/l)	1.389		4.7		34.21		21.75	
σ^2 and σ_4^2	0.30	0.09	0.16	0.04	0.31	0.09	0.31	0.09
AMEL Multiplier[7]	1.5		1.4		1.6		1.6	
Average Monthly Effluent Limit (ug/l)	**1.4**		**5**		**34**		**22**	
MDEL Multiplier[8]	3.1		2.3		3.1		3.1	
Max. Daily Effluent Limit (ug/l)	**2.8**		**8**		**69**		**44**	

General Note: Unless noted otherwise, all concentrations given as total recoverable
(1) Calculated per Section 1.4.B, Step 3 of SIP.
(2) Calculated per Section 1.4.3.2 of SIP
(3) EPA Translators used as default.
(4) The total recoverable criteria is based on the CTR.
(5) See Table 12 for applicable dilution credit for human carcinogenic pollutants.
(6) ECA calculated per Section 1.4.B, Step 2 of SIP.
(7) Assumes sampling frequency n=>4. Uses 95th percentile AMEL multiplier, Step 5 of SIP.
(8) Uses 99th percentile MDEL multiplier, Step 5 of SIP.

TABLE 14 MERCURY LOADING

Date	Mercury effluent (ug/L)	Mercury R-1 (ug/L)
09-Jan-02	0.015	0.0093
07-Feb-02	0.014	0.0053
13-Mar-02	0.019	0.0075
16-Apr-02	0.021	0.0045
14-May-02	0.016	0.0048
13-Jun-02	0.028	0.0036
09-Jul-02	0.017	0.008
06-Aug-02	0.017	0.0054
03-Sep-02	0.027	0.0045
01-Oct-02	0.021	0.0045
12-Nov-02	0.013	0.0056
11-Dec-02	0.022	0.004
Maximum	0.028	0.009
Minimum	0.013	0.004
Mean	0.019	0.006
Median	0.018	0.005
Standard Deviation	0.005	0.002
Coefficient of Variation	0.252	0.315
Number of samples	12	12

Design Flow (mgd)	8.11
Maximum Observed Concentration (ug/l)	0.028
Daily Mass Loading (lbs)	0.00189
Yearly Mass Loading (lbs)	**0.69**

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WASTEWATER QUALITY CONTROL FACILITY
SAN JOAQUIN COUNTY

ATTACHMENT C

Guidelines for the Preparation of an Engineering Report for the Production, Distribution and Use of Recycled Water

March 2001

STATE OF CALIFORNIA-HEALTH AND HUMAN SERVICES AGENCY GRAY DAVIS, *GOVERNOR*

DEPARTMENT OF HEALTH SERVICES
DIVISION OF DRINKING WATER AND ENVIRONMENTAL MANAGEMENT
DRINKING WATER PROGRAM
RECYCLED WATER UNIT

GUIDELINES FOR THE PREPARATION OF AN ENGINEERING REPORT FOR THE PRODUCTION, DISTRIBUTION AND USE OF RECYCLED WATER

March 2001
(Replaces September 1997 Version)

1.0 INTRODUCTION

The current State of California Water Recycling Criteria (adopted in December 2000) require the submission of an engineering report to the California Regional Water Quality Control Board (RWQCB) and the Department of Health Services (DHS) before recycled water projects are implemented. These reports must also be amended prior to any modification to existing projects. The purpose of an engineering report is to describe the manner by which a project will comply with the Water Recycling Criteria. The Water Recycling Criteria are contained in Sections 60301 through 60355, inclusive, of the California Code of Regulations, Title 22. The Criteria prescribe:

* Recycled water quality and wastewater treatment requirements for the various types of allowed uses,

* Use area requirements pertaining to the actual location of use of the recycled water (including dual plumbed facilities), and

* Reliability features required in the treatment facilities to ensure safe performance.

Section 60323 of the Water Recycling Criteria specifies that the engineering report be prepared by a properly qualified engineer, registered in California and experienced in the field of wastewater treatment.

Recycled water projects vary in complexity. Therefore, reports will vary in content, and the detail presented will depend on the scope of the proposed project and the number and nature of the agencies involved in the production, distribution, and use of the recycled water. The report should contain sufficient information

to assure the regulatory agencies that the degree and reliability of treatment is commensurate with the requirements for the proposed use, and that the distribution and use of the recycled water will not create a health hazard or nuisance.

The intent of these guidelines is to provide a framework to assist in developing a comprehensive report which addresses all necessary elements of a proposed or modified project. Such a report is necessary to allow for the required regulatory review and approval of a recycled water project.

References which may assist in addressing various project elements include:

- State of California Water Recycling Criteria (December 2000)
- State of California Regulations Relating to Cross-Connections
- California Waterworks Standards
- California Water Code
- Guidelines for the Distribution of Non-potable Water, (California-Nevada Section-AWWA, 1992)
- Guidelines For The On-Site Retrofit of Facilities Using Disinfected Tertiary Recycled Water (California-Nevada Section-AWWA, 1997)
- Manual of Cross-Connection Control/Procedures and Practices (DOHS)
- Ultraviolet Disinfection - Guidelines for Drinking Water and Water Reuse (NWRI/AWWARF, December 2000)

2.0 RECYCLED WATER PROJECT

The following sections discuss the type of information that should be presented and described in the engineering report. Some sections may be applicable only to certain types of uses.

2.1 General

The report shall identify all agencies or entities that will be involved in the design, treatment, distribution, construction, operation and maintenance of the recycled facilities, including a description of any legal arrangements outlining authorities and responsibilities between the

agencies with respect to treatment, distribution and use of recycled water. In areas where more than one agency/entity is involved in the reuse project, a description of arrangements for coordinating all reuse-related activities (e.g. line construction/repairs) shall be provided. An organizational chart may be useful.

2.2 Rules and Regulations

The procedures, restrictions, and other requirements that will be imposed by the distributor and/or user should be described. In multiple projects covered under a Master Permit issued by the Regional Boards where the reuse oversight responsibility is delegated to the distributor and/or user, the requirements and restrictions should be codified into a set of enforceable rules and regulations. The rules and regulations should include a compliance program to be used to protect the public health and prevent cross connections. Describe in the report the adoption of enforceable rules and regulations that cover all of the design and construction, operation and maintenance of the distribution systems and use areas, as well as use area control measures. Provide a description of the organization of the agency or agencies who has the authority to implement and enforce the rules and regulations, and the responsibilities of pertinent personnel involved in the reuse program. Reference to any ordinances, rules of service, contractual arrangements, etc. should be provided.

2.3 Producer - Distributor - User

The producer is the public or private entity that will treat and/or distribute the recycled water used in the project. Where more than one entity is involved in the treatment or distribution of the recycled water, the roles and responsibilities of each entity (i.e. producer, distributor, user) should be described.

2.4 Raw Wastewater

Describe the chemical quality, including ranges with median and 95th percentile values;

Describe the source of the wastewater to be used and the proportion and types of industrial waste, and

Describe all source control programs.

2.5 Treatment Processes

Provide a schematic of the treatment train;

Describe the treatment processes including loading rates and contact times;

All filtration design criteria should be provided (filtration and backwash rates, filter depth and media specifications, etc.). The expected turbidities of the filter influent (prior to the addition of chemicals) and the filter effluent should be stated;

State the chemicals that will be used, the method of mixing, the degree of mixing, the point of application, and the dosages. Also describe the chemical storage and handling facilities, and

Describe the operation and maintenance manuals available.

2.6 Plant Reliability Features

The plant reliability features proposed to comply with Sections 60333 - 60355 of the Water Recycling Criteria should be described in detail. The discussion of each reliability feature should state under what conditions it will be actuated. When alarms are used to indicate system failure, the report should state where the alarm will be received, how the location is staffed, and who will be notified. The report should also state the hours that the plant will be staffed.

2.7 Supplemental Water Supply

The report should describe all supplemental water supplies. The description should include:

* Purpose
* Source
* Quality
* Quantity available
* Cross-connection control and backflow prevention measures

2.8 Monitoring and Reporting

The report should describe the planned monitoring and reporting program, including all monitoring required by the Water Recycling Criteria, and include the frequency and location of sampling. Where continuous analysis and recording equipment is used, the method and frequency of calibration

should be stated. All analyses shall be performed by a laboratory approved by the State Department of Health Services.

2.9 Contingency Plan

Section 60323 (c) of the Water Recycling Criteria requires that the engineering report contain a contingency plan designed to prevent inadequately treated wastewater from being delivered to the user. The contingency plan should include:

* A list of conditions which would require an immediate diversion to take place;
* A description of the diversion procedures;
* A description of the diversion area including capacity, holding time and return capabilities;
* A description of plans for activation of supplemental supplies (if applicable);
* A plan for the disposal or treatment of any inadequately treated effluent;
* A description of fail safe features in the event of a power failure, and

  A plan (including methods) for notifying the recycled water user(s), the regional board, the state and local health departments, and other agencies as appropriate, of any treatment failures that could result in the delivery of inadequately treated recycled water to the use area.

3.0 TRANSMISSION AND DISTRIBUTION SYSTEMS

Maps and/or plans showing the location of the transmission facilities and the distribution system layout should be provided. The plans should include the ownership and location of all potable water lines, recycled water lines and sewer lines within the recycled water service area and use area(s).

4.0 USE AREAS

The description of each use area should include:

* The type of land uses;
* The specific type of reuse proposed;

* The party(s) responsible for the distribution and use of the recycled water at the site;

* Identification of other governmental entities which may have regulatory jurisdiction over the re-use site such as the US Department of Agriculture, State Department of Health Services, Food and Drug Branch, the State Department of Health Services, Licensing and Certification Section, etc. These agencies should also be provided with a copy of the Title 22 Engineering Report for review and comment.

* Use area containment measures;

* A map showing:

  -Specific areas of use

  -Areas of public access

  -Surrounding land uses

  -The location and construction details of wells in or within 1000 feet of the use area

  -Location and type of signage

* The degree of potential access by employees or the public;

* For use areas where both potable and recycled water lines exist, a description of the cross-connection control procedures which will be used.

In addition to the general information described above, the following should be provided for the following specific proposed uses:

4.1 Irrigation

-Detailed plans showing all piping networks within the use area including recycled, potable, sewage and others as applicable.

-Description of what will be irrigated (e.g. landscape, specific food crop, etc.);

-Method of irrigation (e.g. spray, flood, or drip);

-The location of domestic water supply facilities in or adjacent to the use area;

-Site containment measures;

-Measures to be taken to minimize ponding;

-The direction of drainage and a description of the area to which the drainage will flow;

-A map and/or description of how the setback distances of Section 60310 will be maintained;

-Protection measures of drinking water fountains and designated outdoor eating areas, if applicable;

-Location and wording of public warning signs,

-The proposed irrigation schedule (if public access is included), and

-Measures to be taken to exclude or minimize public contact.

4.2 Impoundments

-The type of use or activity to be allowed on the impoundment;

-Description of the degree of public access;

-The conditions under which the impoundment can be expected to overflow and the expected frequency, and

-The direction of drainage and a description of the area to which the drainage will flow.

4.3 Cooling

-Type of cooling system (e.g. cooling tower, spray, condenser, etc.);

-Type of biocide to be used, if applicable;

-Type of drift eliminator to be used, if applicable, and

-Potential for employee or public exposure, and mitigative measures to be employed.

4.4 Groundwater Recharge

An assessment of potential impacts the proposal will have on underlying groundwater aquifers. The appropriate information

shall be determined through consultation with the Department on a case by case basis.

4.5 Dual Plumbed Use Areas

In accordance with Sections 60313 through 60316 of the Water Recycling Criteria.

4.6 Other Industrial Uses

The appropriate information shall be determined on a case by case basis.

4.7 Use Area Design

The report should discuss how domestic water distribution system shall be protected from the recycled water in accordance with the Regulations Relating to Cross-Connections and the California Waterworks Standards, and how the facilities will be designed to minimize the chance of recycled water leaving the designated use area. Any proposed deviation from the Water Recycling Criteria and necessity therefore, should be discussed in the report.

4.8 Use Area Inspections and Monitoring

The report should describe the use area inspection program. It should identify the locations at the use area where problems are most likely to occur (e.g. ponding, runoff, overspray, cross-connections, etc.) and the personnel in charge of the monitoring and reporting of use area problems.

4.9 Employee Training

The report should describe the training which use area employees will receive to ensure compliance with the Recycled Water Criteria, and identify the entity that will provide the training and its' frequency. The report should also identify any written manuals of practice to be made available to employees.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. R5-2005-0110

AMENDING WASTE DISCHARGE REQUIREMENTS
ORDER NO. R5-2004-0028
NPDES NO. CA0081558

CITY OF MANTECA
WASTEWATER QUALITY CONTROL FACILITY
SAN JOAQUIN COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds:

1. On 19 March 2004, the Regional Board adopted Waste Discharge Requirements (WDR) Order No. R5-2004-0028, NPDES No. CA0081558, prescribing waste discharge requirements for the City of Manteca, City of Lathrop, and Dutra Farms at the Wastewater Quality Control Facility (WQCF) in San Joaquin County. For the purposes of this Resolution, the City of Manteca is hereafter referred to as "Discharger."

2. The Discharger owns and operates a wastewater collection, treatment, and disposal system, and provides sewerage service to the City of Manteca and the City of Lathrop. Land disposal of effluent is maximized by discharging effluent at agronomic rates seasonally to existing City-owned property. Excess flow of treated municipal wastewater receives chlorine disinfection and dechlorination prior to discharge to the San Joaquin River.

3. Finding 31 of WDR Order No. R5-2004-0028 specifies the allowable dilution for human health-based criteria, including bromodichloromethane and dibromochloromethane. Finding 31 states, "A steady state analysis utilizing the harmonic mean flow at Vernalis provides a dilution of 222:1. The Regional Board is not required to grant a mixing zone or allocate the full assimilative capacity of the receiving water. For limitations based on these human health criteria, dilution is limited to the amount required to maintain compliance." In WDR Order No. R5-2004-0028, the dilution credits granted for bromodichloromethane and dibromochloromethane were 11.5:1 and 8.9:1, respectively, and were based on treatment plant performance, resulting in effluent limitations more stringent than water quality-based effluent limitations. Since the effluent limitations were based on treatment plant performance, the Regional Board found the Discharger was able meet the effluent limitations.

4. The WQCF has historically operated in a non-nitrifying or partial nitrifying mode, which typically produced an effluent with elevated levels of ammonia. Chlorine, when combined with ammonia, creates chloramines, which are effective and stable disinfectants. In November 2003, the treatment process was converted to full nitrification mode to reduce ammonia. Without ammonia in the effluent, organochloramines are formed, which are less effective disinfectants than chloramines. Consequently, more chlorine is required for disinfection, increasing disinfection byproducts, including bromodichloromethane and dibromochloromethane.

5. The effluent limitations for bromodichloromethane and dibromochloromethane included in Order No. R5-2004-0028 were based on treatment plant performance prior to converting to full nitrification. With the significant increase in the formation of disinfection byproducts after upgrading the WQCF to operate in full nitrification mode, the Discharger is unable to comply with the effluent limitations.

6. Due to the significant change in wastewater treatment, and based upon new water quality information, the Discharger, in a letter dated 20 April 2005, requested that the effluent limitations for bromodichloromethane and dibromochloromethane be modified based upon current treatment plant performance.

7. This Resolution amends WDR Order No. R5-2004-0028 by increasing the effluent limitations for bromodichloromethane and dibromochloromethane based on re-calculated dilution credits using new effluent data collected while the WQCF was operating in full nitrification mode (see Table 16). The re-calculated dilution credits for bromodichloromethane and dibromochloromethane (see Table 15) are 63:1 and 82:1, respectively, which are less than the maximum allowable human health dilution of 222:1 for the San Joaquin River. Therefore, the increased effluent limitations do not allocate the full assimilative capacity of the receiving water and are more stringent than water quality-based effluent limitations. Based on the sample results in the effluent, it appears the Discharger can meet these new limitations. In addition, the Discharger is installing ultraviolet (UV) disinfection by April 2007. Once operational, the use of chlorine for final effluent disinfection will be eliminated and the formation of disinfection byproducts will be reduced significantly. Consequently, the effluent concentrations of bromodichloromethane and dibromochloromethane will decrease.

8. Sections 402(o)(2) (33 U.S.C. section 1342(o)(2)) and 303(d)(4) (33 U.S.C. section 1313(d)(4)) of the Clean Water Act (CWA) and federal regulations at40 CFR section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued or amended permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. As discussed in Finding 7, the increased effluent limitations for bromodichloromethane and dibromochloromethane are based on new information and are more stringent than water quality-based effluent limitations. Therefore, the relaxation of the effluent limitations for bromodichloromethane and dibromochloromethane is consistent with the anti-backsliding requirements of the CWA and federal regulations and is also consistent with the antidegradation provisions of 40 CFR section 131.12 and State Water Resources Control Board Resolution No. 68-16. Any impact on existing water quality will be insignificant. Furthermore, this Resolution adds a provision to allow Order No. R5-2004-0028 to be reopened to modify the effluent limitations for bromodichloromethane and dibromochloromethane after installation of UV disinfection facilities.

9. The Discharger historically utilized drying beds to dewater biosolids with final disposal on land adjacent to the WQCF. Monitoring and Reporting Program (MRP) Order No. R5-2004-0028 requires biosolids monitoring pursuant to 40 Code of Federal Regulations (CFR) Part 503 for

disposal of biosolids to land. However, the Discharger has since changed biosolids disposal practices and currently hauls biosolids to a landfill. The 40 CFR Part 503 biosolids regulations only apply for biosolids applied to land, so the monitoring and reporting requirements for biosolids can be reduced when the Discharger hauls biosolids to the landfill. This Resolution amends MRP Order No. R5-2004-0028 for biosolids monitoring. The reduction in biosolids monitoring is consistent with the antidegradation provisions of 40 CFR section 131.12 and State Water Resources Control Board Resolution No. 68-16. Any impact on existing water quality will be insignificant.

10. WDR Order No. R5-2004-0028 contains final effluent limitations for oil and grease. However, due to an omission, MRP Order No. R5-2004-0028 does not contain a requirement for effluent monitoring of this parameter. To demonstrate compliance with the effluent limitations, the Discharger has been evaluating the effluent monthly for oil and grease and reporting the results in the Discharger self-monitoring reports (SMRs). In review of SMRs since 1 January 2000, the Discharger has maintained compliance with the effluent limitations for oil and grease. This Resolution amends MRP Order No. R5-2004-0028 to include a requirement for monthly oil and grease monitoring.

11. The action to adopt or amend an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code section 21000, et seq.), requiring preparation of an environmental impact report or negative declaration in accordance with Section 13389 of the California Water Code.

12. The Regional Board has notified the Discharger and interested agencies and persons of its intent to amend waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

13. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

14. This Order shall amend WDR Order No. R5-2004-0028, NPDES No. CA0081558, pursuant to Section 402 of the CWA (33 U.S.C. section 1342), and amendments thereto, and shall take effect upon the date of hearing, provided EPA has no objections.

IT IS HEREBY ORDERED that Order No. R5-2004-0028 is amended solely to add Table 15 and Table 16 to the Information Sheet, change Effluent Limitations B.1, B.2, and B.3 for bromodichloromethane and dibromochloromethane, add Provisions H.26, modify Finding 36 for bromodichloromethane and dibromochloromethane, modify Section 3 of the Information Sheet regarding biosolids management practices, and amend MRP Order No. R5-2004-0028 to modify

biosolids monitoring and add a monthly monitoring requirement for oil and grease. The City of Manteca, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with Amended Order No. R5-2004-0028:

1. Table 15 is added to the Information Sheet for Order No. R5-2004-0028, and supercedes the needed dilution credit calculations for bromodichloromethane and dibromochloromethane in Table 12. Table 16 is added to the Information Sheet for Order No. R5-2004-0028, and supercedes the effluent limitation calculations for bromodichloromethane and dibromochloromethane in Table 13. Table 15 and Table 16 are included in Attachment A to this Resolution.

2. Effluent Limitations B.1 is amended as follows, replacing the effluent limitations for bromodichloromethane and dibromochloromethane in Order No. R5-2004-0028:

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Bromodichloromethane	µg/l	30	---	---	47
	lb/day[3]	1.7	---	---	2.7
Dibromochloromethane	µg/l	7	---	---	16
	lb/day[3]	0.41	---	---	0.93

3 Based upon a design treatment capacity of 6.95 mgd.

3. Effluent Limitations B.2 is amended as follows, replacing the effluent limitations for bromodichloromethane and dibromochloromethane in Order No. R5-2004-0028:

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Bromodichloromethane	µg/l	30	---	---	47
	lb/day[3]	2.0	---	---	3.2
Dibromochloromethane	µg/l	7	---	---	16
	lb/day[3]	0.47	---	---	1.1

3 Based upon a design treatment capacity of 8.11 mgd.

4. Effluent Limitations B.3 is amended as follows, replacing the effluent limitations for bromodichloromethane and dibromochloromethane in Order No. R5-2004-0028:

Constituents	Units	Monthly Average	Weekly Average	1- Hour Average	Daily Maximum
Bromodichloromethane	µg/l	30	---	---	47
	lb/day[3]	2.5	---	---	3.9
Dibromochloromethane	µg/l	7	---	---	16
	lb/day[3]	0.58	---	---	1.3

3 Based upon a design treatment capacity of 9.87 mgd.

5. Provisions H.26 shall be added to Order No. R5-2004-0028 as follows:

   26. After installation of ultraviolet disinfection facilities, this Order may be reopened to modify the effluent limitations for bromodichloromethane and dibromochloromethane based on the performance of the WQCF.

6. Finding 36 of Order No. R5-2004-0028 shall be replaced as follows:

   Bromodichloromethane (BDCM) and dibromochloromethane (DBCM): Based on information included in analytical laboratory results submitted by the Discharger, the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for BDCM and DBCM. The CTR includes standards for the protection of human health based on a one-in-a-million cancer risk for these organic constituents. The criteria for waters from which both water and organisms are consumed are 0.56 µg/l and 0.41 µg/l for BDCM and DBCM, respectively. The maximum observed effluent concentrations for BDCM and DBCM are 25.7 µg/l and 5.5 µg/l, respectively. Effluent limitations for BDCM and DBCM are included in this Order based on the CTR criteria for the protection of human health. The Discharger is able to comply with the limitations.

7. Section 3 of the Information Sheet in Order No. R5-2004-0028 shall be replaced as follows:

   3 Biosolids Management

   The City of Manteca historically dewatered biosolids in drying beds with final disposal to City-owned farmland adjacent to the treatment plant at agronomic rates, as described in the Order. New limitations on metal concentrations in sludge/soil mixtures and new conditions for sludge use as a soil amendment have been established. This new permit requires the City to reevaluate the sludge and effluent application rates to land and submit a land application plan.

   The City has recently changed facility operations and currently utilizes a centrifuge to dewater the biosolids prior to hauling them to a landfill for disposal. This disposal practice requires less stringent monitoring requirements than those required if disposing biosolids to land. Therefore, Monitoring and Reporting Program R5-2004-0028 includes alternative monitoring requirements, depending on the disposal practice utilized by the City.

8. Biosolids monitoring required in MRP Order No. R5-2004-0028 shall be replaced as follows:

BIOSOLIDS MONITORING

The Discharger has historically disposed of biosolids on City-owned land adjacent to the WQCF. However, the Discharger has recently changed facility operations and currently disposes biosolids in a landfill for disposal. The biosolids monitoring requirements vary based on the method of disposal. When the Discharger disposes biosolids in a landfill, the Discharger shall comply with the biosolids monitoring requirements identified in Section A, below. If the Discharger returns to disposing of biosolids on land, the biosolids monitoring requirements identified in Section B apply. The requirements identified in Section C, apply for all methods of disposal:

A. The Discharger shall comply with the following biosolids monitoring requirements when biosolids are disposed in a landfill:

   A composite sample of sludge shall be collected annually in accordance with EPA's POTW Sludge Sampling and Analysis Guidance Document, August 1989, and tested for the following metals:

Cadmium	Copper	Nickel
Chromium	Lead	Zinc

   Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

B. The Discharger shall comply with the following biosolids monitoring requirements when disposing of biosolids to land:

   A composite sample of biosolids shall be collected in accordance with USEPA's POTW Biosolids Sampling and Analysis Guidance Document, August 1989, (or most recent edition) and tested for the following constituents:

Constituent	Units	Sample Type	Frequency
Quantity	Dry Tons	--------	Quarterly
Solids Content	% percentage	Composite	Quarterly
Disposal Location	--------	--------	Quarterly
Arsenic	mg/kg	Composite	Quarterly
Cadmium	mg/kg	Composite	Quarterly
Chromium	mg/kg	Composite	Quarterly
Copper	mg/kg	Composite	Quarterly
Lead	mg/kg	Composite	Quarterly
Mercury	mg/kg	Composite	Quarterly
Molybdenum	mg/kg	Composite	Quarterly
Nickel	mg/kg	Composite	Quarterly
Selenium	mg/kg	Composite	Quarterly
Zinc	mg/kg	Composite	Quarterly
Oil and Grease	mg/kg	Composite	Quarterly
Nitrogen	mg/kg (dry)	Composite	Quarterly
Ammonia	mg/kg (dry)	Composite	Quarterly
Nitrate	mg/kg (dry)	Composite	Quarterly
Total Kjeldahl Nitrogen	mg/kg (dry)	Composite	Quarterly
Fecal Coliform	MPN/gram total solids	Composite	See Footnote 1
Priority Pollutants_____	---	Composite	See Footnote 2

[1] The Discharger shall collect seven composite samples over a two-week period each quarter, and analyze the samples for fecal coliform (report as MPN/gm total solids). Results for each sample shall be reported along with the geometric mean of the results.

[2] **Within 90 days of the effective date of this Order, and annually thereafter**, the Discharger shall submit results of chemical analysis for the priority pollutants listed in 40 CFR 122 Appendix D, Tables II and III (excluding total phenols). Suggested methods for analysis of biosolids are provided in USEPA publications titled "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods" and "Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater". Other guidance is available in USEPA's POTW Biosolids Sampling and Analysis Guidance Document, August 1989 (or most recent edition).

Results of monitoring shall be reported in compliance with the Reporting Section. The biosolids monitoring report shall include a statement concerning compliance with 40 CFR Part 503 biosolids disposal requirements. The report shall include, but is not limited to, an assessment of cumulative metals and nitrogen loadings from all sources, type of crop grown, nitrogen demand, and setback and runoff compliance, as well as compliance with pathogen reduction and vector attraction reduction standards.

C. The Discharger shall submit **annually, by 30 January**, the following:

1. Annual sludge production in dry tons and percent solids;

2. A schematic diagram showing sludge handling facilities and a solids flow diagram;

3. Depth of application and drying time for sludge drying beds (if applicable); and

4. A description of the disposal method(s) used at the WQCF, including the following information. If more than one method is used, include the percentage of annual sludge production disposed by each method.

   a. For **landfill disposal**, include (1) the Regional Board's WDR numbers that regulate the landfill(s) used, (2) the present classifications of the landfill(s) used, and (3) the names and locations of the receiving facility(ies).

   b. For **land application,** include (1) location of the site(s), (2) the Regional Board's WDR numbers that regulate the site(s), (3) the application rate in lbs/year (specify wet or dry), and (4) subsequent uses of the land.

   c. For **incineration**, include (1) name and location of the site(s) where sludge incineration occurs, (2) the Regional Board's WDR numbers that regulate the site(s), (3) the disposal method of the ash, and (4) the names and locations of facilities receiving ash (if applicable).

   d. For **composting**, include (1) name and location of the site(s) where sludge composting occurs, and (2) the Regional Board's WDR numbers that regulate the site(s).

9. The effluent monitoring requirements (when discharging to Surface Waters) in MRP Order No. R5-2004-0028 shall be amended to include a monitoring requirement for oil and grease as follows:

Constituents	Units	Type of Sample	Sampling Frequency
Oil and Grease	mg/l	grab	Monthly

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 5 August 2005.

_____
THOMAS R. PINKOS, Executive Officer

TABLE 15
SUMMARY OF HUMAN CARCINOGENIC POLLUTANT STATISTICS
BROMODICHLOROMETHANE AND DIBROMOCHLOROMETHANE

Sample Date (Concentrations in ug/l)	Dibromochloromethane	Bromodichloromethane
April-04	5.5	25.7
May-04	0.5	14.0
June-04	0.5	17.0
July-04	0.5	17.0
September-04	3.5	15.0
October-04	3.9	17.0
November-04	2.4	13.0
December-04	1.3	7.5
January-05	1.2	9.2
February-05	1.6	9.4
March-05	2.5	14.0
April-05	2.6	14.0

Sample Count	12	12
Max. Concentration (µg/l)	5.50	25.70
Mean (µg/l)	2.17	14.40
Median (ug/l)	2	14
Std. Dev.	1.55	4.77
CV	0.72	0.33
Estimated Max. Effluent Concentration (µg/l)(1)	7.3	30.1
Human Health Criteria	0.41	0.56
Background Conc. (µg/l) (2)	< 0.3	< 0.2
Needed Dilution Credit(3)	**63**	**82**

(1) Estimated MEC calculated as the mean plus 3.3 times the standard deviation.
(2) Lowest MDL utilized for background concentration, per Section 1.4.3.2 of SIP.
(3) Needed Dilution Credit = (Est. max. conc.- HH Criteria)/(HH criteria - background conc.)

TABLE 16
PRIORITY POLLUTANT EFFLUENT LIMITATIONS FOR HUMAN HEALTH
BROMODICHLOROMETHANE AND DIBROMOCHLOROMETHANE

Description	Dibromochloromethane		Bromodichloromethane	
Effluent Concentrations				
Sample Dates - Begin	Apr-04		Apr-04	
Sample Dates - End	Apr-05		Apr-05	
Sample Count	12		12	
Count Above Reporting Limits	12		12	
% of Samples Above Reporting Limits	100		100	
Reporting Limits (µg/l)	0.3		0.2	
Maximum Reported Concentration (µg/l)	5.5		25.7	
Mean (1) (µg/l)	2.2		14.4	
Std. Deviation (1) (µg/l)	1.6		4.8	
Coefficient of Variation (1) (CV) (µg/l)	0.72		0.33	
Background Concentrations				
Sample Dates - Begin	Jan-02		Jan-02	
Sample Dates - End	Dec-02		Dec-02	
Sample Count	12		12	
Count Above Reporting Limits	0		0	
Reporting Limits (µg/l)	0.3		0.2	
Maximum Reported Concentration (µg/l)	< 0.3		< 0.2	
Arithmetic mean (µg/l)(2)	< 0.3		< 0.2	
Criteria	Human Health		Human Health	
Basin Plan Objective (µg/l, dissolved)				
Translator (3)	n/a		n/a	
Criteria (µg/l, total recoverable)(4)	0.41		0.56	
Effluent Limit Calculations				
Dilution Credit(5)	63		82	
Effluent Concentration Allowance (6) (µg/l)	7.3		30.1	
σ^2 and σ_4^2	0.42	0.12	0.10	0.03
AMEL Multiplier (7)	1.7		1.3	
Average Monthly Effluent Limit (ug/l)	**7**		**30**	
MDEL Multiplier (8)	3.6		2.0	
Max. Daily Effluent Limit (ug/l)	**16**		**47**	

General Note: Unless noted otherwise, all concentrations given as total recoverable
(1) Calculated per Section 1.4.B, Step 3 of SIP.
(2) Calculated per Section 1.4.3.2 of SIP
(3) EPA Translators used as default.
(4) The total recoverable criteria is based on the CTR.
(5) See Table 15 for applicable dilution credits for bromodichloromethane and dibromochloromethane.
(6) ECA calculated per Section 1.4.B, Step 2 of SIP.
(7) Assumes sampling frequency n=>4. Uses 95th percentile AMEL multiplier, Step 5 of SIP.
(8) Uses 99th percentile MDEL multiplier, Step 5 of SIP.

APPENDIX F

Near and Far Field Dilution Analysis Report (October 2006)

Resource Management Associates

NEAR AND FAR FIELD DILUTION ANALYSIS OF THE MANTECA WASTEWATER DISCHARGE

Prepared For:
Larry Walker Associates

October 2006

Summary

Near field and far field dilution analysis of the Manteca discharge has been completed using local and Delta-wide versions of the 2-D depth-averaged models RMA2 and RMA11.

Near Field

Near field dilution simulations were performed for three river flow rates, three discharge rates and two outfall scenarios. San Joaquin River flow rates analyzed were the 1Q10 of 564 cfs, representing Acute conditions, the 7Q10 of 615 cfs, representing Chronic conditions, and the harmonic mean of 2,015 cfs, representing Human Health conditions. Observed tide at Old River at Head was used for the downstream tidal boundary. The Acute and Chronic simulations used the July 1-17, 1992 tide, and the November 20 – December 5, 2001 tide was used for the Human Health simulations. Discharge rates analyzed were the current permitted rate of 9.87 MGD, and proposed discharge levels of 17.5 MGD and 27 MGD. Timed discharge was required for the Acute and Chronic simulations due to the low river flow rates. The flow rate for the Human Health simulations was sufficiently high to allow continuous discharge. All of the flow – discharge combinations were analyzed with a side bank outfall and with a 140' long diffuser. Dilution along plume centerlines was analyzed for each flow and discharge scenario.

For the Acute side bank discharge scenarios, there is virtually no dilution at the outfall, and at 10,000 ft downstream of the discharge, dilution is approximately 37:1 for the 9.87 MGD simulation, 21:1 for the 17.5 MGD simulation, and 13:1 for the 27 MGD. For the Acute diffuser scenarios, the lowest dilution occurs at approximately 700 feet downstream of the diffuser. For the 9.87 MGD simulation, the lowest dilution is approximately 11:1, for the 17.5 MGD simulation 6:1 and for the 27 MGD simulation 4:1. The side bank outfall and diffuser plume centerline concentration profiles are essentially identical beyond about 2,000 feet from the discharge point.

For the Chronic side bank discharge scenarios, there is limited dilution at the outfall, and at 10,000 ft downstream of the discharge, dilution is approximately 16:1 for the 9.87 MGD simulation, 9:1 for the 17.5 MGD simulation, and 6:1 for the 27 MGD. For the diffuser scenarios, the lowest dilution occurs at approximately 4,100 feet downstream of the diffuser. For the 9.87 MGD simulation, the lowest dilution is approximately 12:1, for the 17.5 MGD simulation 6:1 and for the 27 MGD simulation 4:1. At 10,000 ft downstream of the discharge, dilution is the same as for the side bank scenario. The side bank outfall and diffuser plume centerline concentration profiles only differ significantly within about 5,000 feet of the discharge point.

For the Human Health scenarios there is virtually no dilution at the outfall, and at 10,000 ft downstream of the discharge, dilution is approximately 134:1 for the 9.87 MGD simulation, 75:1 for the 17.5 MGD simulation, and 47:1 for the 27 MGD. For the diffuser scenarios, the lowest dilution occurs at the diffuser. For the 9.87 MGD simulation, the lowest dilution is approximately 69:1, for the 17.5 MGD simulation 38:1 and for the 27 MGD simulation 25:1. At 10,000 ft downstream of the discharge, dilution is approximately 126:1 for the 9.87 MGD simulation, 71:1 for the 17.5 MGD simulation,

and 46:1 for the 27 MGD, similar to the side bank scenario. The side bank outfall and diffuser plume centerline concentration profiles differ for the two cases down to the location where the model transitions to 1-D (approximately 5,400 ft), at which point the concentrations become fully mixed across the channel cross-section.

Thermal Analysis

The model used for the current study was used previously to simulate temperature for the *Thermal Plan Exception* study (LWA, 2006). The temperature simulations were performed using the 3-D version of the model with a side bank discharge.

Results from winter low flow condition simulations indicate that the maximum channel cross-sectional area impacted by over 1º F with the side bank discharge is 21% for the 9.87 MGD discharge rate and 51% for the 27 MGD discharge rate.

Sensitivity analysis runs were performed for the fall historical low flow intermittent, 27 MGD discharge to determine the amount of effluent cooling that would be required under this flow rate. Results indicate that a reduction of approximately 11º F would be required to reduce the cross-sectional area impacted by more than 1º F to less than 25%. The required effluent temperature reduction results in a 2.5º F differential under critical conditions.

Temperature simulations were not performed with a diffuser outfall, however near field diffuser simulation results for Acute conditions can be used to estimate differentials between effluent and background river temperatures that would maintain less than 25% of the channel cross-section below 1º F. For any discharge, the maximum allowable temperature differential between effluent temperature and background river temperature would equal the minimum Acute dilution plus one. For the Acute conditions analyzed in this report, this results in maximum temperature differentials of 12º F for the 9.87 MGD discharge, 8º F for the 17.5 MGD discharge and 5º F for the 27 MGD discharge.

Far Field

Far field tracer simulations were performed for a critically dry year (October 1991 through September 1992) and a normal dry year (January through December, 2002) with three discharge rates: the current permitted rate of 9.87 MGD, and proposed discharge levels of 17.5 MGD and 27 MGD. For each scenario, effluent contribution was analyzed at six key locations including the Clifton Court intake, DMC intake, Contra Costa intake at Rock Slough, Contra Costa intake on Old River, San Joaquin River at Light 18 and the Stockton Turning Basin.

During the 1991 – 1992 simulation, the lowest peak effluent contributions occur at Contra Costa intake in Rock Slough where the maximum effluent contribution for the 9.87 MGD case is 0.2%, for the 17.5 MGD case is 0.3%, and for the 27 MGD case is 0.5%.

The highest peak effluent contributions occur at the Stockton Turning Basin where the maximum effluent contributions is 3.2% for the 9.87 MGD case 3.7% for the 17.5 MGD case, and 5.7% for the 27 MGD case.

During the 2002 simulation, the lowest peak effluent contributions again occur at Contra Costa intake in Rock Slough where the maximum effluent contribution for the 9.87 MGD case is 0.1%, for the 17.5 MGD case is 0.3%, and for the 27 MGD case is 0.4%.

For 2002, the highest peak effluent contributions occur again at the Stockton Turning Basin where the maximum effluent contributions is 1.2% for the 9.87 MGD case 2.1% for the 17.5 MGD case, and 3.3% for the 27 MGD case.

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Introduction

Near field and far field dilution analysis of the Manteca discharge has been completed in support of the Manteca Wastewater Control Facility EIR, using local and Delta-wide versions of the 2-D depth-averaged models RMA2 and RMA11.

Background

The 2-D depth averaged model of the San Joaquin River that extends from Old River to Vernalis was calibrated to temperature during the Manteca thermal plan exception modeling (LWA, 2006). This model is used for the current study to perform near field dilution analysis.

In the past, the far field modeling effort used a tidally averaged 1-D link-node hydrodynamic water quality model to predict the fate and transport of Manteca effluent throughout the Delta system. However the link-node model cannot evaluate inter tidal impacts associated with a timed discharge, a key requirement for the present investigation. As a result RMA has applied the 1-D / 2-D finite element Delta model (RMA2/11), which has gained wide acceptance with the Department of Water Resources (DWR) and others, to the far field investigations.

Numerical Models

To simulate the hydrodynamic and water quality responses in shallow estuaries, RMA has developed two computer programs, RMA-2 (King, 1986) and RMA-11 (King, 1995). RMA-2 is a generalized free surface hydrodynamic model that is used to compute a continuous temporal and spatial description of fluid velocities and depth throughout an estuary system. RMA-11 is a generalized two-dimensional water quality model that computes a temporal and spatial description of conservative and non-conservative water quality parameters. RMA-11 is designed to simulate both inter-tidal and tidally averaged water quality conditions. RMA-11 uses the results from RMA-2 for its description of the flow field.

RMA-2 solves a set of differential equations that represent hydrodynamic response of shallow water waves throughout the estuary. They are essentially a hydrodynamic quantification of Newton's second law (i.e., force = mass x acceleration) and include the effects of momentum transfer, wind, bottom friction, the Coriolis force, and turbulent diffusion. The complex effects of turbulent diffusion are approximated by turbulent diffusion analogy (i.e. eddy diffusion).

RMA-11 solves a set of differential equations representing the conveyance of dissolved or suspended material by advection and turbulent mixing. These equations are derived from a statement of conservation of mass. Eddy diffusion is also used to approximate the complex process of time dependent transport by turbulent mixing.

Near Field Dilution Analysis

Near field dilution analysis simulations were performed to analyze the dilution of the effluent plume in the San Joaquin River in the local vicinity of the Manteca discharge

using two discharge cases: the first with the current side bank discharge, and the second, a preliminary design diffuser. Both cases were run for different river flow conditions and with different discharge rates to simulate SIP critical conditions (SWRCB, 2005).

Model Description

The finite element representation of the San Joaquin River used for the Manteca near field dilution modeling extends from the gage at Vernalis to the bifurcation at the head of Old River as shown in Figure 1. The model includes one-dimensional cross-sectionally averaged sections at the upstream and down stream ends and a two-dimensional depth-averaged section extending from below Mossdale Bridge to just upstream of the outfall. Details of the entire 2-D section of the finite element mesh are shown in Figure 2, and the immediate vicinity of the outfall is shown in Figure 3 and Figure 4 with the side bank discharge and with the diffuser, respectively. Three-D views of the network, colored by depth, are shown in Figure 5 and Figure 6 with the side bank discharge and the diffuser, respectively, where the lines show the projection of the individual element on the channel bottom and the shaded areas show the shape and location of cross sections that are referenced below. The bridge piers appear as holes in the networks.

For the side bank discharge simulations, effluent is input to the first two elements of the side bank discharge channel, as shown in Figure 7. For the diffuser simulations, effluent is input to the 16 elements making up the diffuser (Figure 8). The diffuser is 140 feet long, located in the deepest section of the channel on the eastern side of the San Joaquin River, extending out from the location of the existing side bank discharge. Diffuser elevations follow the existing channel contours.

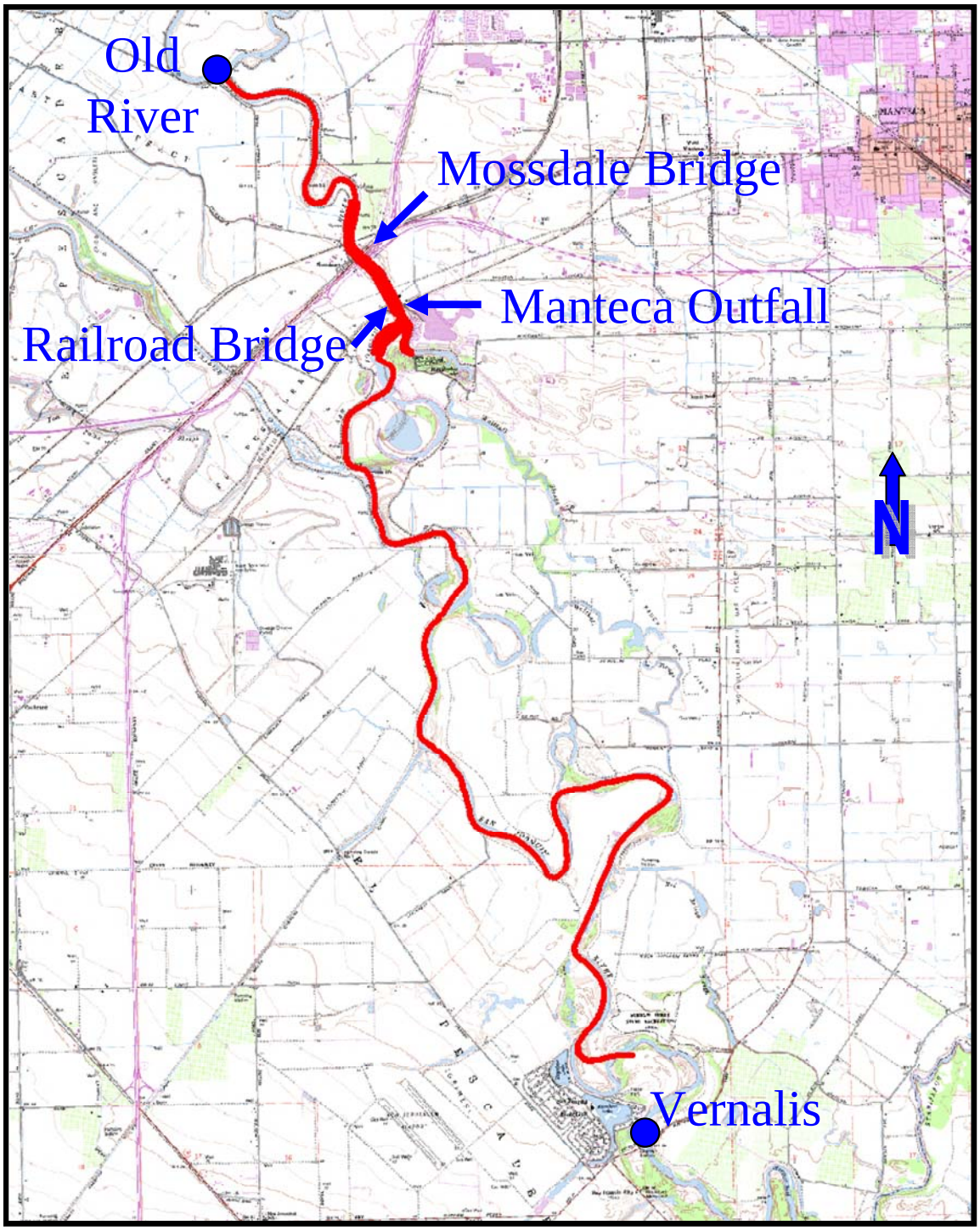

Figure 1 Finite element model extents.

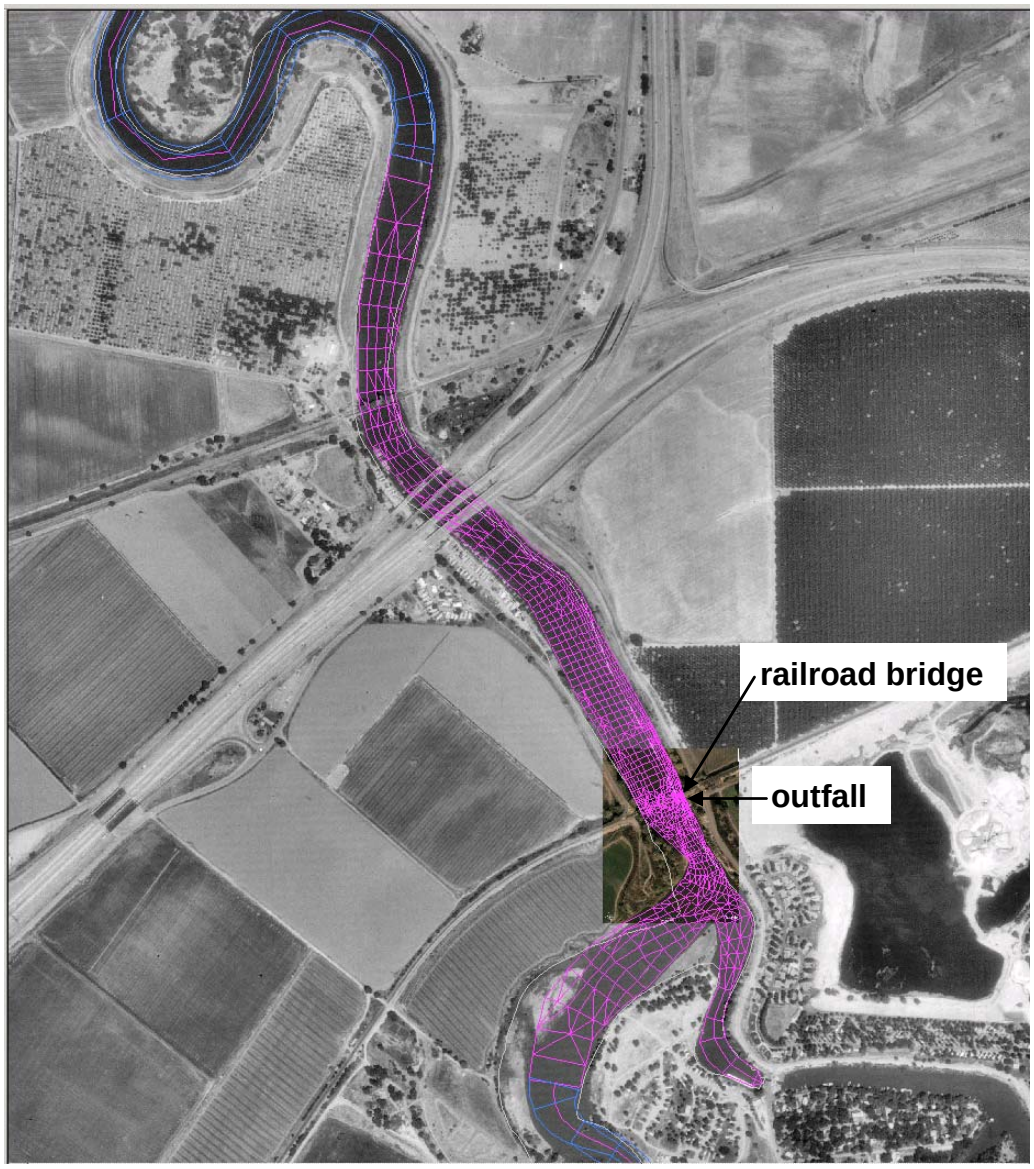

Figure 2 Finite element network near discharge.

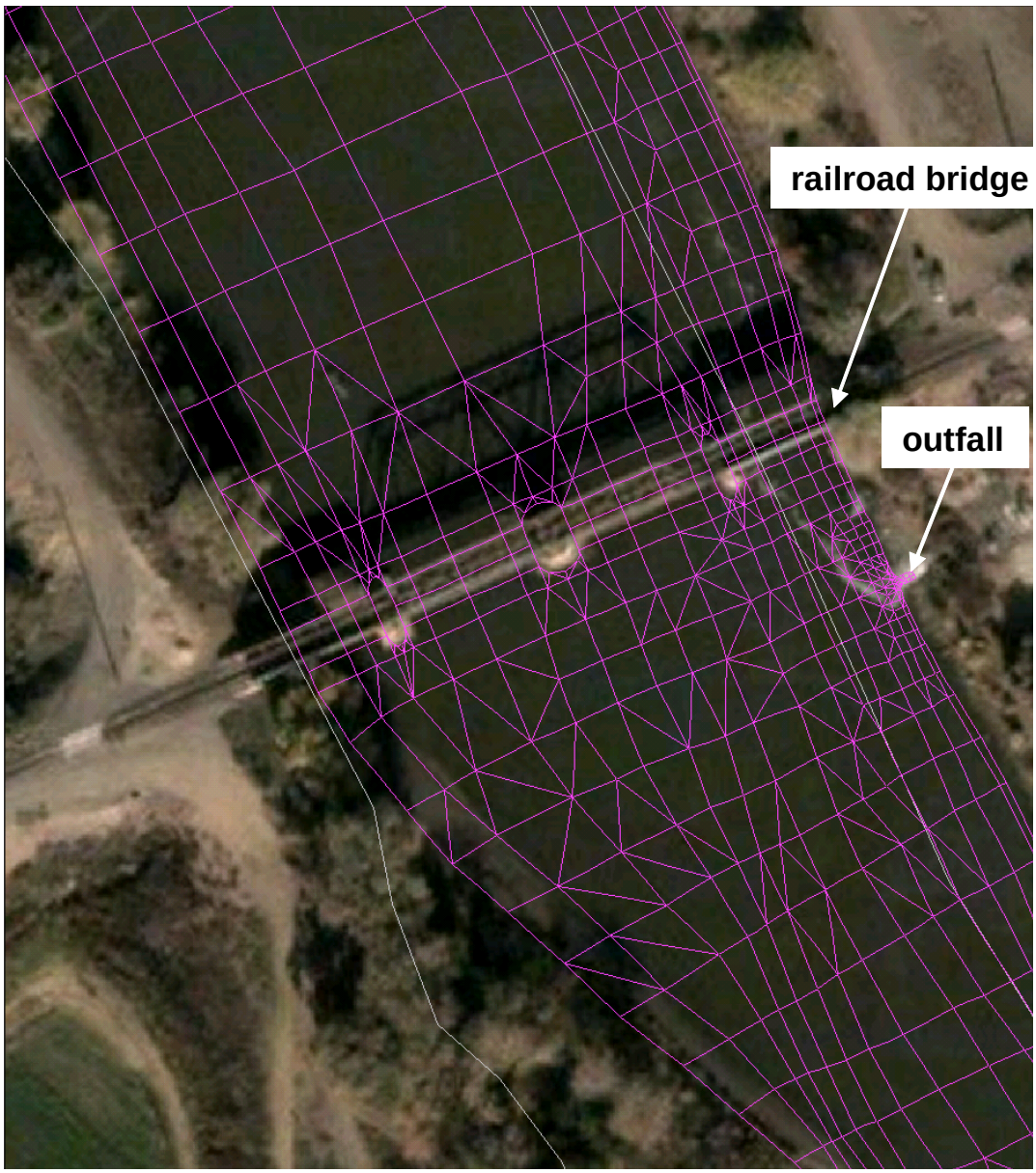

Figure 3 Finite element network near discharge with side bank discharge (enlarged scale).

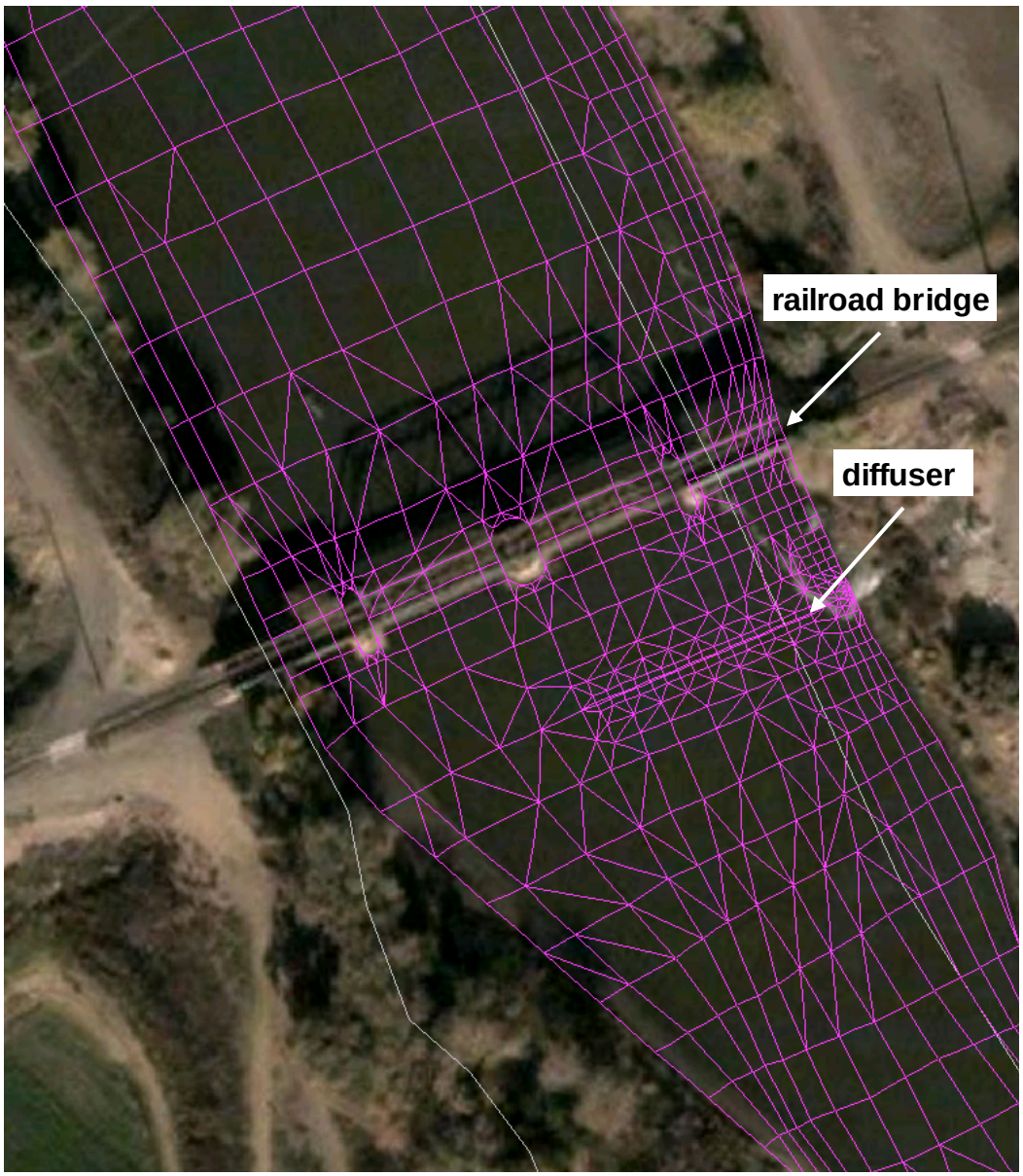

Figure 4 Finite element network near diffuser (enlarged scale).

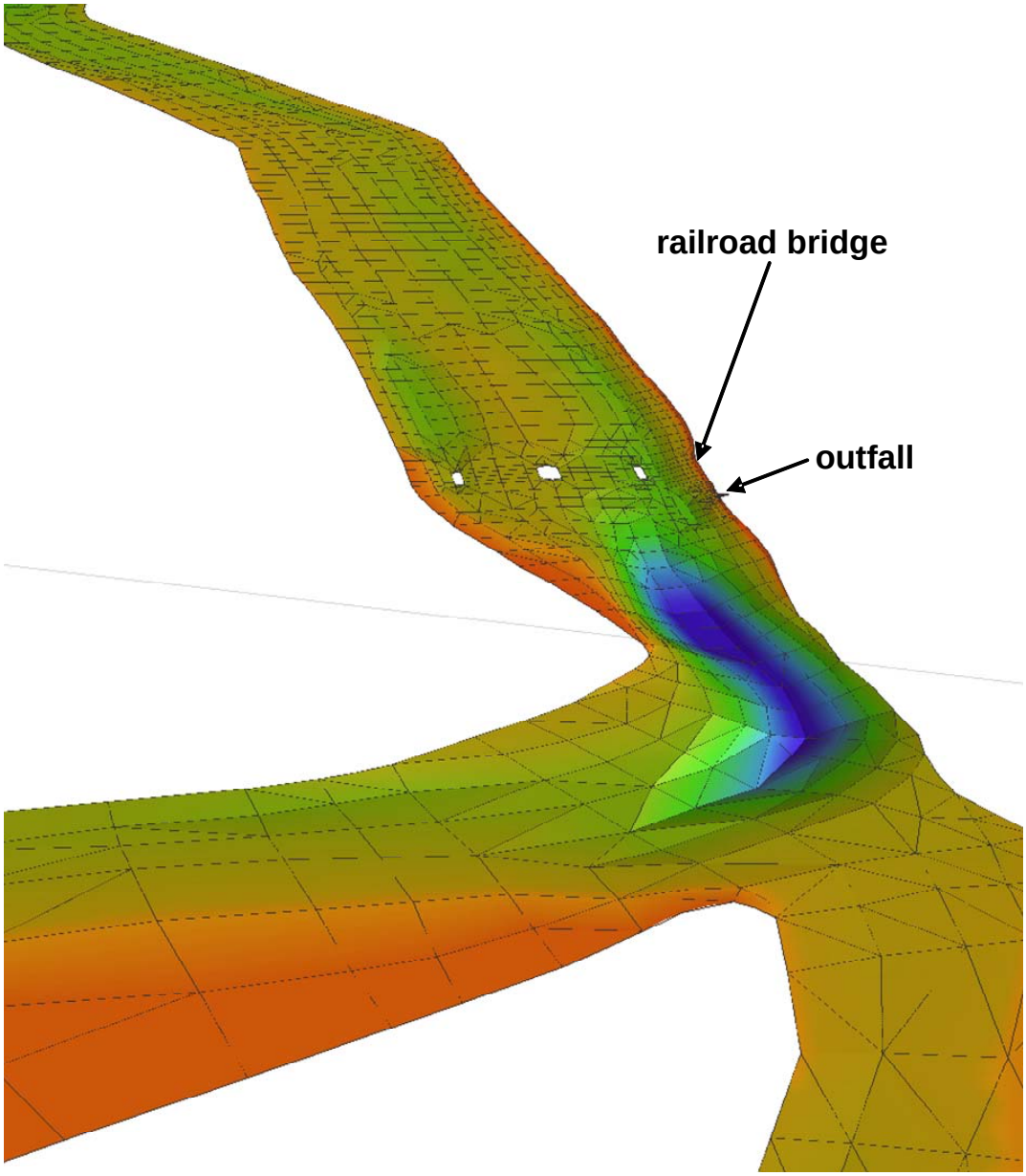

Figure 5 Finite element network with side bank discharge showing bed contours near side bank discharge.

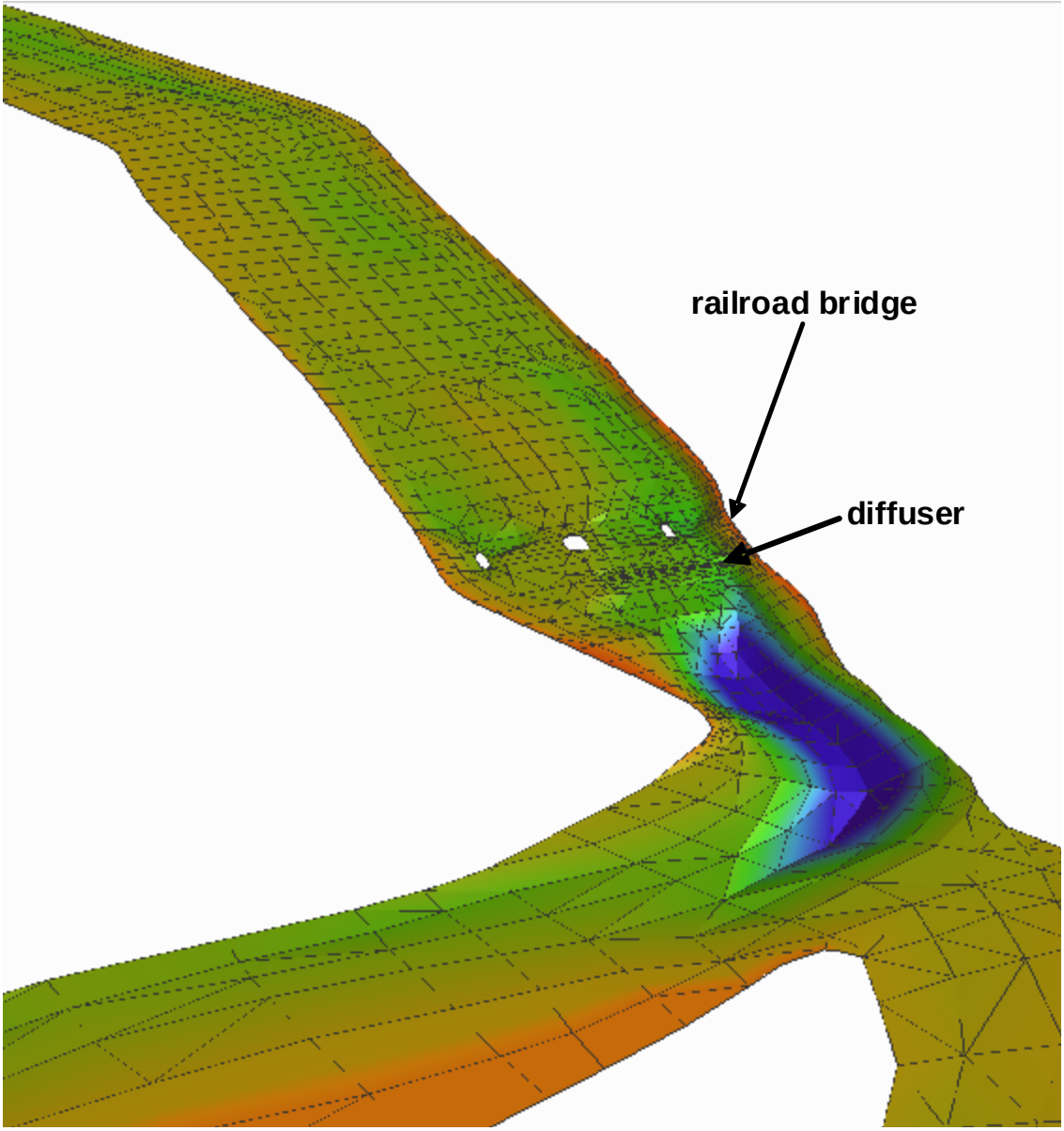

Figure 6 Finite element network with diffuser showing bed contours near diffuser.

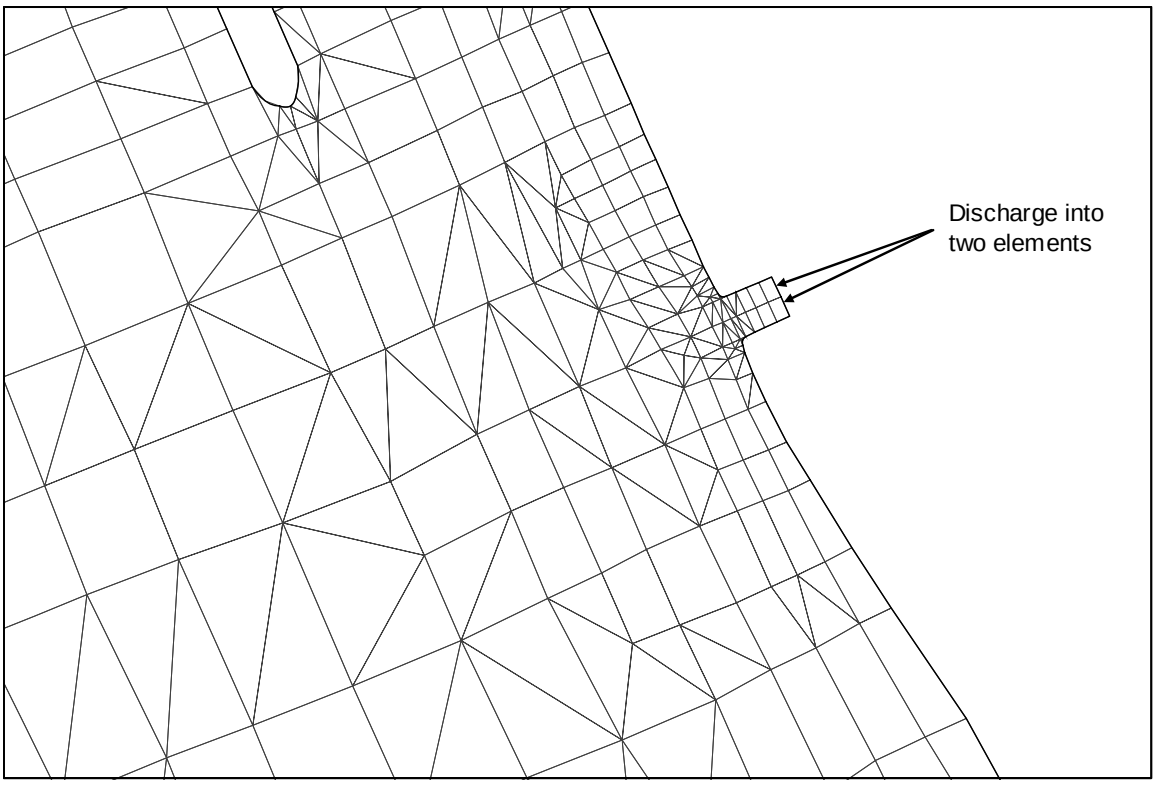

Figure 7 Close-up of finite element mesh showing side bank discharge channel.

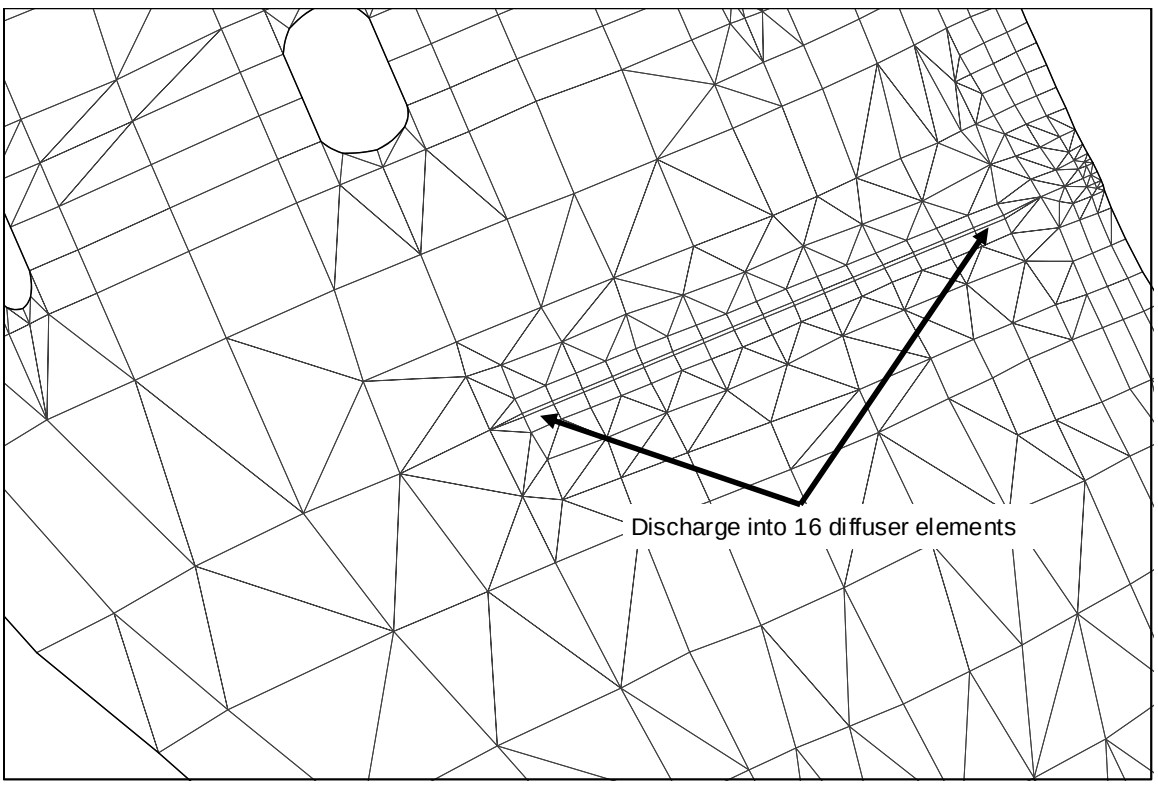

Figure 8 Close-up of finite element mesh showing diffuser.

Model Simulations

Near field dilution analysis simulations were performed for three San Joaquin River flow conditions, three treatment plant discharge rates and two discharge methods.

The three river flow conditions corresponding to SIP Table 3 are:

Acute – "1Q10 river flow," or 564 cfs;

Chronic – "7Q10 river flow," or 615 cfs; and

Human health – Harmonic mean river flow, or 2015 cfs.

For each of the above river flows, average daily treatment plant discharge rates of 9.87 MGD, 17.5 MGD and 27 MGD were simulated.

Each of these nine flow-discharge combinations was simulated with a side bank discharge and with a diffuser. For the side bank discharge scenarios, the treatment plant discharge was input to two elements as shown in Figure 7. For the diffuser scenarios, the treatment plant discharge was distributed among 16 elements in a 140' long diffuser as shown in Figure 8. Flows into each diffuser element varied based on channel depth, with greater flows into the elements in the deeper area of the channel. This method resulted in a relatively even effluent concentration distribution across the width of the diffuser.

The treatment plant discharge was tagged with a tracer concentration of 100 so that effluent dilution could be computed. The upstream boundary concentration was set to zero. Because the effluent does reach the downstream boundary at some low concentration and, therefore, returns on the incoming tide, for the acute and chronic simulations the downstream boundary concentration is set to a rough average of the concentration that occurs on the outgoing tide. This concentration is applied on the incoming tide only. Sensitivity tests were done and this number has no effect on the results within 10,000 feet of the discharge. Further downstream, this has the conservative effect of slightly reducing dilution near the downstream boundary. Overall, the effect is minimal. For the human health simulations, only one brief flow reversal occurs, so the downstream concentration boundary condition is not an issue.

Acute Simulations

For the Acute simulations, the San Joaquin River flow was set constant at 564 cfs. The downstream tide was set using observed stage data at the CDEC station at Old River at Head for July 1992, a time when San Joaquin River flows were similar to the acute river flow conditions. The Old River at Head stage was smoothed using a 3 point centered moving average.

Under the low flow conditions of the Acute simulation, timed treatment plant discharge is required. The discharge schedule defined in the thermal exemption request is used to determine allowable discharge. The following points summarize the method used to determine the times to start and stop the discharge.

When, under an ebb (falling) tide, San Joaquin River flow at Mossdale Bridge exceeds 800 cfs in the downstream direction, discharge from the outfall restarts.

If the approaching flood (rising) tide encompasses a slack tide or flow reversal (San Joaquin River flow less than 400 cfs in the downstream direction), then the discharge stops at least 30 minutes before the minimum low tide.

When the approaching flood tide does not include a period with less than 400 cfs downstream river flow, then the discharge is stopped when the downstream flow at the Mossdale Bridge station drops below 1,200 cfs.

Using this method, the hours per day during which discharge was allowed were summed and the respective instantaneous discharge rates for the 9.87 MGD, 17.5 MGD and 27 MGD were determined and applied during times of discharge. For example, if discharge were allowed for 12 hours during a day, the instantaneous discharge rate during those 12 hours would be 19.74 MGD or 30.5 cfs under the 9.87 MGD discharge scenario.

Hourly average effluent dilution was computed for each scenario and the times of lowest dilution were selected for plotting. Figure 9 shows the lowest hourly average dilution profiles along the centerline of the effluent plume for the three side bank discharge scenarios. At this time, the lowest dilution occurs at the outfall where it is nearly pure effluent for all flow scenarios. At 10,000 ft downstream of the discharge, dilution is approximately 37:1 for the 9.87 MGD simulation, 21:1 for the 17.5 MGD simulation, and 13:1 for the 27 MGD. The highest dilution occurs at approximately 4,000 ft downstream of the discharge. This area of high dilution results from the timed discharge. Because hourly averages are shown, the water that passed by the discharge point when no discharge was occurring shows up downstream at a time when the lowest dilution occurs at the discharge. If these results were tidally averaged, the dilution peak would disappear.

Figure 10 shows the hourly average dilution profiles along the centerline of the effluent plume for the three diffuser scenarios for the same time the side bank results are plotted (also among the times of lowest dilution for the diffuser scenarios). At this time, the lowest dilution occurs at approximately 700 feet downstream of the diffuser. For the 9.87 MGD simulation, the lowest dilution is approximately 11:1, for the 17.5 MGD simulation 6:1 and for the 27 MGD simulation 4:1. At 10,000 ft downstream of the discharge, dilution is the same as for the side bank scenario.

In Figure 11, a plot of plume centerline dilution profiles for the 9.87 MGD cases with the side bank outfall and with the diffuser shows that the profiles only differ significantly within about 2,000 feet of the discharge point. The offset between the two results further downstream is primarily due to the slightly longer plume centerline path for the diffuser case.

Plan view color contour plots of effluent dilution at the same time shown in Figure 9 through Figure 11 are shown in Figure 12 through Figure 14 for each of the discharge rates.

The lowest dilution values at 45’ down the plume centerline from the point of discharge are summarized in Table 1. For the side bank discharge, near the outfall, the plume centerlines follow different paths depending on the discharge rate, because the higher discharge pushes the plume further into the channel than the lower discharge.

Chronic Simulations

For the Chronic simulations, the San Joaquin River flow was set constant at 615 cfs. The downstream tide was set the same as for the Acute simulation.

Under the low flow conditions of the Chronic simulation, timed treatment plant discharge is required and was computed using the method described above for the Acute simulation.

For the tidally averaged dilution plots for the Chronic condition discussed below, dilution was computed using tidally averaged effluent concentration. This provides a more accurate assessment of dilution in the immediate vicinity of the discharge. However, further downstream, where the effluent plume is moving back and forth with the tide, this method may not be as accurate as if instantaneous effluent concentration were used in the dilution calculations.

Tidally averaged effluent dilution was computed for each scenario and the time of lowest dilution was selected for plotting. Figure 15 shows the lowest tidally averaged dilution profiles along the centerline of the effluent plume for the three side bank discharge scenarios. Figure 16 shows the hourly average dilution profiles along the centerline of the effluent plume for the three diffuser scenarios for the same time the side bank results are plotted (also the lowest for the diffuser scenarios).

At this time, the lowest dilution for the side bank outfall case occurs at the outfall where, using tidally averaged effluent concentration in the dilution calculations, there is almost no dilution for all flow scenarios. At 10,000 ft downstream of the discharge, dilution is approximately 16:1 for the 9.87 MGD simulation, 9:1 for the 17.5 MGD simulation, and 6:1 for the 27 MGD simulation.

For the diffuser case, the lowest dilution occurs at approximately 4,100 feet downstream of the diffuser. Although the lowest instantaneous dilutions occur at the diffuser, on a tidally averaged basis, the lowest dilutions occur further downstream. One factor influencing this phenomenon is the initial dilution achieved by the diffuser. The other factor is that while the lower dilutions at the diffuser disappear nearly as soon as discharge stops, the effluent plume is persistent further downstream as it is moved back and forth with the tide. Therefore, when the results are averaged over the tidal cycle, times of zero concentration (when there is no discharge) are included for nearly half of the averaging period at the diffuser, whereas at around 4,100 feet downstream, lower dilutions are present over the majority of tidal cycle. The phenomenon of minimum dilution at a downstream location is not seen in the side bank discharge case because there is almost no dilution at the outfall (this is true even on a tidally averaged basis because tidally averaged effluent concentrations are used in the dilution calculations). Even though the plume is persistent over the tidal cycle at the downstream location, it does not produce dilutions as low as those seen near the side bank discharge. At 4,100 feet downstream, the side bank and diffuser dilution values are very similar.

For the 9.87 MGD diffuser simulation, the lowest dilution is approximately 12:1, for the 17.5 MGD simulation 6:1 and for the 27 MGD simulation 4:1. At 10,000 ft downstream of the discharge, dilution is the same as for the side bank scenario.

In Figure 17, a plot of plume centerline dilution profiles for the 9.87 MGD cases with the side bank outfall and with the diffuser shows that the profiles only differ significantly within about 5,000 feet of the discharge point.

Plan view color contour plots of minimum effluent dilution are shown in Figure 18 through Figure 20 for each of the discharge rates.

The lowest dilution values at 450' down the plume centerline from the point of discharge are summarized in Table 1. For the 9.87 MGD simulation, the dilution credit is 2.4:1, which is slightly less than the 3:1 dilution credit in the permit. This difference is due to the expanded model and refined critical conditions.

Human Health Simulation Results

For the Human Health simulations, the San Joaquin River flow was set constant at 2,015 cfs. The downstream tide was set using observed stage data at the CDEC station at Old River at Head for November 20 through December 5, 2001, a time when San Joaquin River flows averaged around 2,015 cfs. The Old River at Head stage was smoothed using a 3 point centered moving average.

Under the higher flow conditions of the Human Health simulation, constant treatment plant discharge is allowed.

Tidally averaged effluent dilution was computed for each scenario and the times of lowest dilution were selected for plotting. Figure 21 shows the lowest tidally averaged dilution profiles along the centerline of the effluent plume for the three side bank discharge scenarios. At this time, the lowest dilution occurs at the outfall where it is nearly pure effluent for all flow scenarios. At 10,000 ft downstream of the discharge, dilution is approximately 134:1 for the 9.87 MGD simulation, 75:1 for the 17.5 MGD simulation, and 47:1 for the 27 MGD.

Figure 22 shows the lowest hourly average dilution profiles along the centerline of the effluent plume for the three diffuser scenarios (the lowest dilution for the diffuser case does not occur at the same time as for the side bank case). At this time, the lowest dilution occurs at the diffuser. For the 9.87 MGD simulation, the lowest dilution is approximately 69:1, for the 17.5 MGD simulation 38:1 and for the 27 MGD simulation 25:1. At 10,000 ft downstream of the discharge, dilution is approximately 126:1 for the 9.87 MGD simulation, 71:1 for the 17.5 MGD simulation, and 46:1 for the 27 MGD, similar to the side bank scenario.

A plot of plume centerline dilution profiles for the 9.87 MGD cases with the side bank outfall and with the diffuser is shown in Figure 23 at the time of lowest dilution for the side bank discharge case. This plot shows that the dilutions differ for the two cases down to the location where the model transitions to 1-D (approximately 5,400 ft), at which point the concentrations become fully mixed across the channel cross-section.

Plan view color contour plots of minimum effluent dilution are shown in Figure 24 through Figure 26 for each of the discharge rates.

The lowest dilution values at 5280' down the plume centerline from the point of discharge are summarized in Table 1.

Table 1 Summary of lowest dilution credits.

Criterion	Distance Downstream (feet)	Side Bank Dilution[1] (parts river water:1part wastewater)			Diffuser Dilution[1] (parts river water:1part wastewater)		
		9.87 MGD	17.5 MGD	27 MGD	9.87 MGD	17.5 MGD	27 MGD
Acute	45	0.35	0.19	0.17	13.3	7.3	4.6
Chronic	4,100[2]	2.4	1.3	0.90	11.8	6.4	4.0
Human Health	5,280	92.9	52.2	32.5	119	66.7	43.4

(1) Values are presented with the dilution credit, D, for direct use in effluent limit calculation:

$D = \frac{C_{eff} - C_{plume}}{C_{plume} - C_{up}}$ where C_{eff} = effluent concentration, C_{plume} = plume concentration, and C_{up} = upstream concentration, which is zero.

(2) Minimum dilution occurs at 4,100 ft downstream of discharge. These dilution values are appropriate for use in evaluating Chronic objectives.

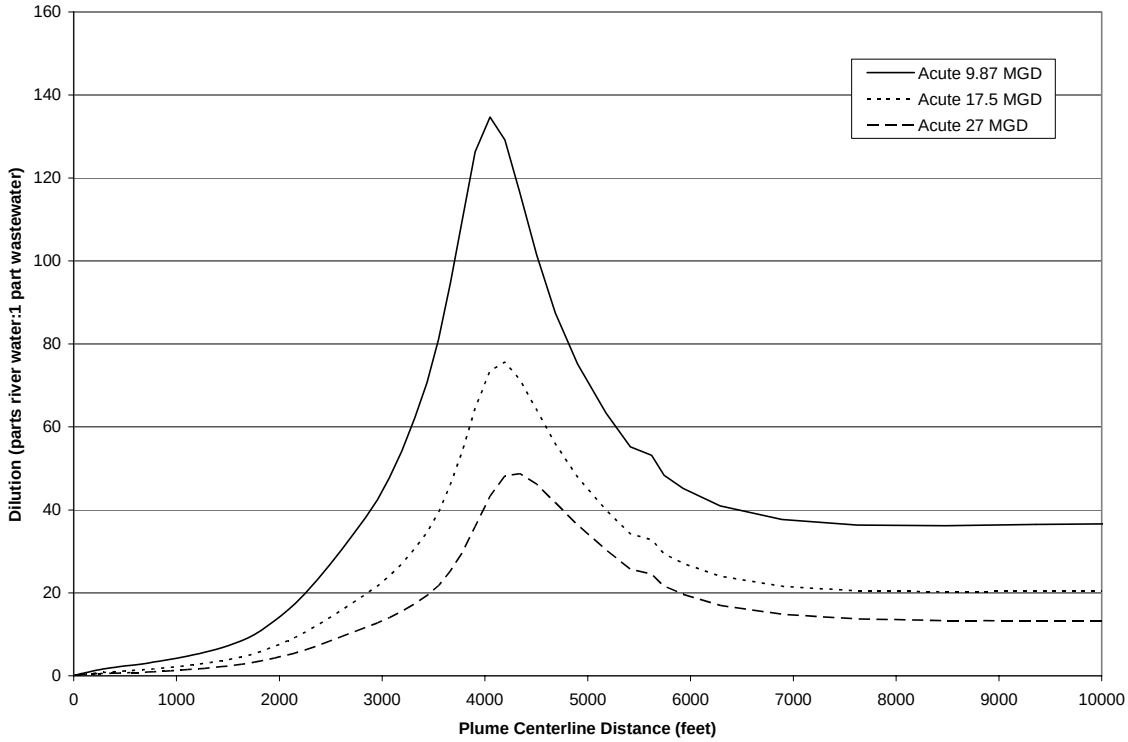

Figure 9 Plume centerline dilution profiles for Acute simulations with side bank discharge, at critical hour during tidal cycle.

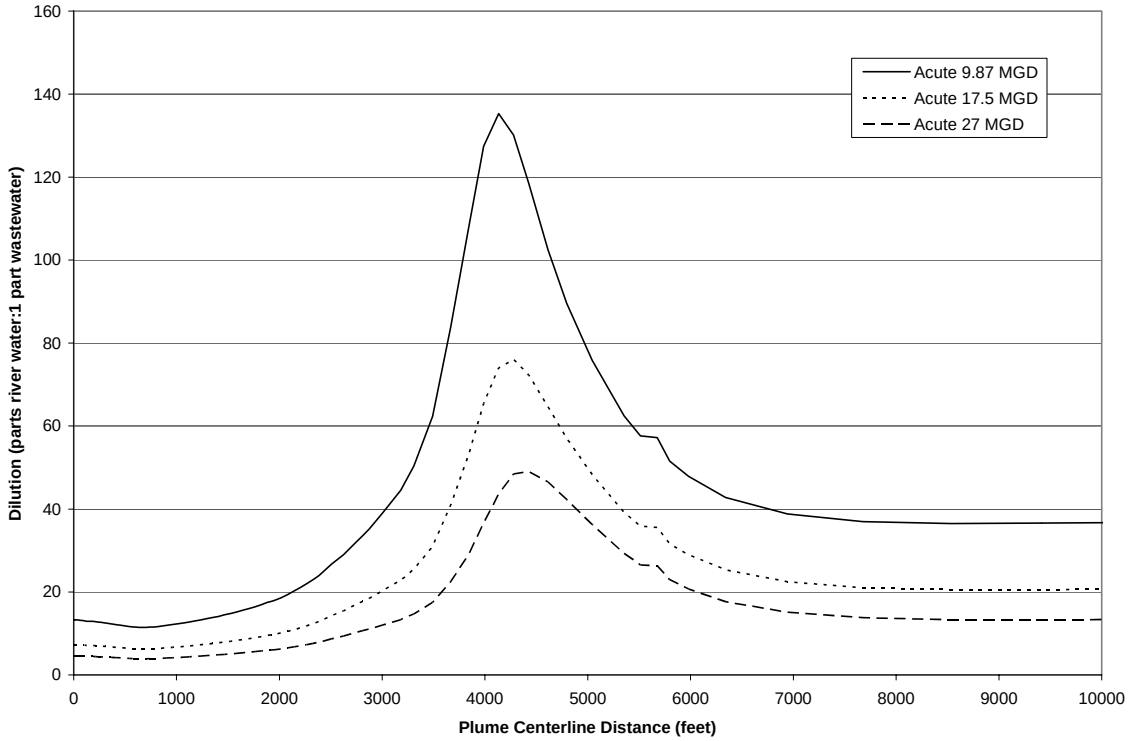

Figure 10 Plume centerline dilution profiles for Acute simulations with diffuser, at critical hour during tidal cycle.

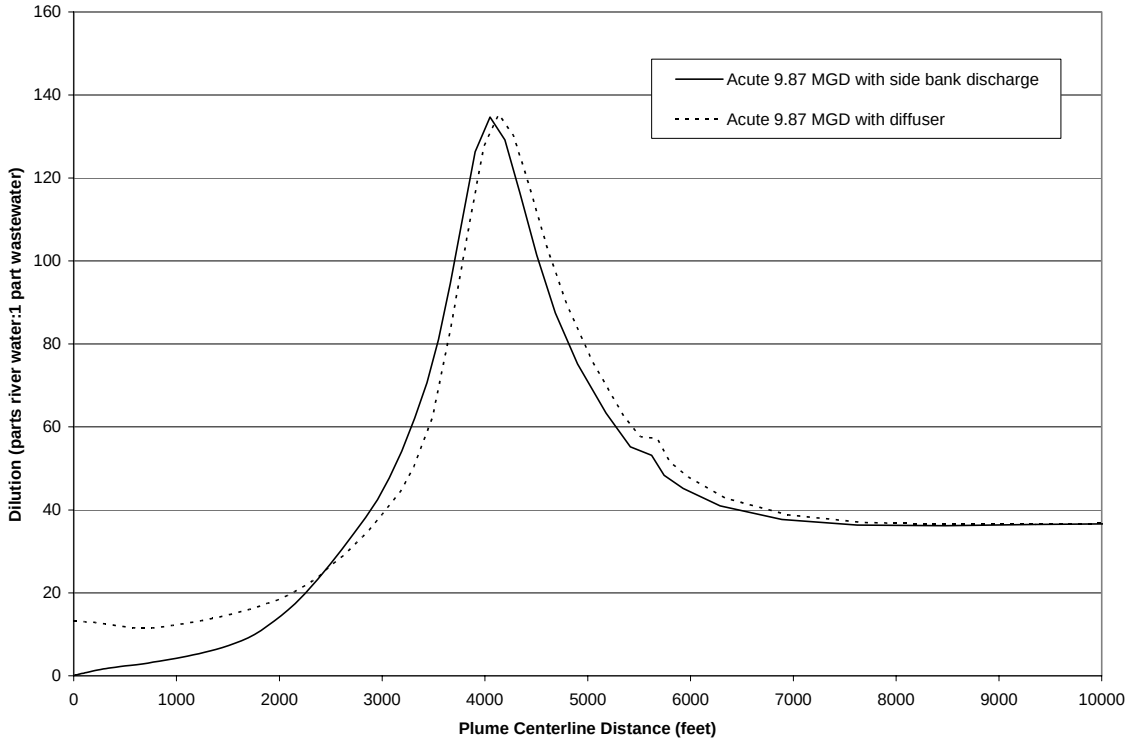

Figure 11 Plume centerline dilution profiles for Acute 9.87 MGD simulations with side bank discharge and with diffuser, at critical hour during tidal cycle.

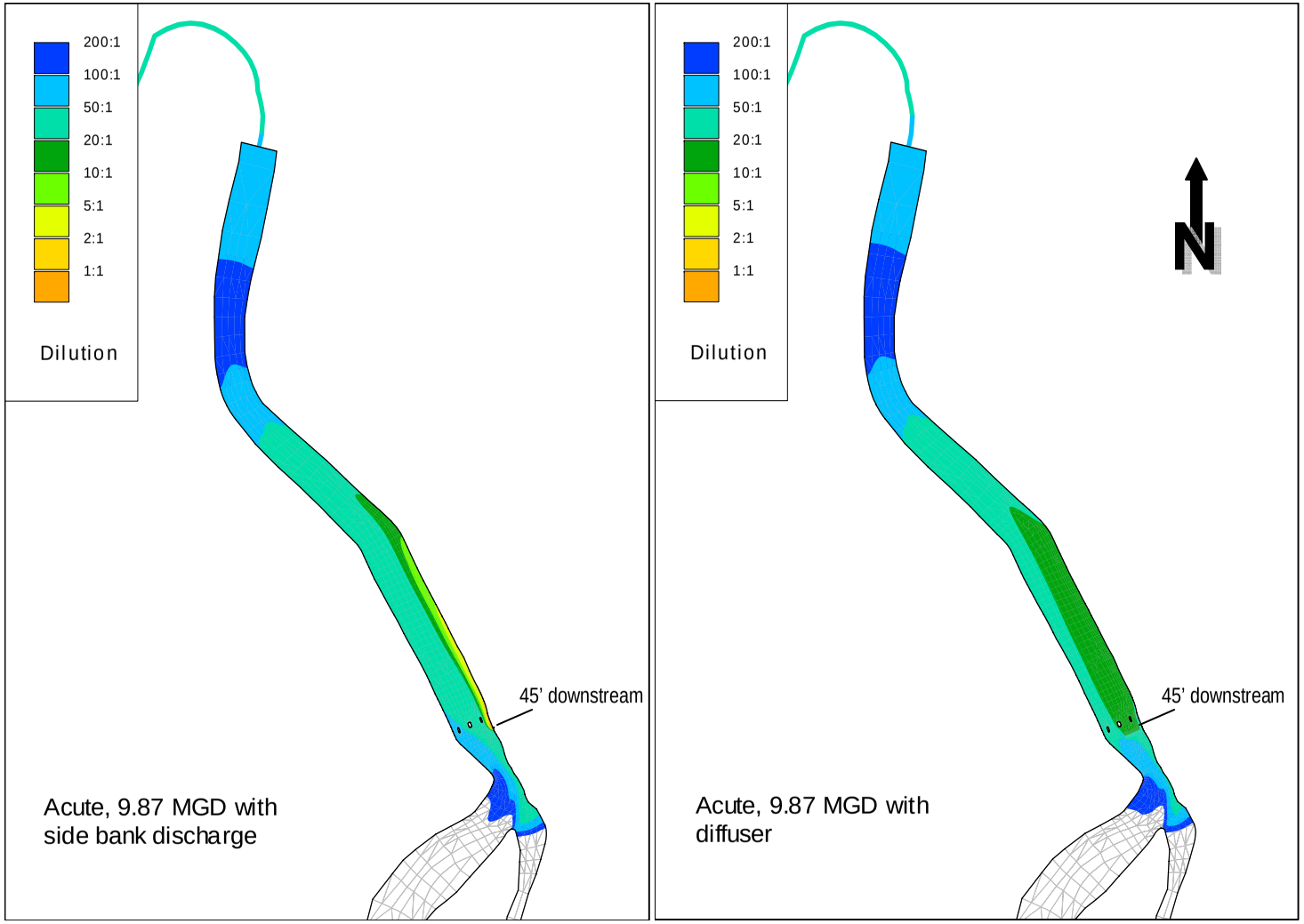

Figure 12 Dilution contours for Acute, 9.87 MGD simulation with side bank discharge and with diffuser.

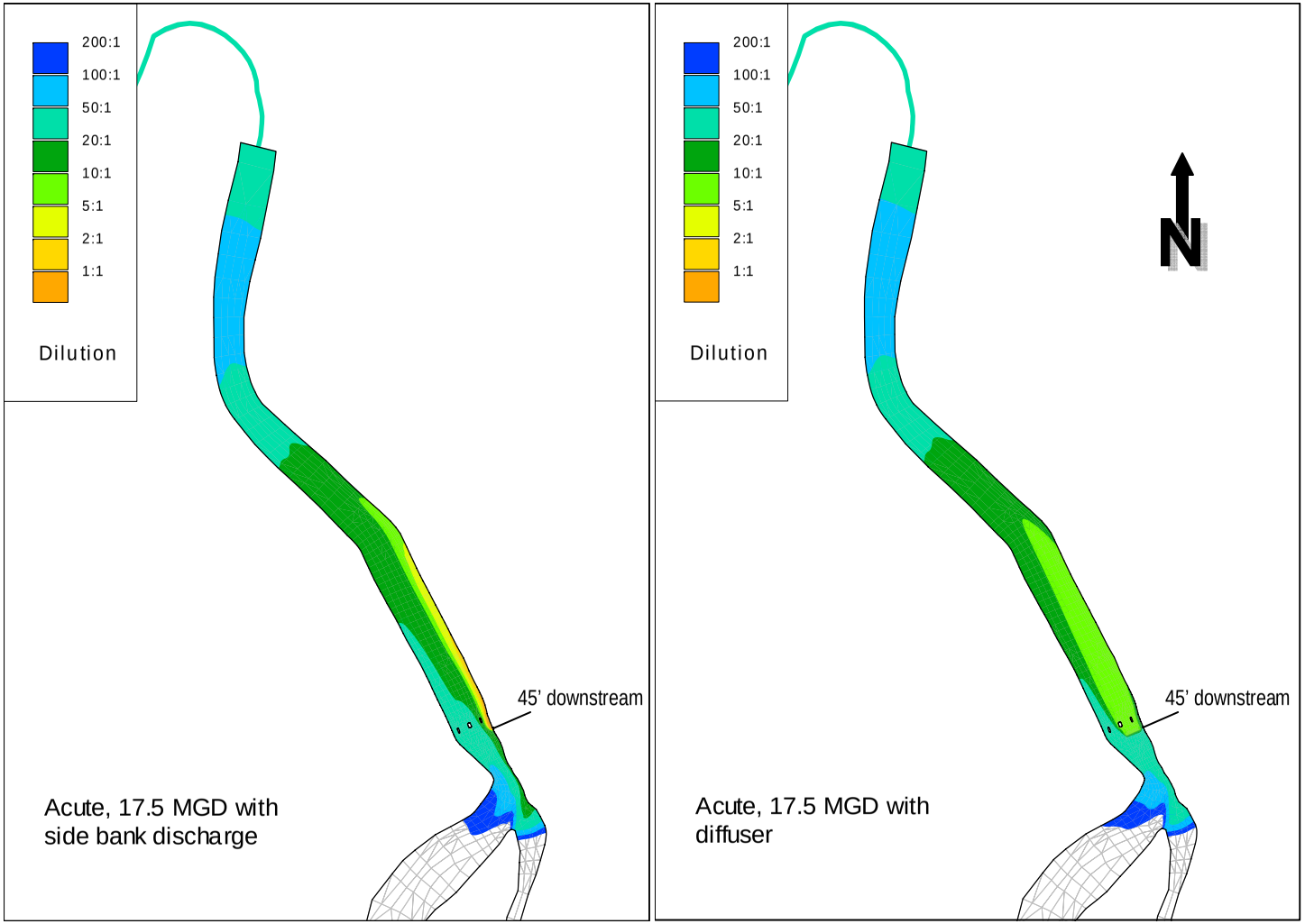

Figure 13 Dilution contours for Acute, 17.5 MGD simulation with side bank discharge and with diffuser.

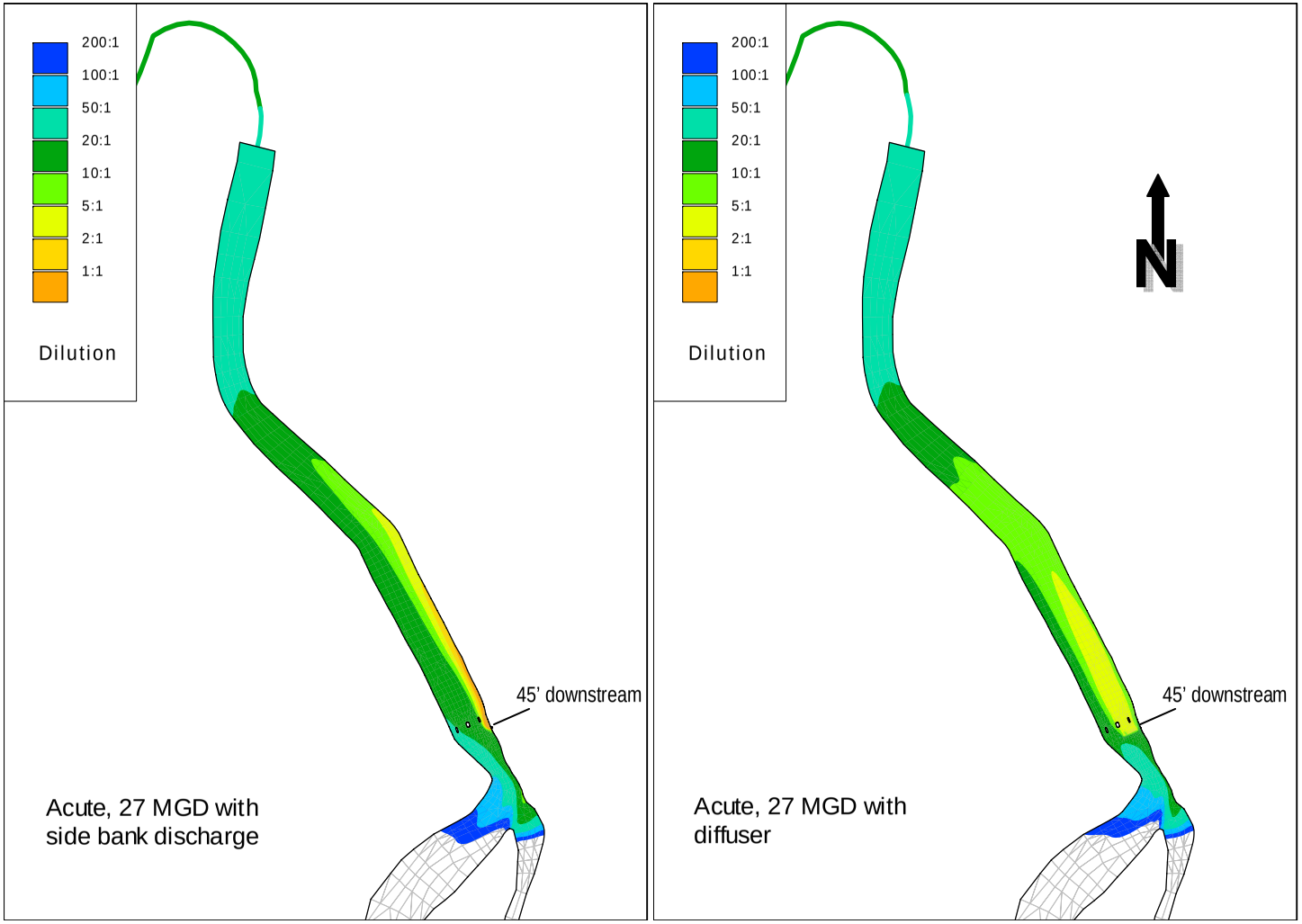

Figure 14 Dilution contours for Acute, 27 MGD simulation with side bank discharge and with diffuser.

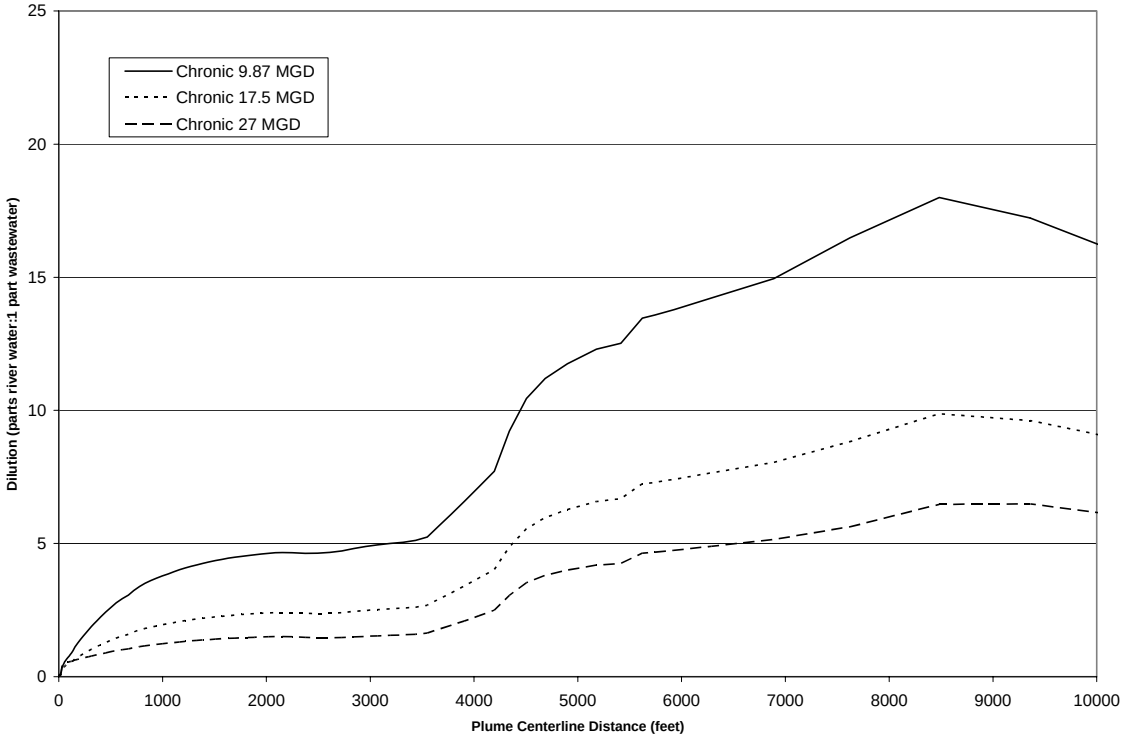

Figure 15 Tidally averaged plume centerline dilution profiles for Chronic simulations with side bank discharge.

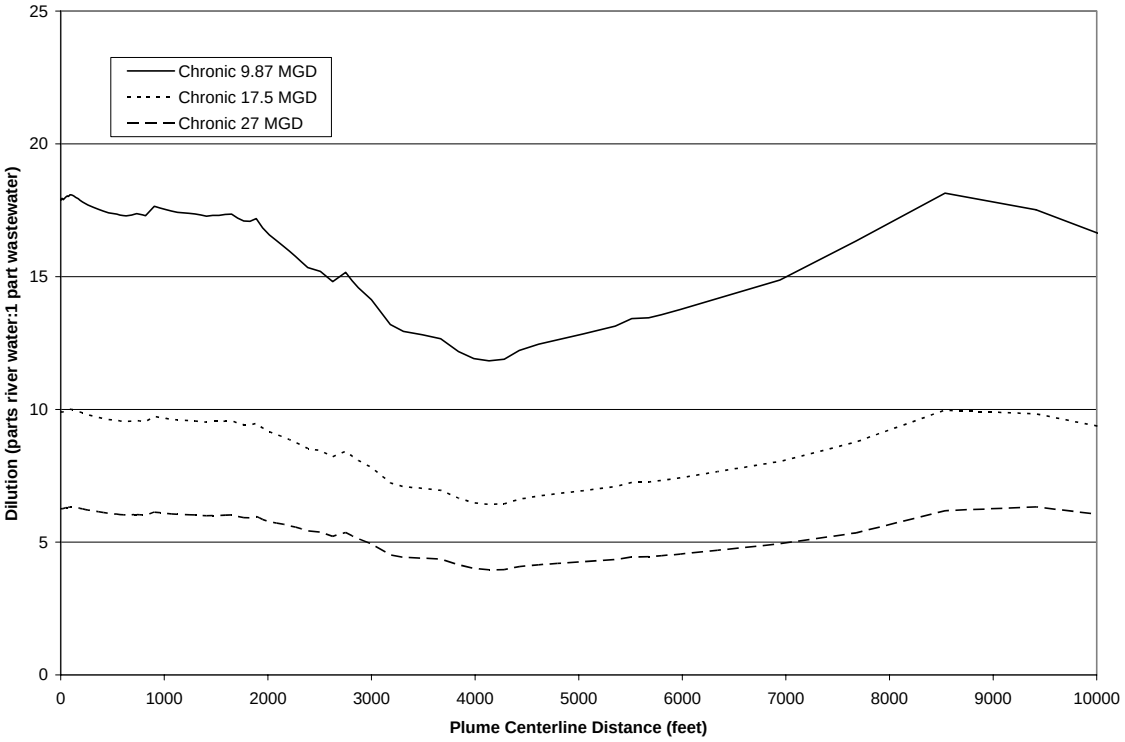

Figure 16 Tidally averaged plume centerline dilution profiles for Chronic simulations with diffuser.

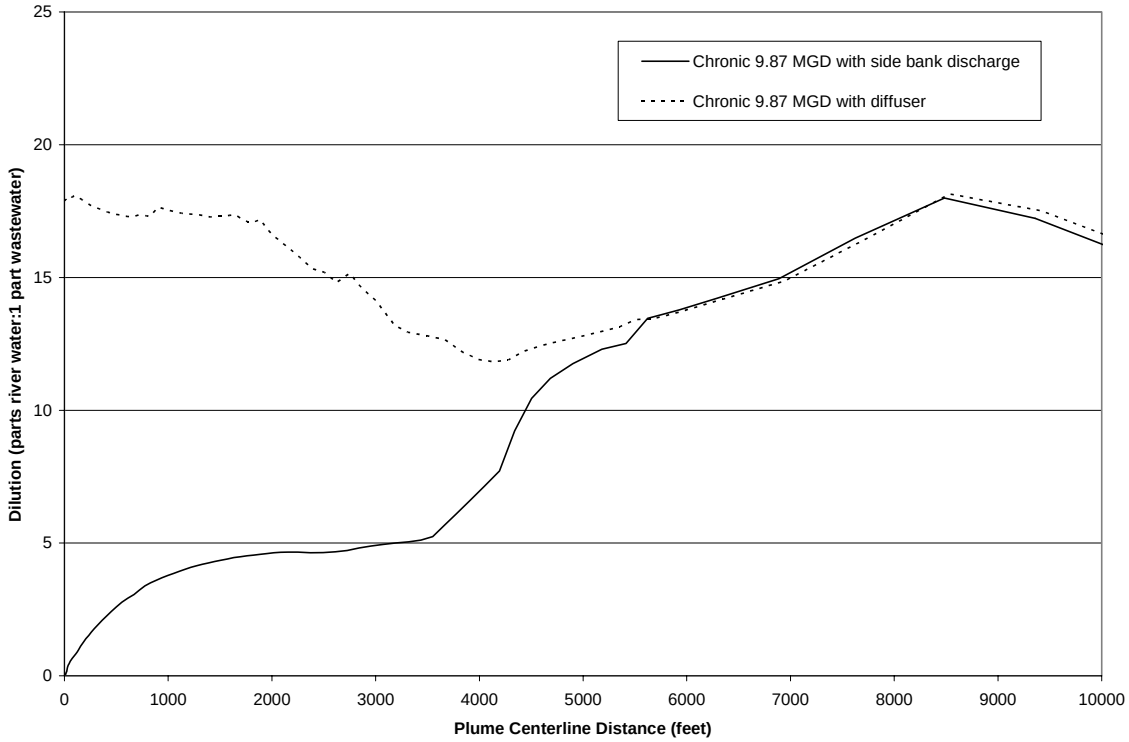

Figure 17 Tidally averaged plume centerline dilution profiles for Chronic 9.87 MGD simulations with side bank discharge and with diffuser.

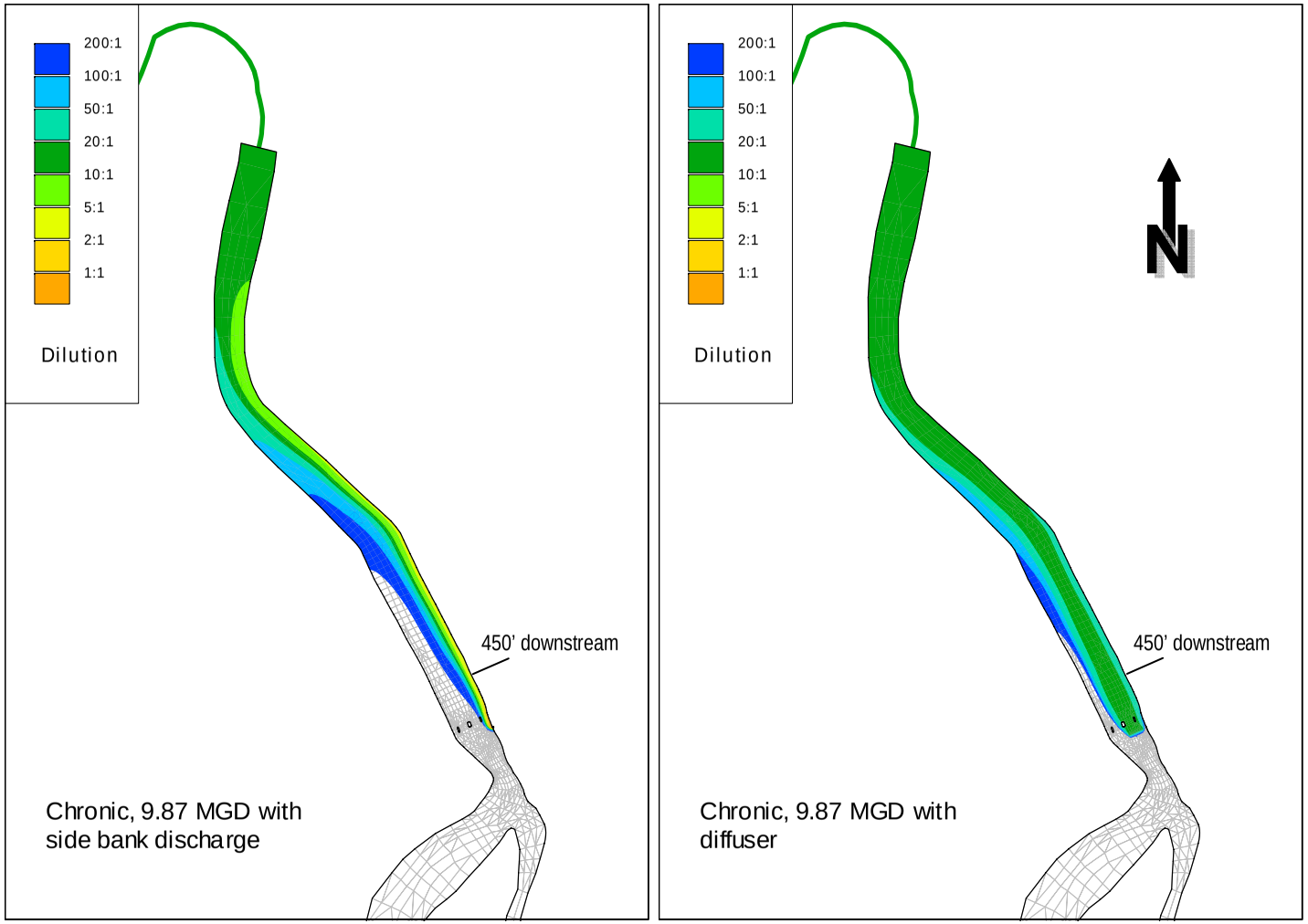

Figure 18 Dilution contours for Chronic, 9.87 MGD simulation with side bank discharge and with diffuser.

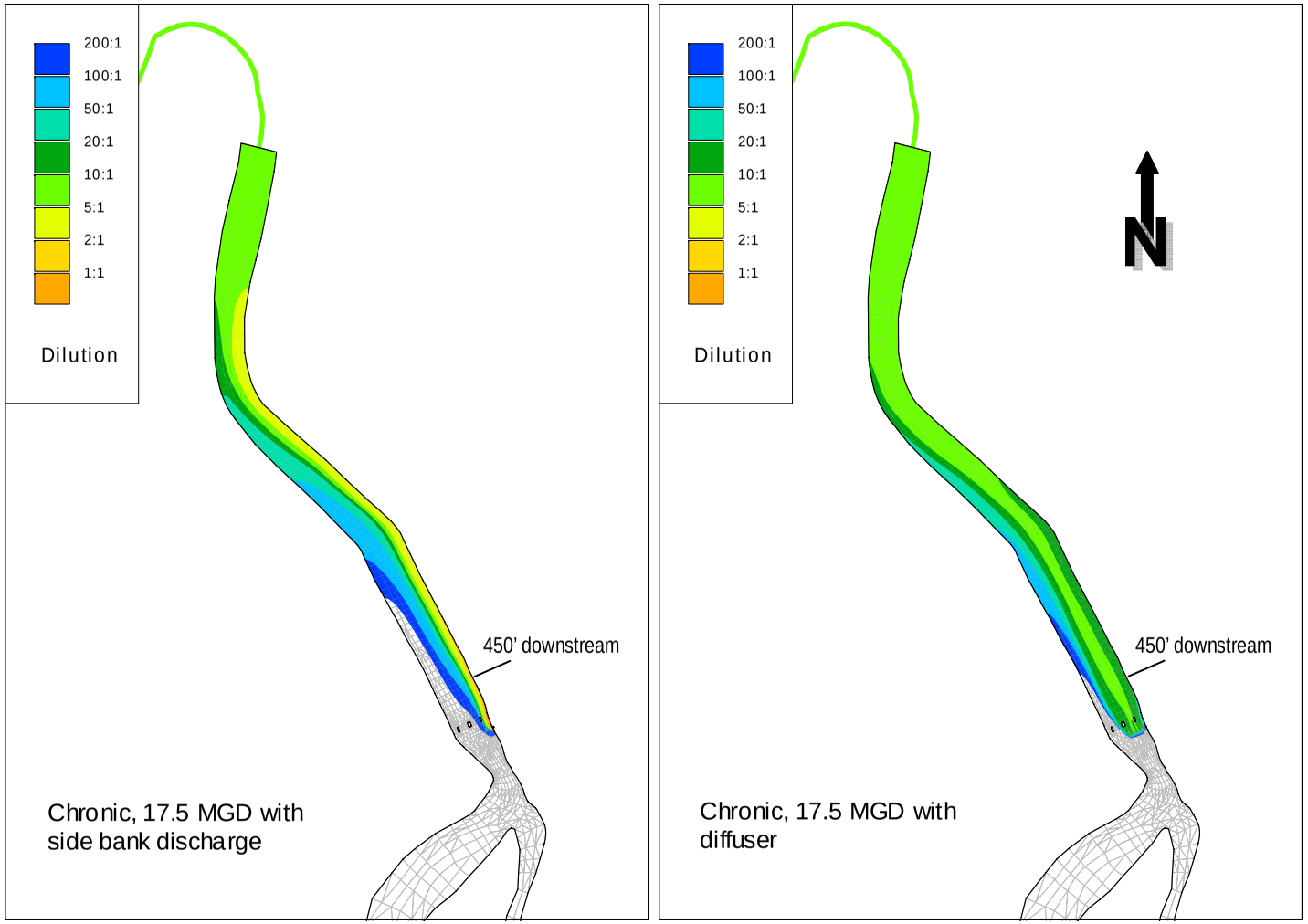

Figure 19 Dilution contours for Chronic, 17.5 MGD simulation with side bank discharge and with diffuser.

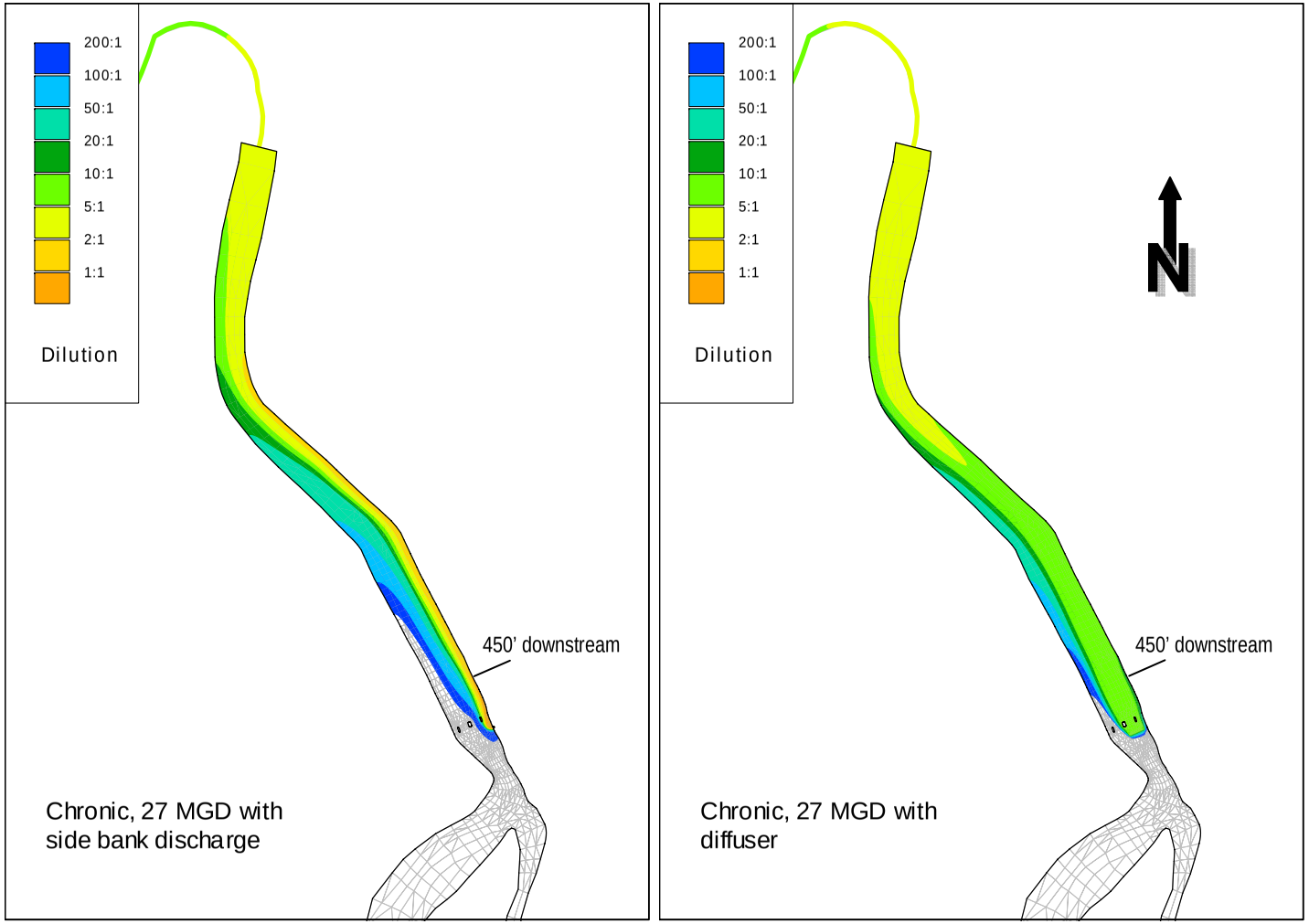

Figure 20 Dilution contours for Chronic, 27 MGD simulation with side bank discharge and with diffuser.

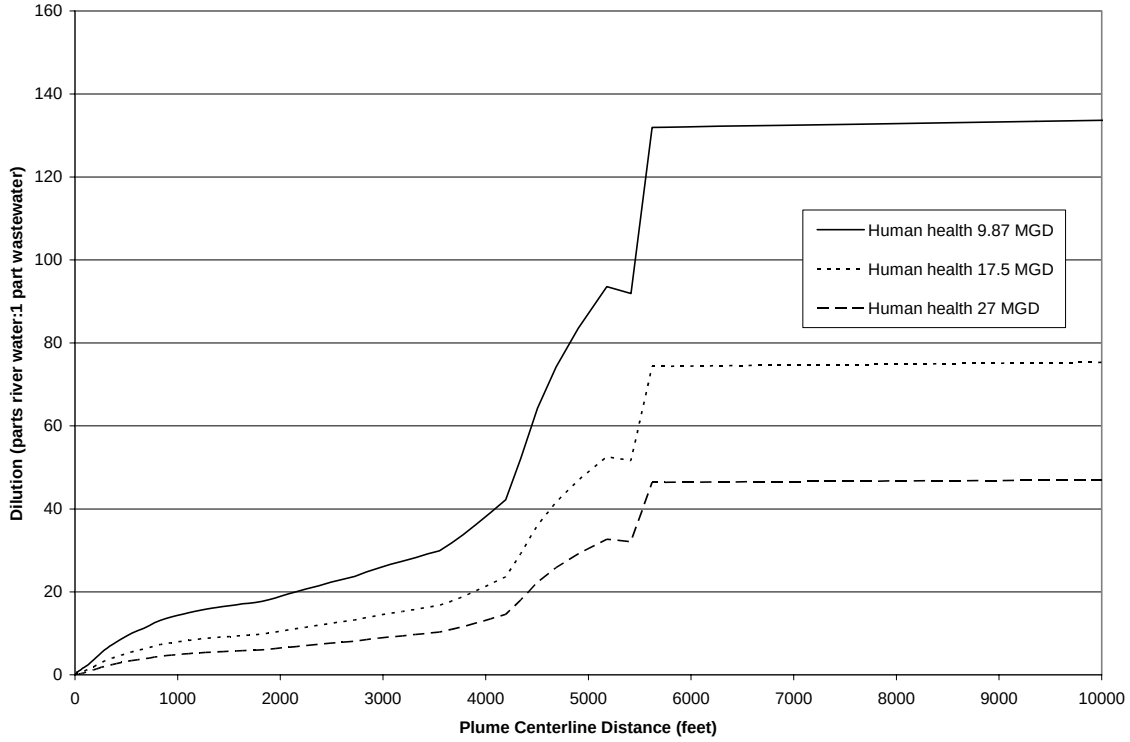

Figure 21 Plume centerline dilution profiles for Human Health simulations with side bank discharge.

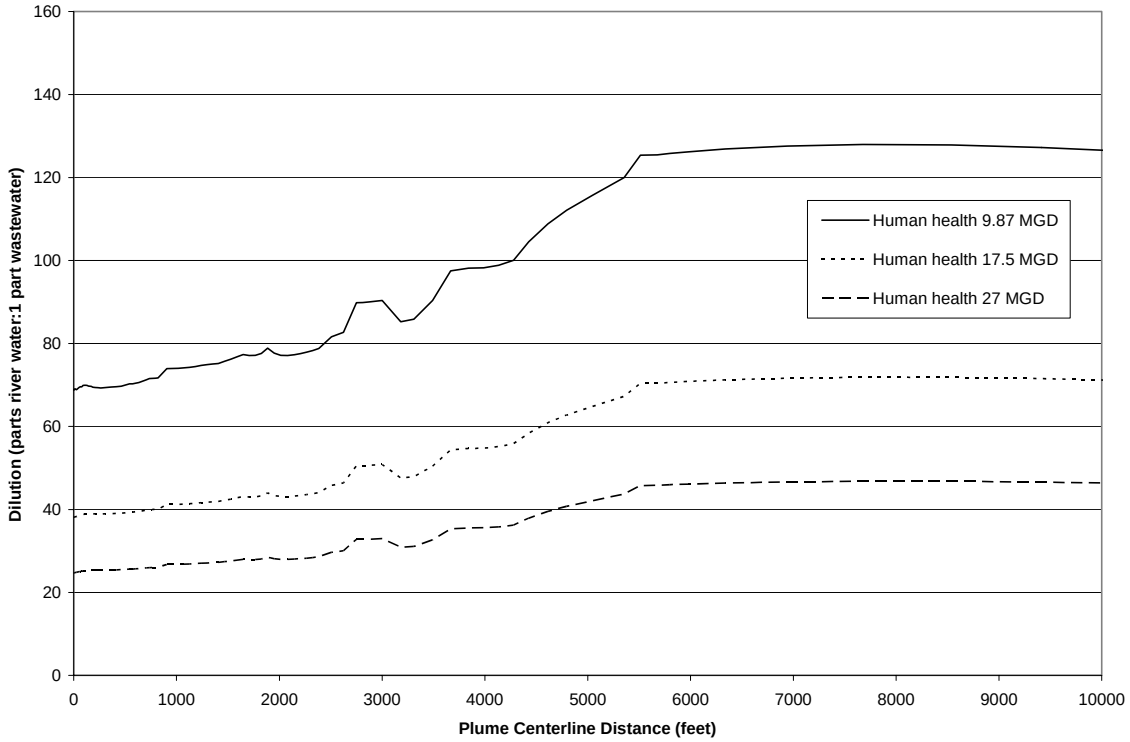

Figure 22 Plume centerline dilution profiles for Human Health simulations with diffuser.

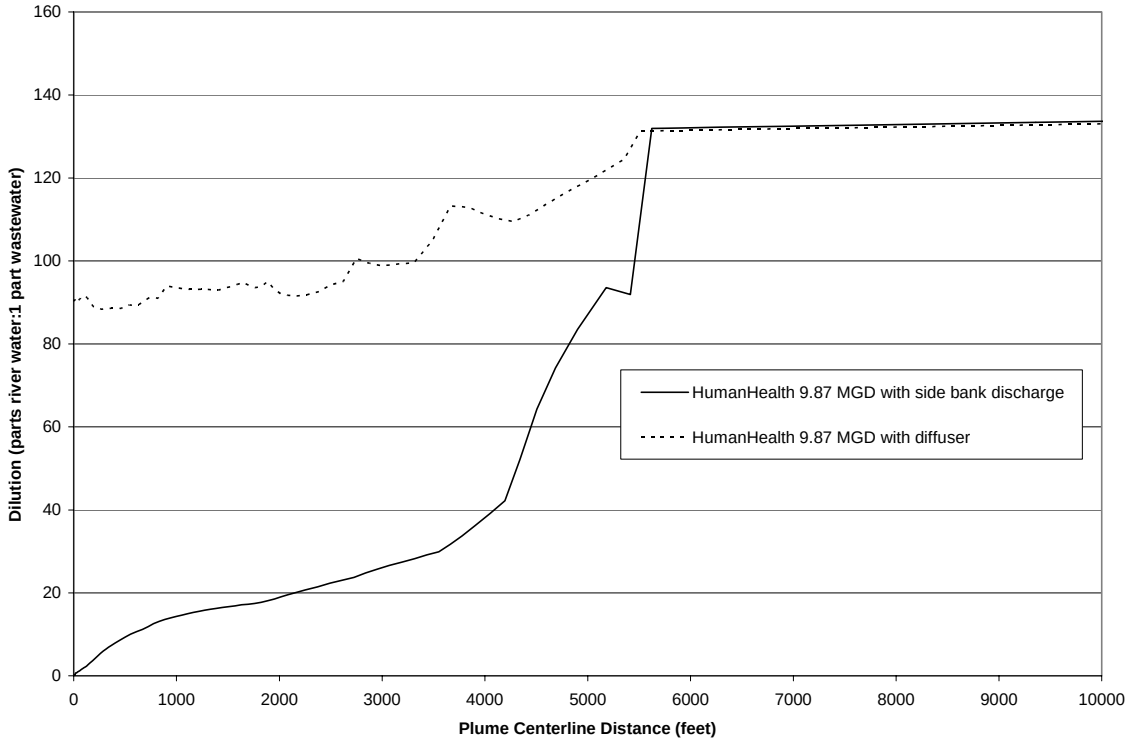

Figure 23 Plume centerline dilution profiles for Human Health 9.87 MGD simulations with side bank discharge and with diffuser at the time of lowest dilution for the side bank discharge scenario.

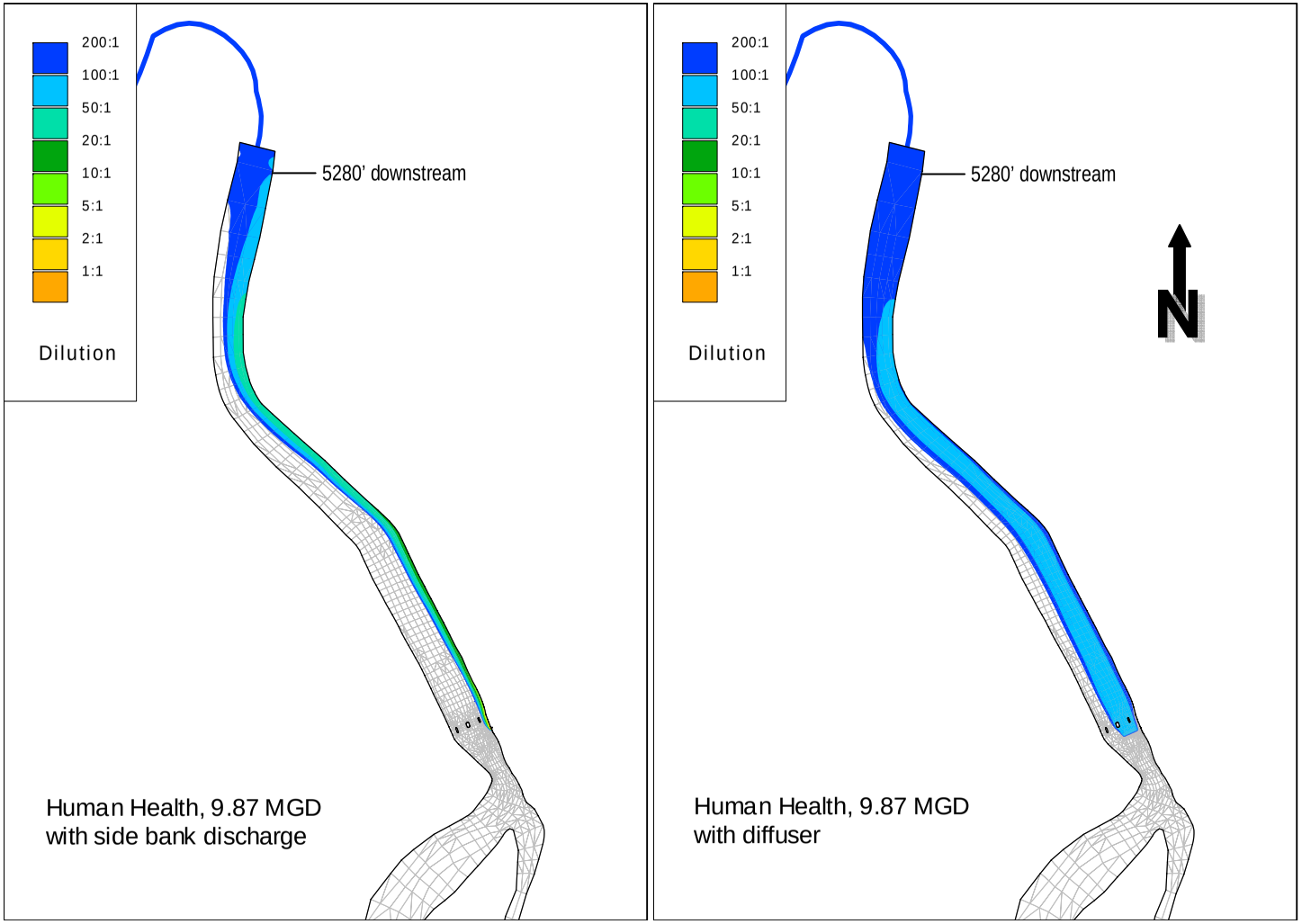

Figure 24 Dilution contours for Human Health, 9.87 MGD simulation with side bank discharge and with diffuser.

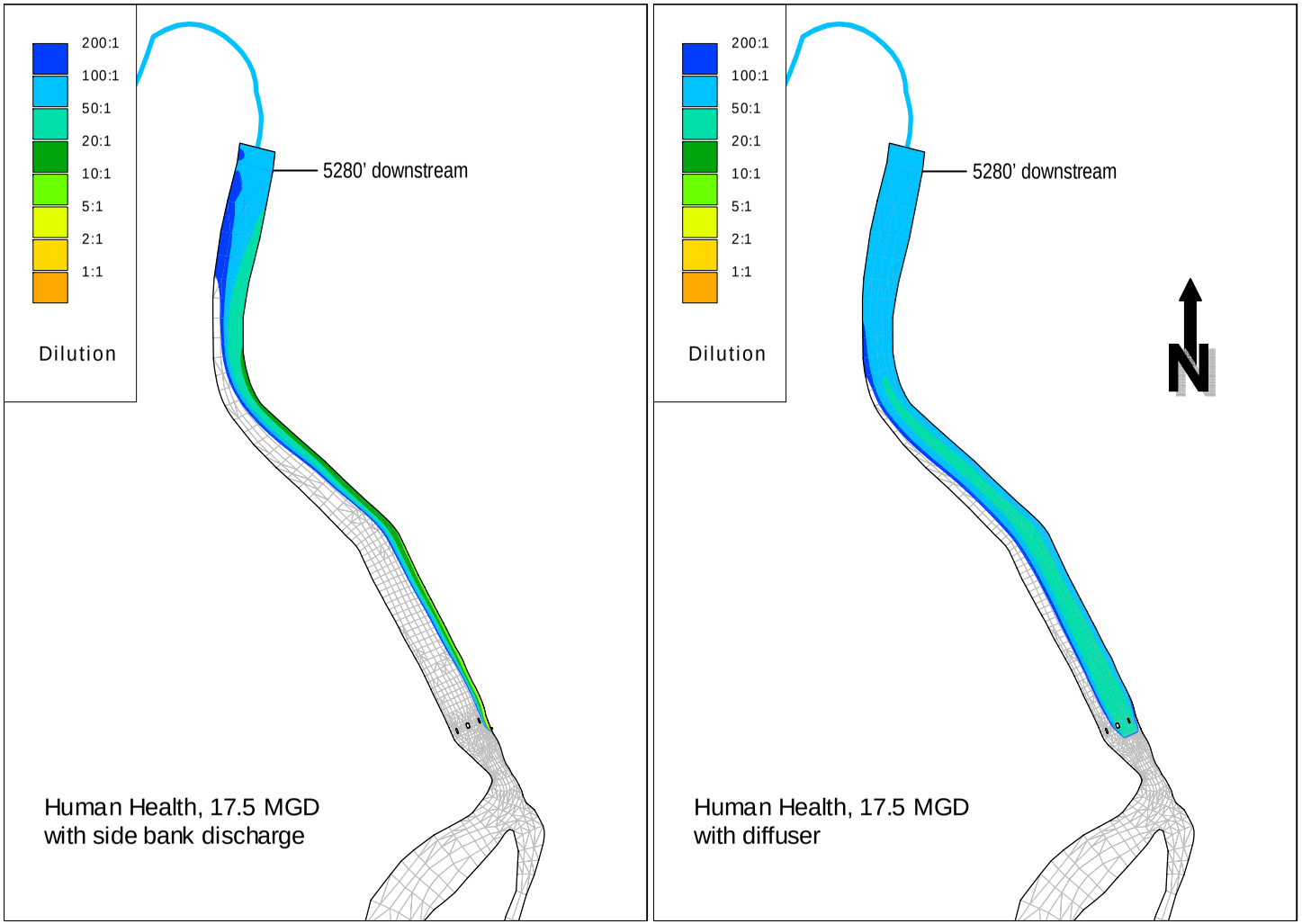

Figure 25 Dilution contours for Human Health, 17.5 MGD simulation with side bank discharge and with diffuser.

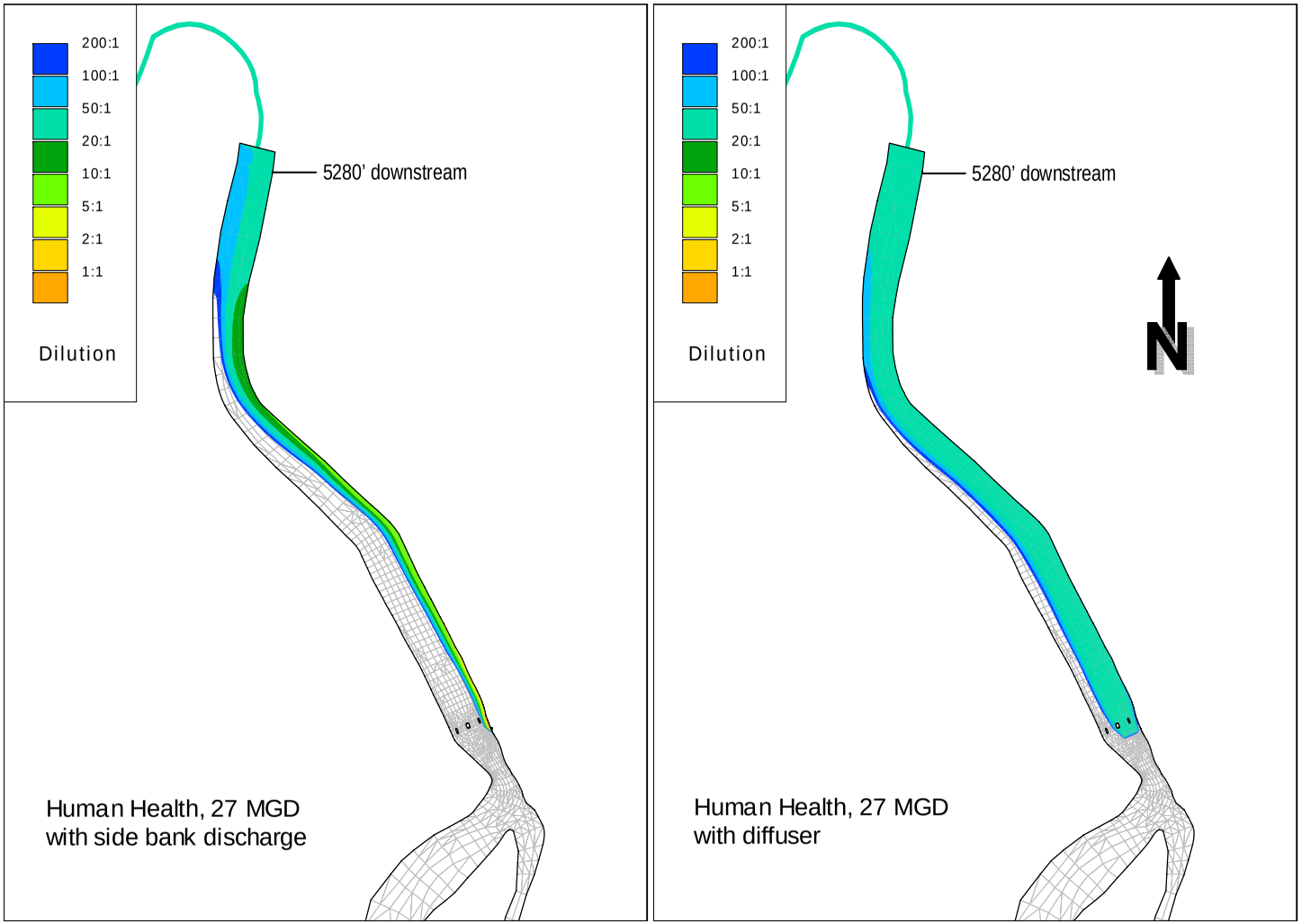

Figure 26 Dilution contours for Human Health, 27 MGD simulation with side bank discharge and with diffuser.

Thermal Modeling

The model used for the current study was used previously to simulate temperature for the *Thermal Plan Exception* study (LWA, 2006). The temperature simulations were performed using the 3-D version of the model with a side bank discharge.

Winter, Historical Low Flow Temperature Simulations

The winter low flow condition was simulated for the *Thermal Plan Exceptions* study to examine the critical condition for temperature impacts. The differential between the effluent and ambient temperature is the greatest and minimum river flow results in lower dilution of the effluent plume. For this period, the difference between Manteca effluent temperatures and ambient river temperatures was approximately 17º F.

The combination of low flow and strong spring tide for this simulation provide an opportunity to investigate the effects of recirculation.

December 2002 stage at the Lathrop CDEC station was applied to the downstream boundary. Temperature and EC at the downstream boundary were computed within the model. Temperature and EC from the Vernalis CDEC station for this period were applied at the upstream boundary. San Joaquin River flows averaging 900 cfs, representative of historical extreme low conditions, were applied at the upstream boundary. An intermittent Manteca daily discharge rate of 9.87 MGD with a temperature of 66 º F (based on analysis of valve pit temperatures) was used. Heat exchange was computed using heat budget parameters calibrated for this period.

Additional preliminary simulations were run with 28 MGD Manteca discharge. These simulations were not discussed in the *Thermal Plan Exception.*

Historical low flow simulations with zero Manteca discharge were also performed so that incremental temperature changes resulting from the discharge could be computed.

Typical model results are shown in Figure 28 through Figure 30 on December 6 at a time when the fraction of the channel cross section with temperature impacts of 1º F or more is at a peak. The first plot shows 3-D color contours of incremental temperature change. A plan view of surface temperature increments and profile cross sections at this time are shown in Figure 29 and Figure 30, respectively. For the time shown in these plots, the percent of the cross-sectional areas at each of these locations with temperature increments greater than 1º F are summarized in Table 2. The maximum area impacted is 22% at 1,000 ft downstream of the discharge.

Similar plots from the preliminary 28 MGD simulation are shown in Figure 31 through Figure 33 for December 3, 2002. For the time shown in these plots, the percent of the cross-sectional areas at each of these locations with temperature increments greater than 1º F are summarized in Table 2. The maximum area impacted is 51% at 1,500 ft downstream of the discharge.

Table 2 Summary of percent cross-sectional area elevated more than 1º F during the winter, historical low flow, intermittent discharge simulations.

Distance downstream of discharge (ft)	% cross-sectional area elevated more than 1º F	
	9.87 MGD on December 6	28 MGD on December 3
25	7	15
125	8	35
250	9	41
450	16	47
1,000	22	48
1,500	0	51

Temperature Differential Sensitivity Analysis

Sensitivity analysis simulations were performed for fall, historical low flow conditions to determine the amount of cooling of effluent temperatures that would be required to achieve less than 25% of the river cross-section elevated more than 1º F for the 27 MGD discharge rate with a side bank discharge.

For the fall historical low flow intermittent discharge sensitivity analysis simulations, October 2002 stage at the Old River at Head CDEC station was applied to the downstream boundary. Temperature and EC at the downstream boundary were computed within the model. Temperature and EC from the Vernalis CDEC station for this period were applied at the upstream boundary. San Joaquin River flows averaging 600 cfs, representative of historical extreme low conditions, were applied at the upstream boundary. An intermittent Manteca daily discharge rate of 27 MGD was used.

The Manteca discharge was assigned for different temperatures to determine the effluent temperature reduction that would be required to achieve less than 25% of the river cross-section elevated more than 1º F. The observed effluent temperature during this time is estimated to be 76º F based on analysis of valve pit temperatures. Heat exchange was computed using heat budget parameters calibrated for this period.

Table 3 shows peak cross-sectional area percentages elevated above 1º F for four different effluent temperatures. Results indicate that a reduction of approximately 11º F would be required to reduce the cross-sectional area impacted to less than 25%.

Table 3 Summary of peak cross-sectional area impacts resulting from four different discharge temperatures for fall, historical low flow, intermittent side bank discharge simulations.

Date	Background San Joaquin River temperature (º F)	Discharge temperature (º F)	Reduction from observed effluent temperature (º F)	Peak cross-sectional area impacted by 1º F or more
October 4	61	65	11	22.5%
October 4	61	66	10	29.7%
October 4	61	67	9	37.3%
October 4	61	68	8	41.3%
October 3	62	65	11	19.0%
October 3	62	66	10	28.2%
October 3	62	67	9	35.1%
October 3	62	68	8	39.7%

Diffuser

Temperature simulations were performed only with side bank discharge. Diffuser discharge was not examined.

The diffuser distributes effluent across a wider portion of the channel, but at higher dilution than the side bank discharge. The difference between the two discharge types is illustrated in Figure 27. This plot shows dilution across the channel width for side bank and diffuser discharge, 27 MGD Acute simulations at the time and location (800' downstream of diffuser) of minimum dilution for the diffuser case. Twenty-five percent of the channel cross-section with the minimum dilution is shown for each case. For the side bank discharge case, the lowest dilution is along the eastern bank, whereas for the diffuser, the lowest dilution is towards the middle of the channel.

We can evaluate the diffuser discharge based on the following.

- We have assumed that the diffuser will be designed such that the vertical effluent distribution is nearly uniform a short distance downstream from the diffuser.
- Acute dilution computed for the diffuser represents the minimum dilution (maximum impact).
- Minimum dilution occurs approximately 800' downstream of the diffuser for the Acute scenario, however travel time over 800' is short so that heat exchange is not a significant issue.

- The diffuser would likely extend over more than 50% of the cross section therefore, the 1° F over 25% of the cross section would apply. The centerline (minimum) dilution would be a good approximation for estimating the temperature over 25% of the cross section area (see Figure 27).
- Since complete mixing is the goal of the diffuser and there is no discharge at slack water, the 4° F surface increment would never be an issue.

For any discharge, the maximum allowable temperature differential between effluent temperature and background river temperature would equal the minimum Acute dilution +1 (to get to 1° F impact) as illustrated below.

An equation for concentration when temperature increment is 1° F, using minimum dilution: $\frac{D_{\min}(T_{River}) + T_{Effluent}}{D_{\min} + 1} = T_{River} + 1$

Therefore: $T_{Effluent} = T_{River} + D_{\min} + 1$

Using the minimum Acute dilutions presented in Figure 10, we estimate maximum temperature increment for 1° F impact over less than 25% of the river cross-section as shown in Table 4.

Table 4 Estimated maximum temperature increment to satisfy 1° F criterion with diffuser outfall.

Flow	Minimum dilution (parts river water per 1 part wastewater) for Acute case	Maximum temperature increment (° F) for 1° F impact over < 25% cross-section
9.87 MGD	11	12
17.5 MGD	7	8
27 MGD	4	5

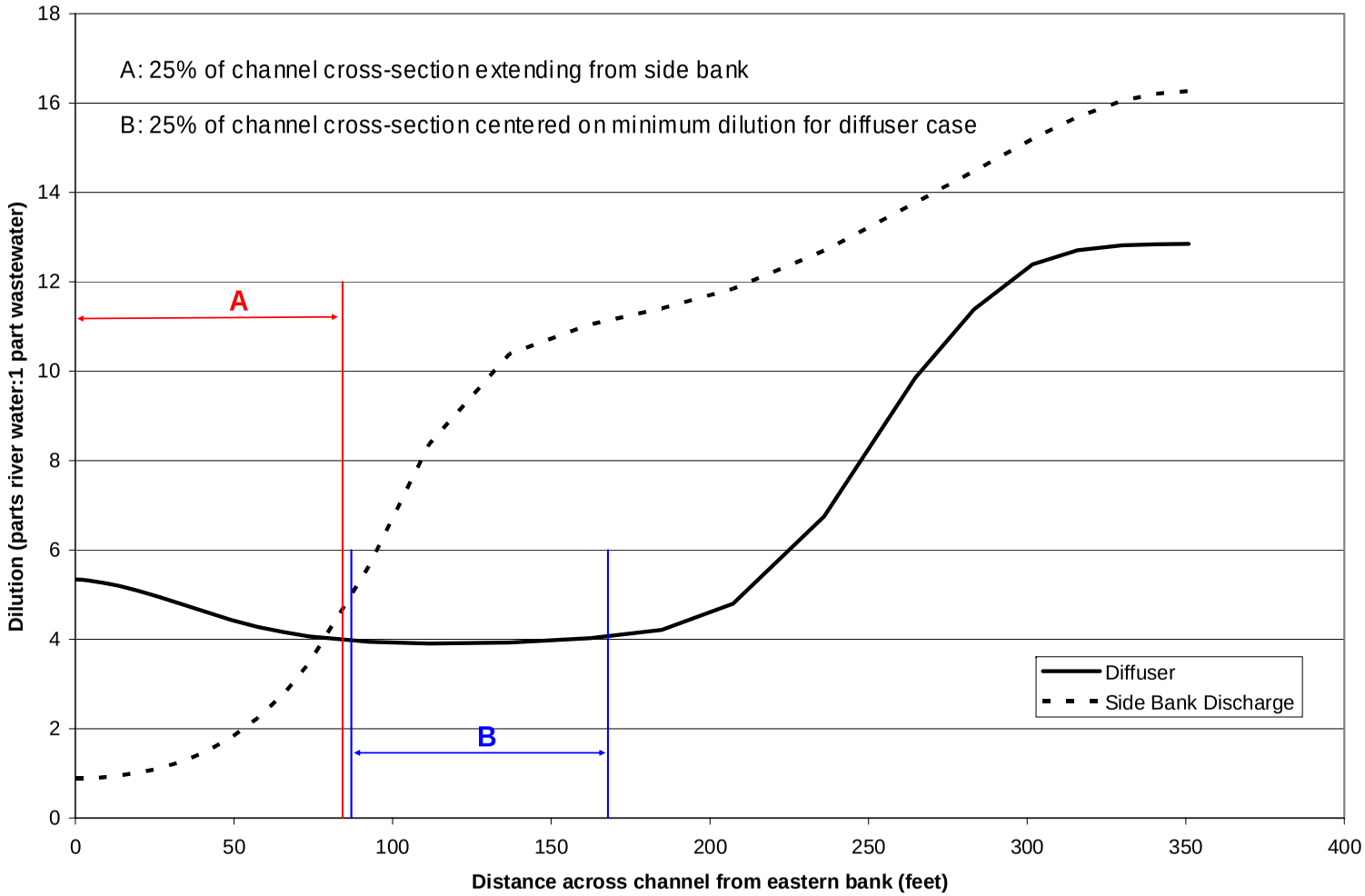

Figure 27 Comparison of dilution across the river channel for the diffuser and the side bank discharge with 27 MGD Manteca discharge and Acute river flow conditions. Plot is for time and location of minimum dilution diffuser case. Twenty-five percent of the channel cross-section at minimum dilution is noted for each discharge case.

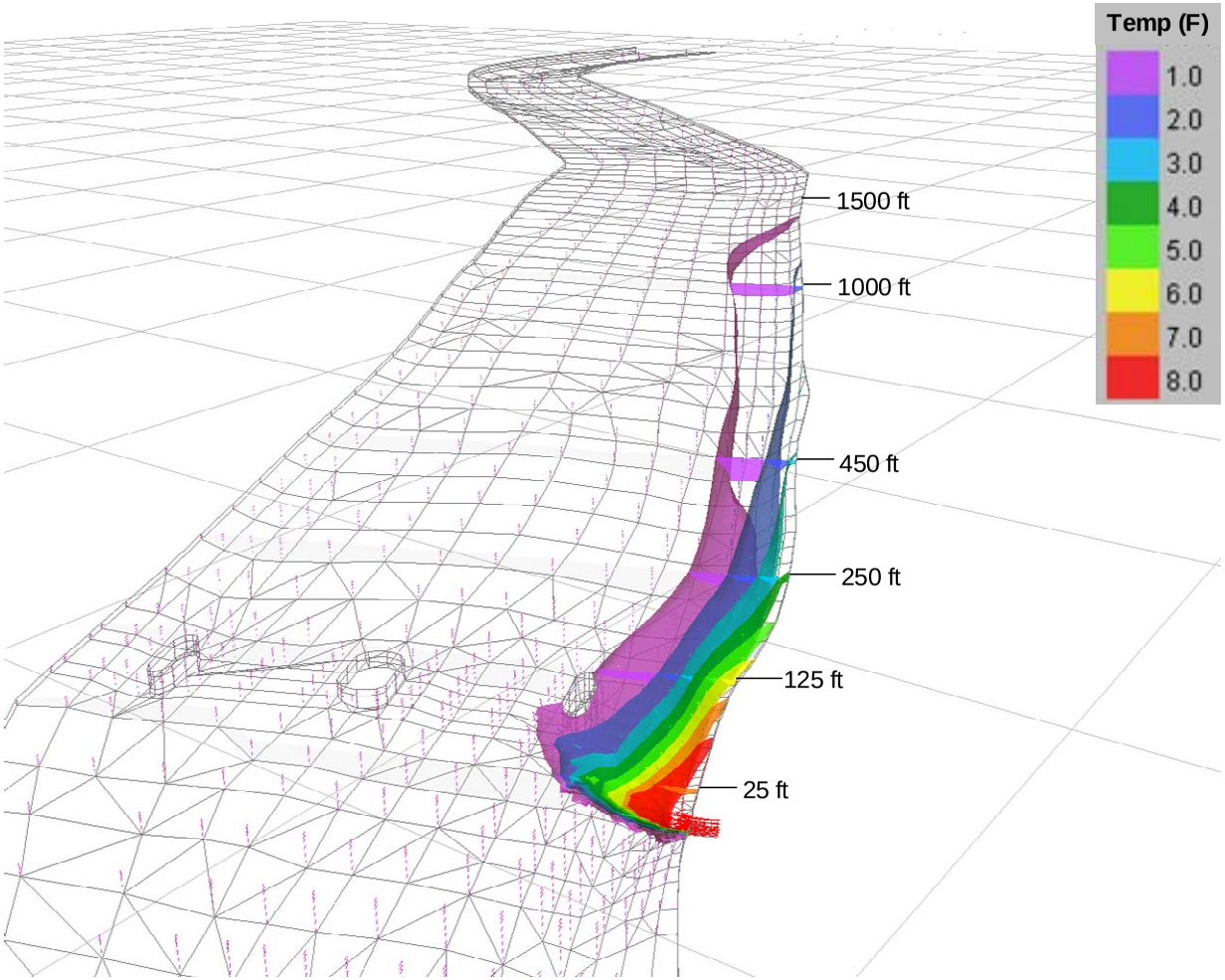

Figure 28 Contours of computed temperature increment on December 6, 2002 from the Thermal Plan Exception study winter historical low river flow (900 cfs), 9.87 MGD intermittent, side bank discharge simulation.

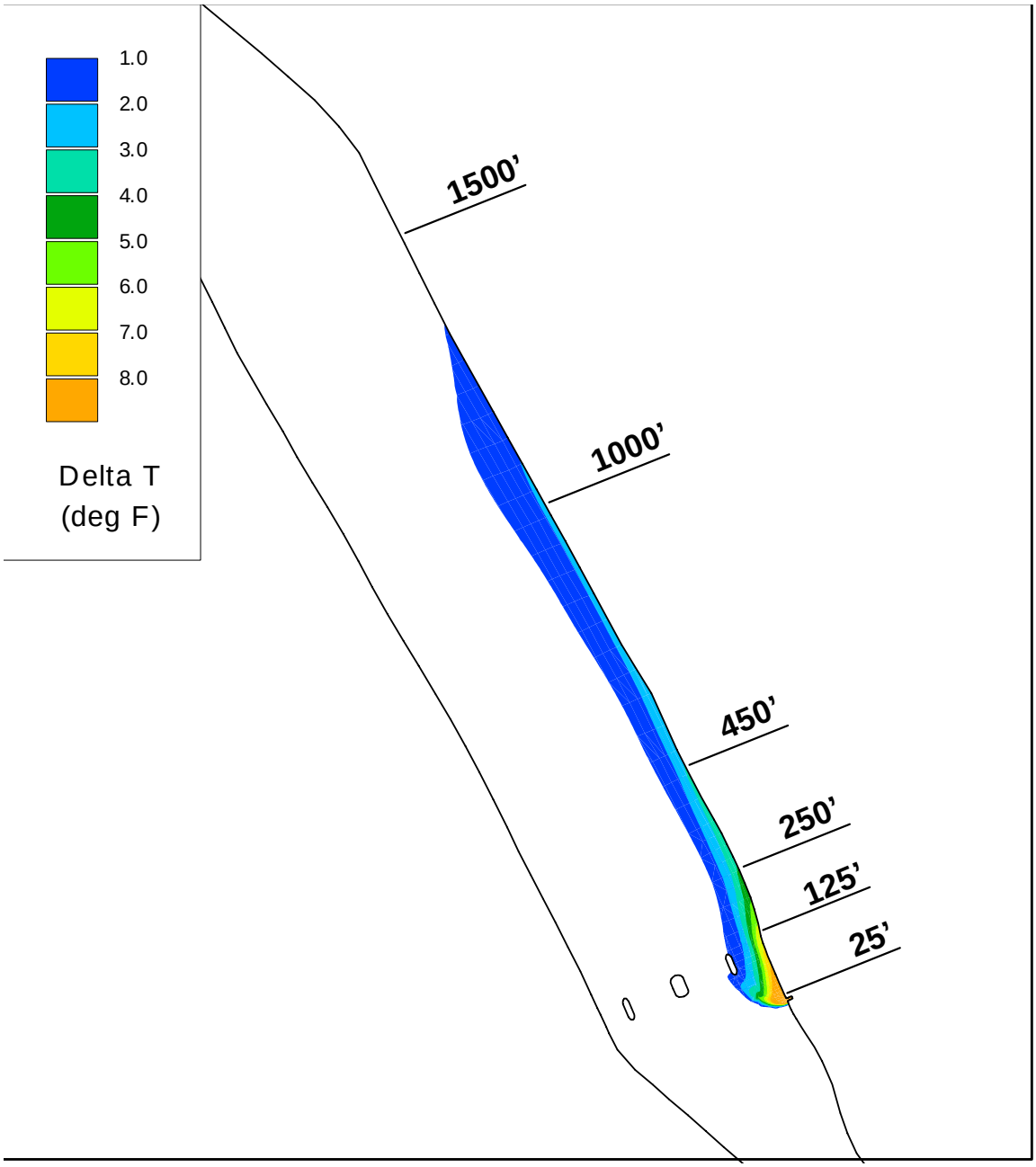

Figure 29 Contours of computed surface temperature increment on December 6, 2002 from the Thermal Plan Exception study winter historical low river flow (900 cfs), 9.87 MGD intermittent, side bank discharge simulation.

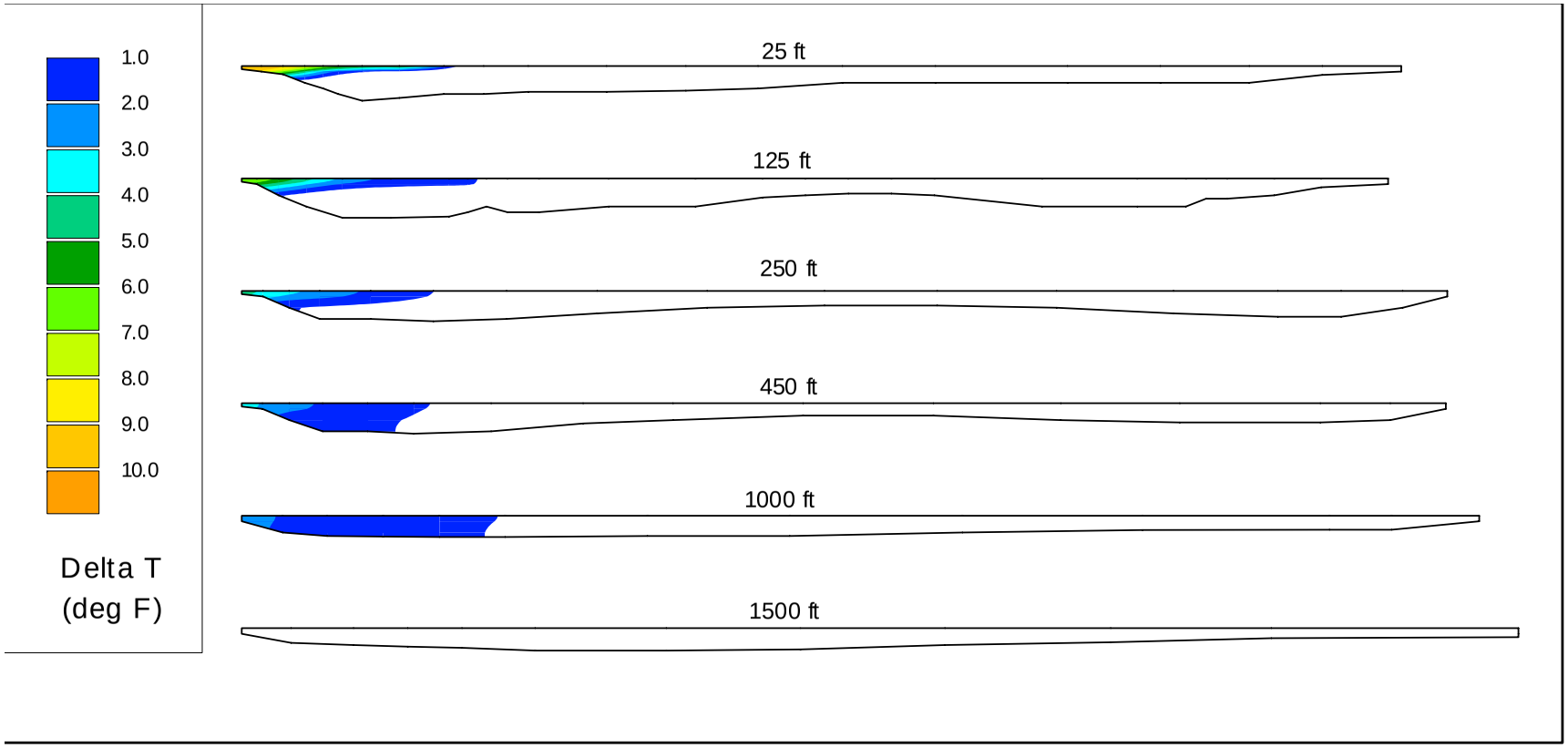

Figure 30 Cross sections of computed temperature increment on December 6, 2002 from the Thermal Plan Exception study winter historical low river flow (900 cfs), 9.87 MGD intermittent, side bank discharge simulation.

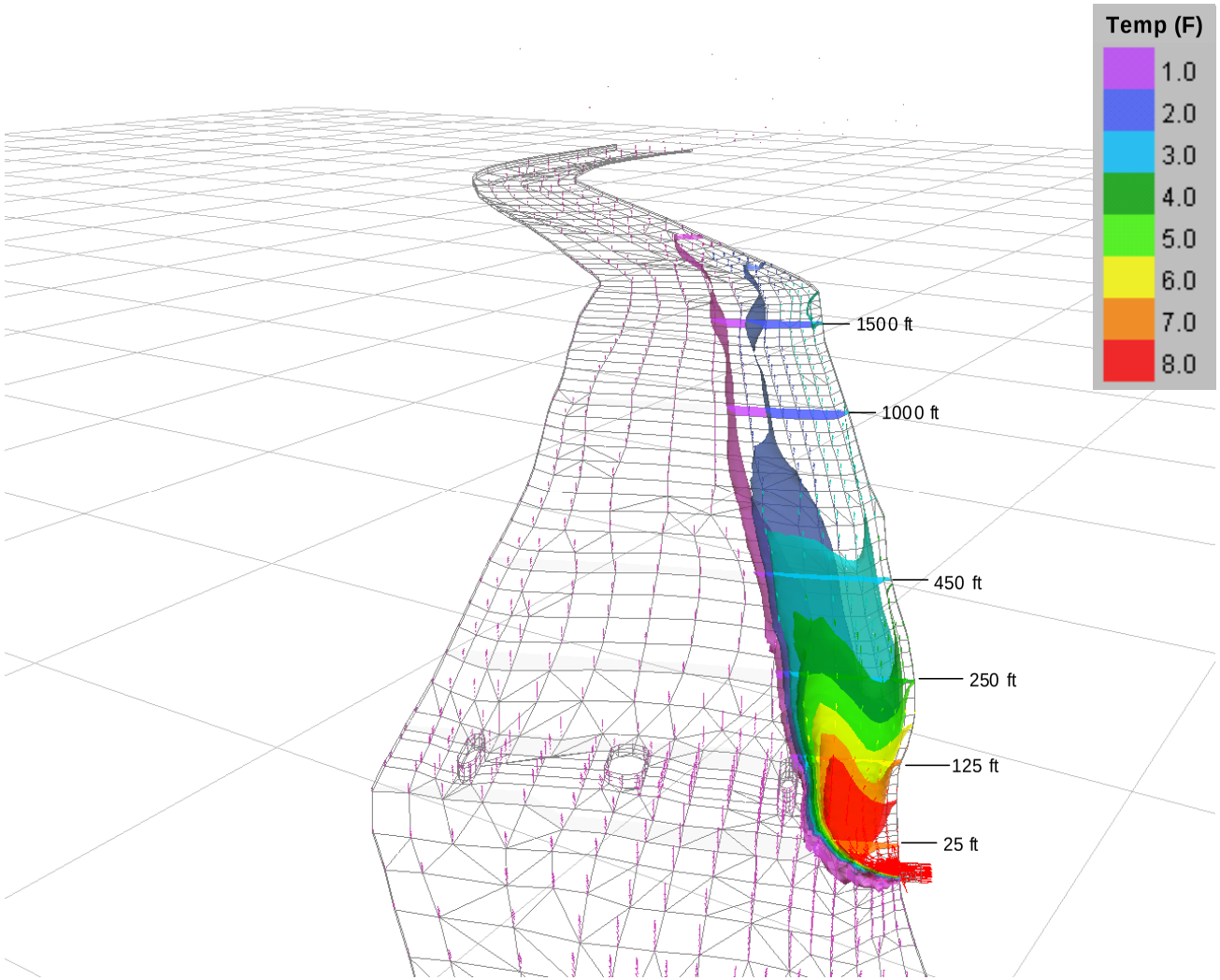

Figure 31 Contours of computed temperature increment on December 3, 2002 from preliminary winter historical low river flow (900 cfs), 28 MGD intermittent, side bank discharge simulation.

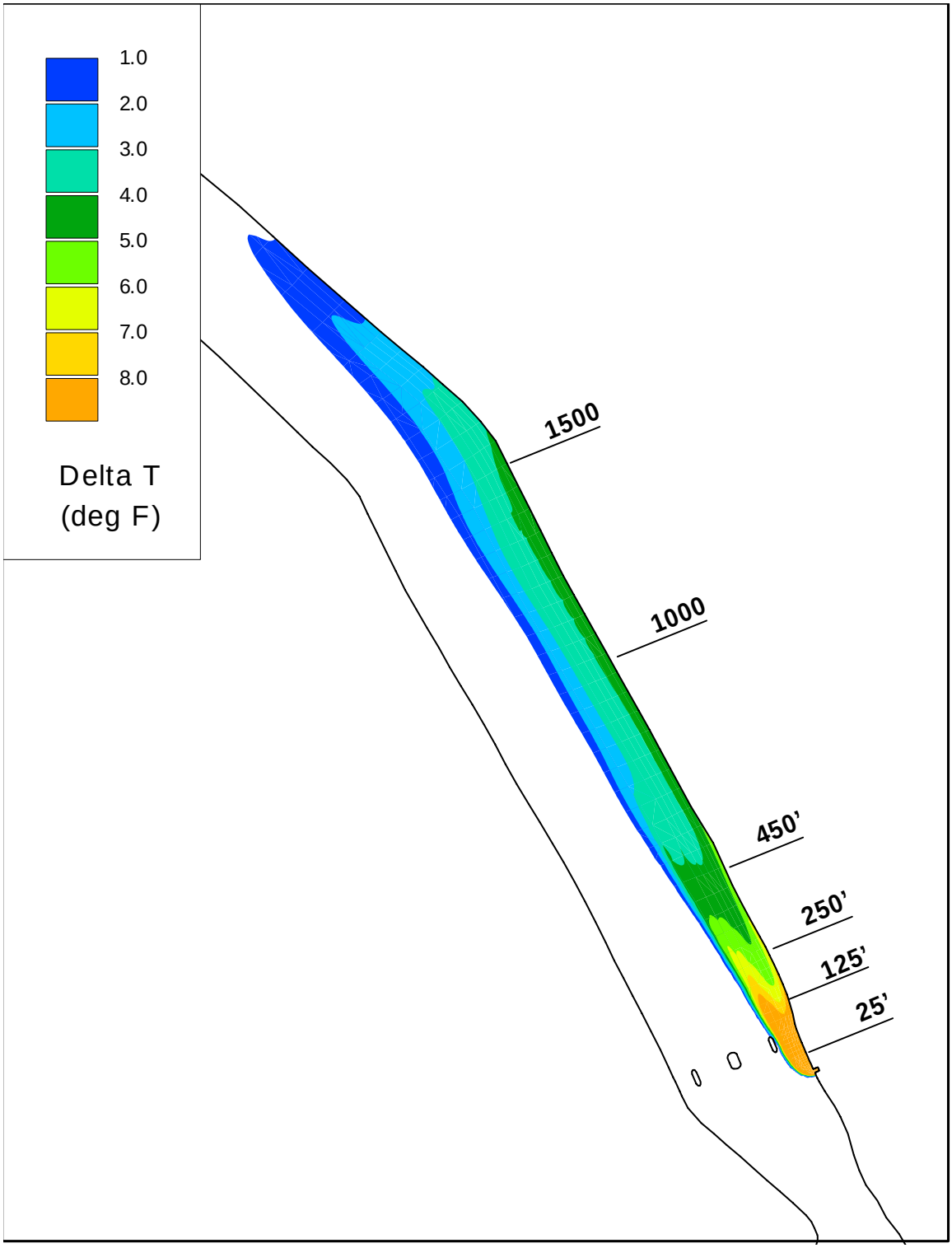

Figure 32 Contours of computed surface temperature increment on December 3, 2002 from preliminary winter historical low river flow (900 cfs), 28 MGD intermittent, side bank discharge simulation.

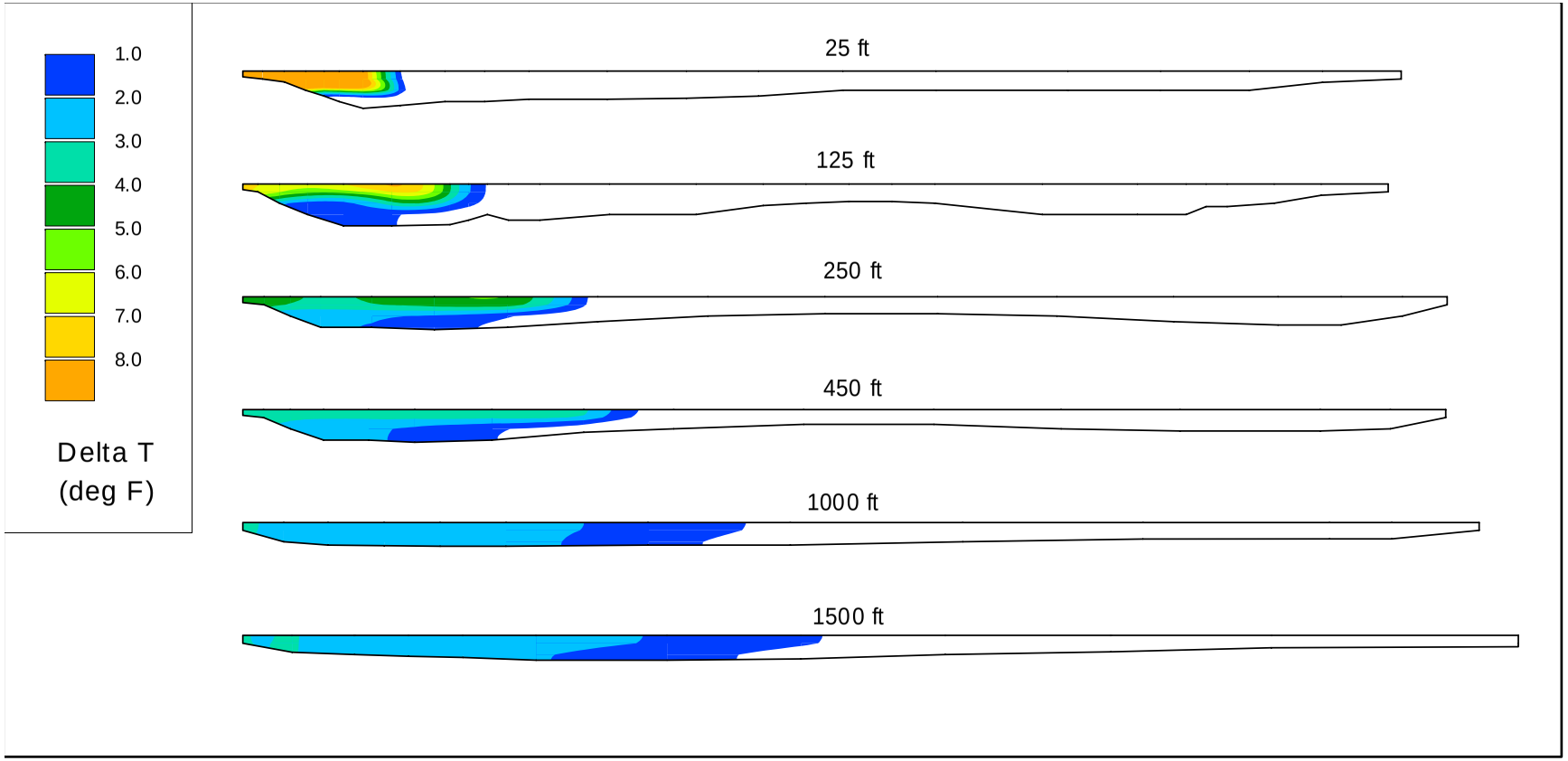

Figure 33 Cross sections of computed temperature increment on December 3, 2002 from preliminary winter historical low river flow (900 cfs), 28 MGD intermittent, side bank discharge simulation.

Far Field Dilution Analysis

Far field dilution analysis simulations were performed to investigate the incremental impact of Manteca effluent at various key locations in the Delta.

Two one-year periods were simulated: October 1991 through September 1992, a critically dry year, and January 2002 through December 2002, a normal dry year. For each simulation, a two month spin up period was simulated to develop a reasonable initial condition tracer concentration for the year long simulation.

Model Description

RMA's existing two-dimensional depth averaged model of the Sacramento-San Joaquin Delta was used for the Manteca far field dilution analysis simulations. This model has been developed, calibrated and refined during numerous modeling projects in the Bay – Delta system (RMA, 2005, 2004, 2002a, 2000, 2000a, 1998, 1997). The RMA staff has successfully applied these models in previous studies to evaluate the incremental water quality responses of treated wastewater discharges to San Francisco Bay and the Delta (RMA, 2004, 2002, 2002a, 2001, 2001a, 2000, 1998, 1997, 1997a, 1996).

The model extends from Martinez at the downstream end, up the Sacramento River to the American River confluence, and up the San Joaquin River to Vernalis. The finite element mesh is shown in Figure 34.

Boundary conditions for the model include historical 15-minute tide at Martinez, historical daily inflows for the Sacramento River, San Joaquin River, Cosumnes River, Mokelumne River, Yolo Bypass and Miscellaneous east side flows (includes Calaveras River, French Camp Slough and others), historical daily average exports at the Delta Mendota Canal, Contra Costa at Old River (2002 only), Contra Costa at Rock Slough and North Bay Aqueduct, historical hourly exports at Clifton Court, and estimated historical monthly average Delta Islands consumptive use inflows and withdrawals. Sacramento and San Joaquin River flows for the two simulation periods are shown in Figure 35 Figure 36.

Historical operations of operable gates and temporary barriers were included in the model as well.

For each of the simulation years, average daily treatment plant discharge rates of 9.87 MGD, 17.5 MGD and 27 MGD were simulated.

During the majority of the 1991-1992 simulation and much of the 2002 simulation, timed treatment plant discharge is required. The following points summarize the method used to determine the times to start and stop the discharge.

- When, under an ebb (falling) tide, San Joaquin River flow at Mossdale Bridge exceeds 800 cfs in the downstream direction, discharge from the outfall restarts.
- If the approaching flood (rising) tide encompasses a slack tide or flow reversal (San Joaquin River flow less than 400 cfs in the downstream direction), then the discharge stops at least 30 minutes before the minimum low tide.

- When the approaching flood tide does not include a period with less than 400 cfs downstream river flow, then the discharge is stopped when the downstream flow at the Mossdale Bridge station drops below 1,200 cfs.

Using this method, the hours per day during which discharge was allowed were summed and the respective instantaneous discharge rates for the 9.87 MGD, 17.5 MGD and 27 MGD were determined. For example, if discharge were allowed for 12 hours during a day, the instantaneous discharge rate during those 12 hours would be 19.74 MGD or 30.5 cfs under the 9.87 MGD discharge scenario.

The treatment plant discharge was tagged with a tracer concentration of 100 so that percent effluent could be computed. All other boundary concentrations were set to zero.

Model results are analyzed for six locations shown in Figure 37.

1991 - 1992 Simulation Results

Tidally averaged effluent concentrations for the 1991 -1992 simulations with 9.87 MGD, 17.5 MGD and 27 MGD Manteca discharge rates are plotted for six key locations in Figure 38 through Figure 43. August – September 1991 was simulated for model spin up, but results for this period are not shown.

In Figure 38, at the Clifton Court intake, peak effluent concentrations occur during mid-December and mid-February. The lowest concentrations occur in early April. The effluent concentration for the 9.87 MGD case ranges from near zero to 1%. For the 17.5 MGD case, effluent concentration ranges near zero to 1.7%, and for the 27 MGD case, it ranges from 0.1% to 2.7%.

In Figure 39, at the Delta Mendota Canal intake at Lindemann Road, peak effluent concentrations occur during mid-December and mid-February. The lowest concentrations occur in early May. The effluent concentration for the 9.87 MGD case ranges from less than 0.1% to 1.1%. For the 17.5 MGD case, effluent concentration ranges from 0.1% to 1.9%, and for the 27 MGD case, it ranges from 0.1% to 3%.

In Figure 40, at the Contra Costa intake in Rock Slough, peak effluent concentrations occur during mid-December. The lowest concentrations occur in mid-April. The effluent concentration for the 9.87 MGD case ranges from near zero to 0.2%. For the 17.5 MGD case, effluent concentration ranges near zero to 0.3%, and for the 27 MGD case, it ranges from near zero to 0.5%.

In Figure 41, at the Contra Costa intake in Old River, peak effluent concentrations occur during mid-December and mid-February. The lowest concentrations occur in early April. The effluent concentration for the 9.87 MGD case ranges from near zero to 0.3%. For the 17.5 MGD case, effluent concentration ranges near zero to 0.5%, and for the 27 MGD case, it ranges from near zero to 0.8%.

In Figure 42, at San Joaquin River at Light 18, peak effluent concentrations occur during early November. The lowest concentrations occur in early April. The effluent concentration for the 9.87 MGD case ranges from near zero to 0.9%. For the 17.5 MGD case, effluent concentration ranges from near zero to 1.6%, and for the 27 MGD case, it ranges from less than 0.1% to 2.4%.

In Figure 43, at the Stockton Turning Basin, peak effluent concentrations occur at the end of September. The lowest concentrations occur in early April. The effluent concentration for the 9.87 MGD case ranges from 0.2% to 2.1%. For the 17.5 MGD case, effluent concentration ranges from 0.3% to 3.7%, and for the 27 MGD case, it ranges from 0.5% to 5.7%.

Results are summarized in Table 5.

Table 5 Summary of minimum and maximum effluent concentrations for 1991-1992 simulations.

Location	**Minimum effluent concentration**			**Maximum effluent concentration**		
	9.87 MGD	**17.5 MGD**	**27 MGD**	**9.87 MGD**	**17.5 MGD**	**27 MGD**
Clifton Court intake	<0.1%	<0.1%	0.1%	1%	1.7%	2.7%
DMC intake	<0.1%	0.1%	0.1%	1.1%	1.9%	3.0%
CC intake at Rock Slough	<0.1%	<0.1%	<0.1%	0.2%	0.3%	0.5%
CC intake on Old River	<0.1%	<0.1%	<0.1%	0.3%	0.5%	0.8%
San Joaquin R. at Light 18	<0.1%	<0.1%	<0.1%	0.9%	1.6%	2.4%
Stockton Turning Basin	0.2%	0.3%	0.5%	2.1%	3.7%	5.7%

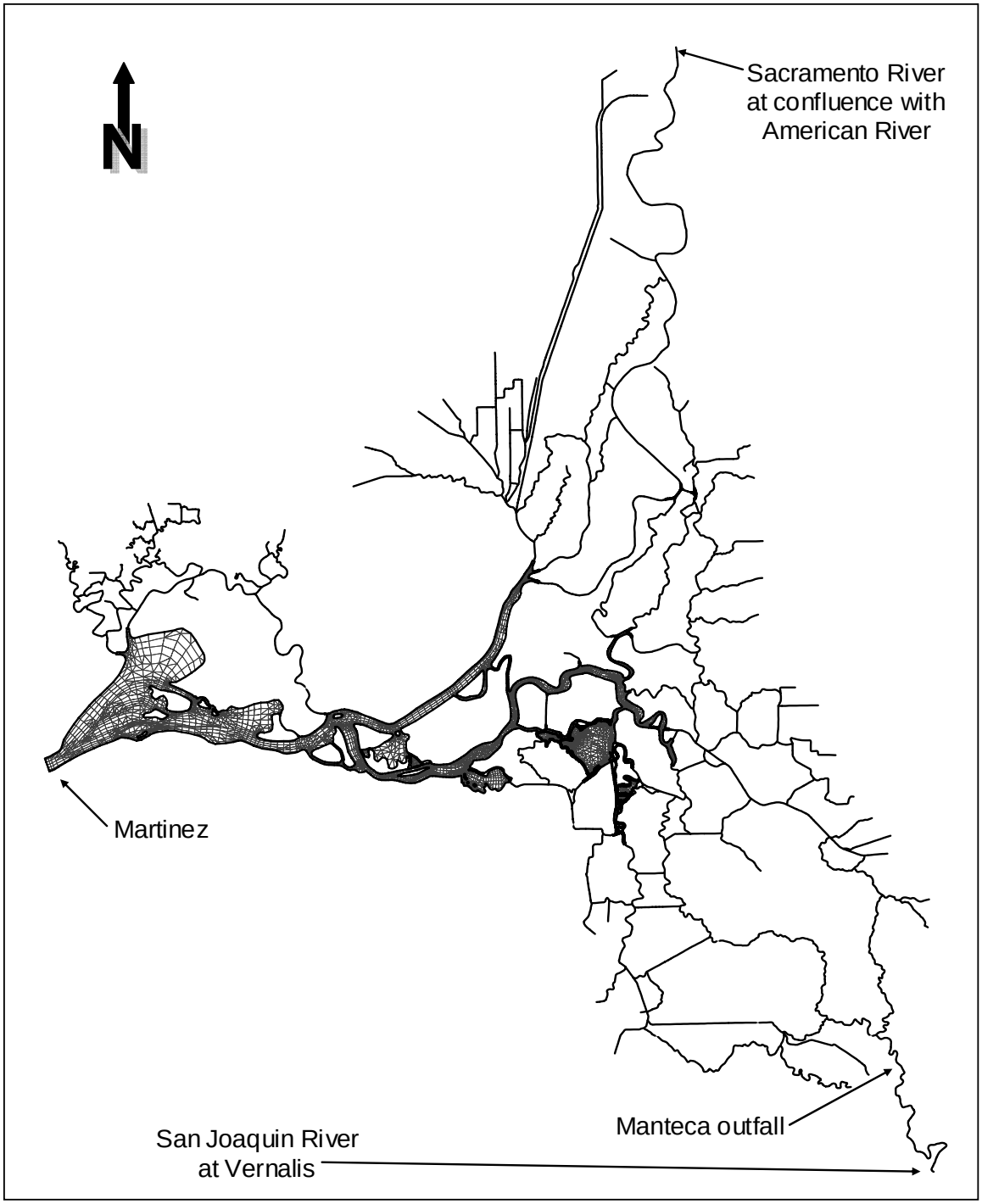

Figure 34 Finite element mesh for far field simulations.

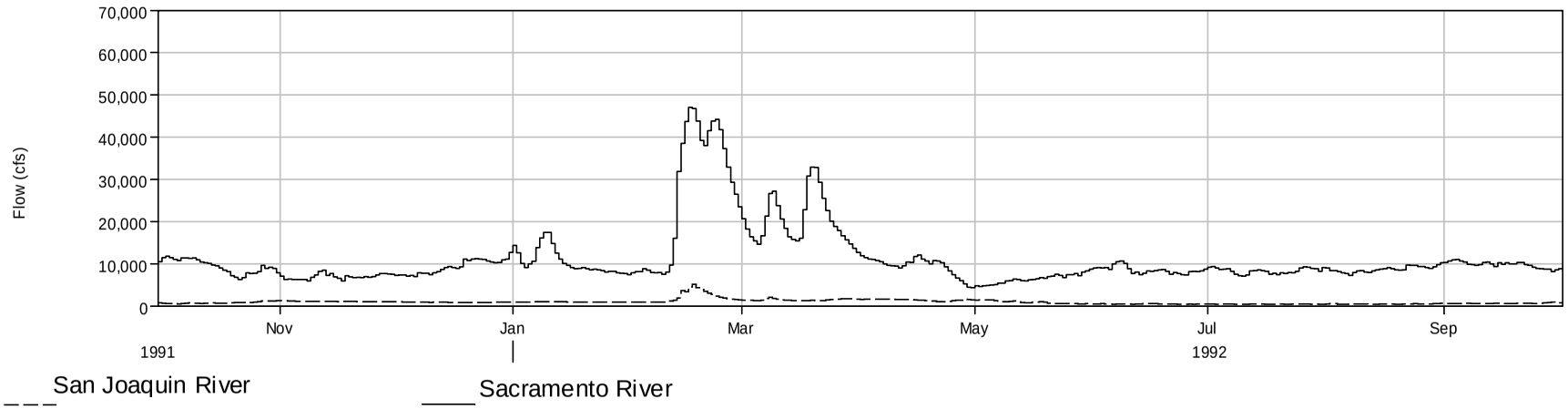

Figure 35 Sacramento and San Joaquin River flows during the 1991 - 1992 simulation period.

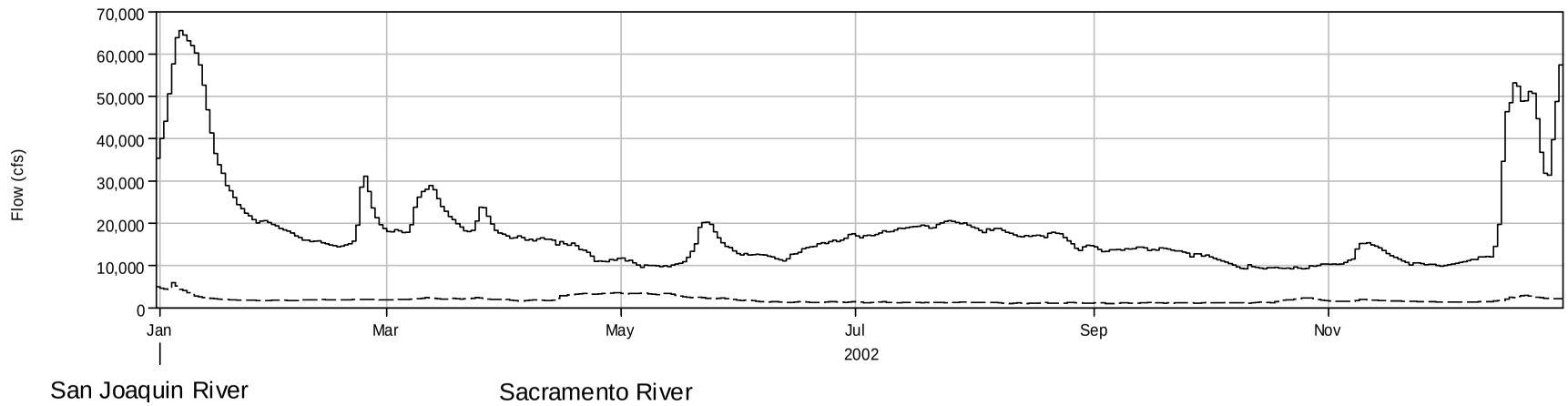

Figure 36 Sacramento and San Joaquin River flows during the 2002 simulation period.

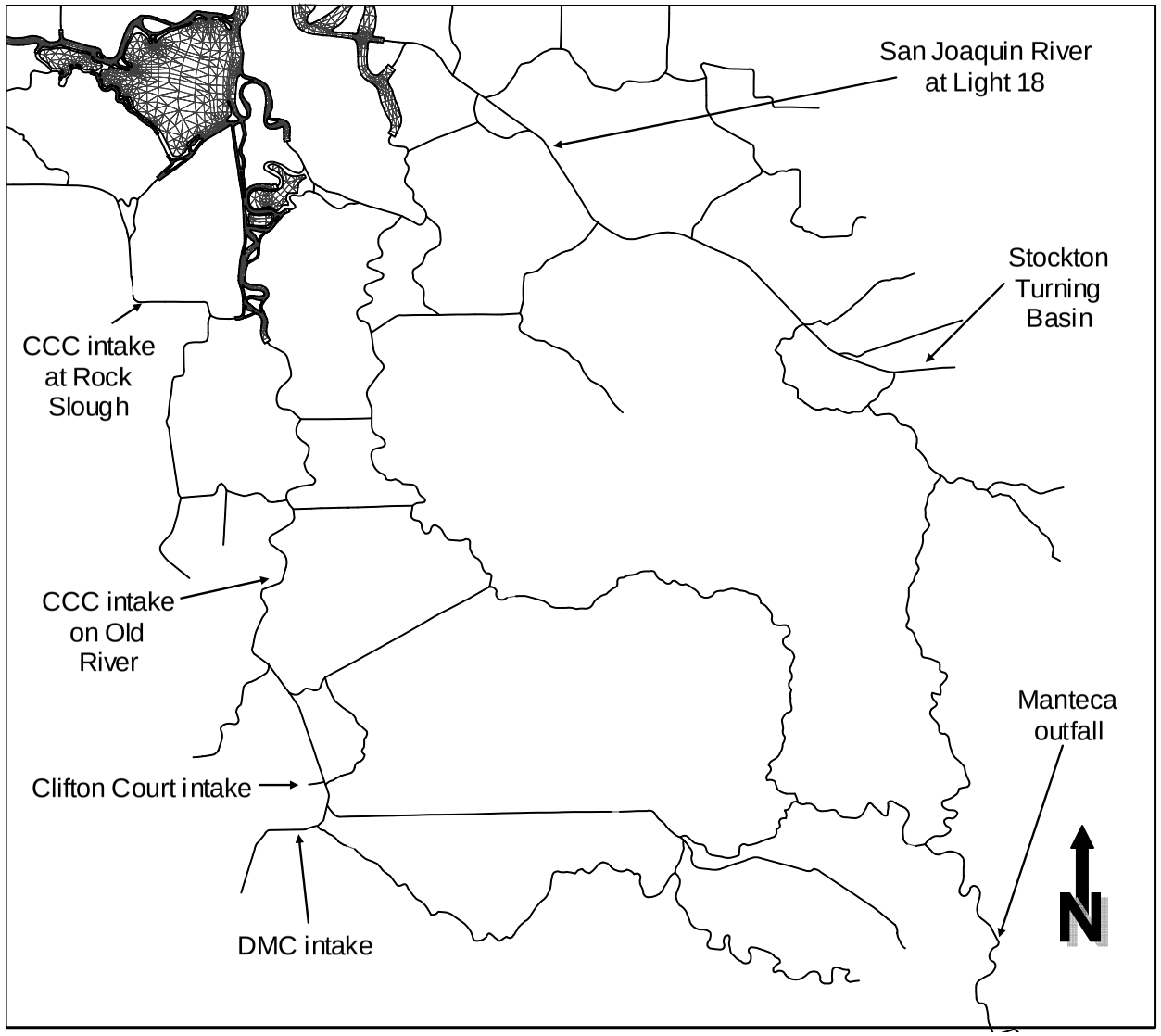

Figure 37 Far field dilution simulation times series plot locations.

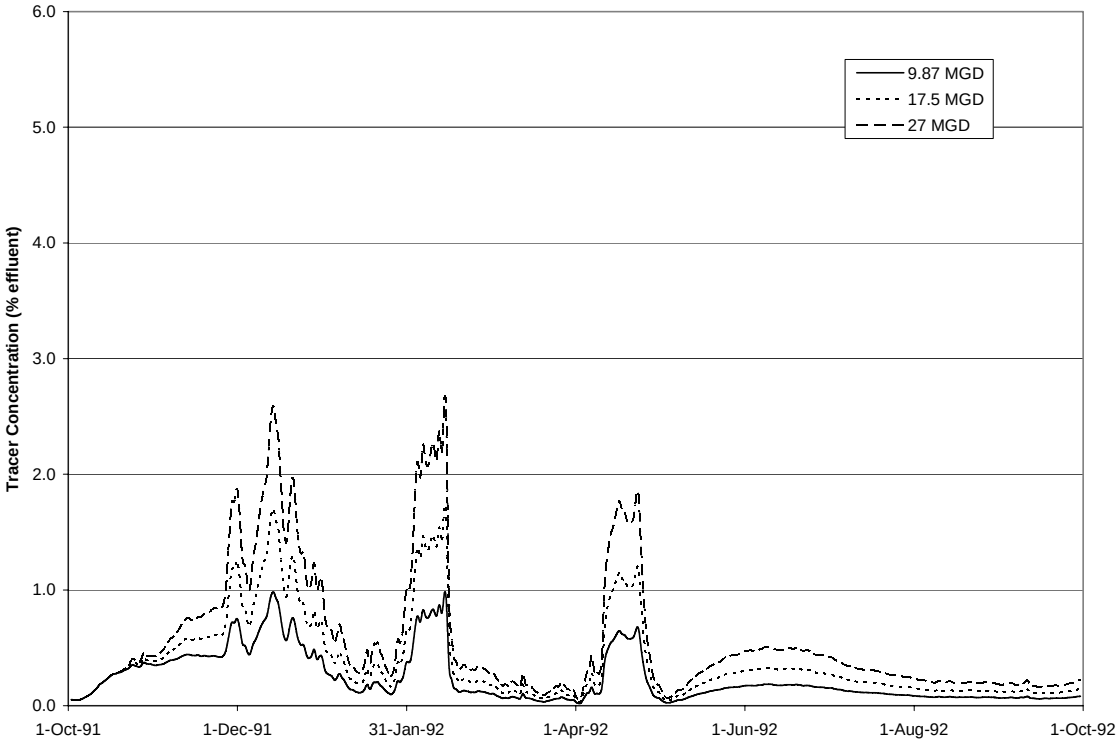

Figure 38 Tidally averaged tracer concentrations for the 1991–1992 simulation at Clifton Court intake.

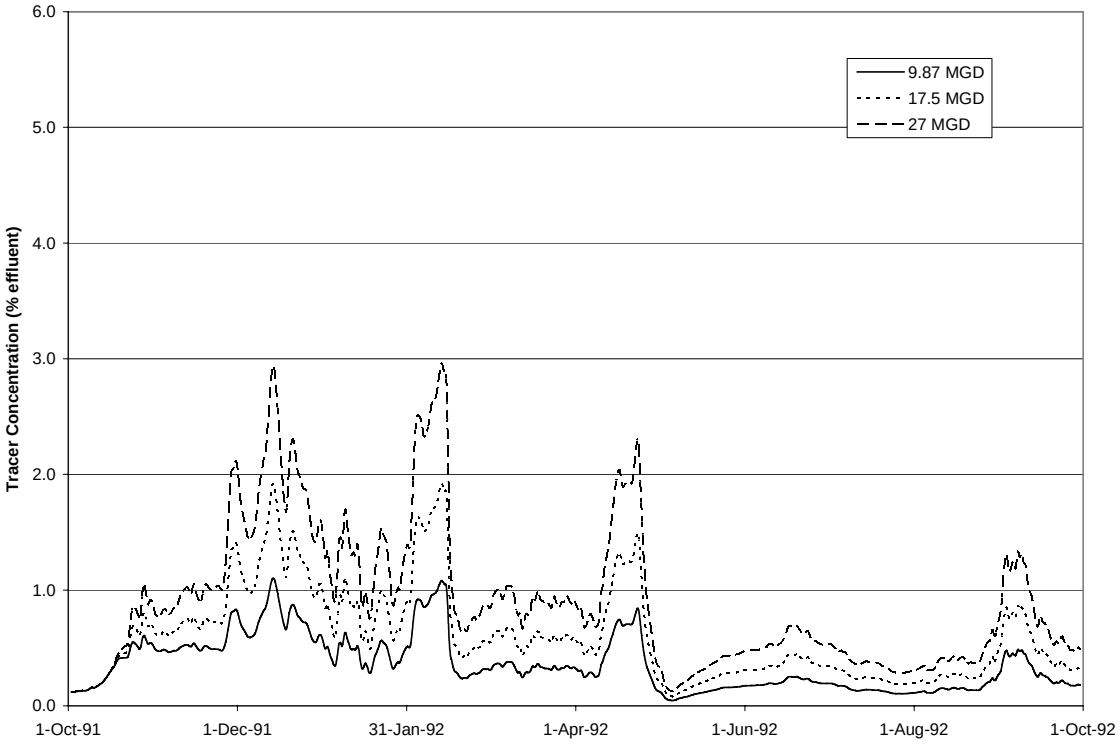

Figure 39 Tidally averaged tracer concentrations for the 1991–1992 simulation at DMC intake.

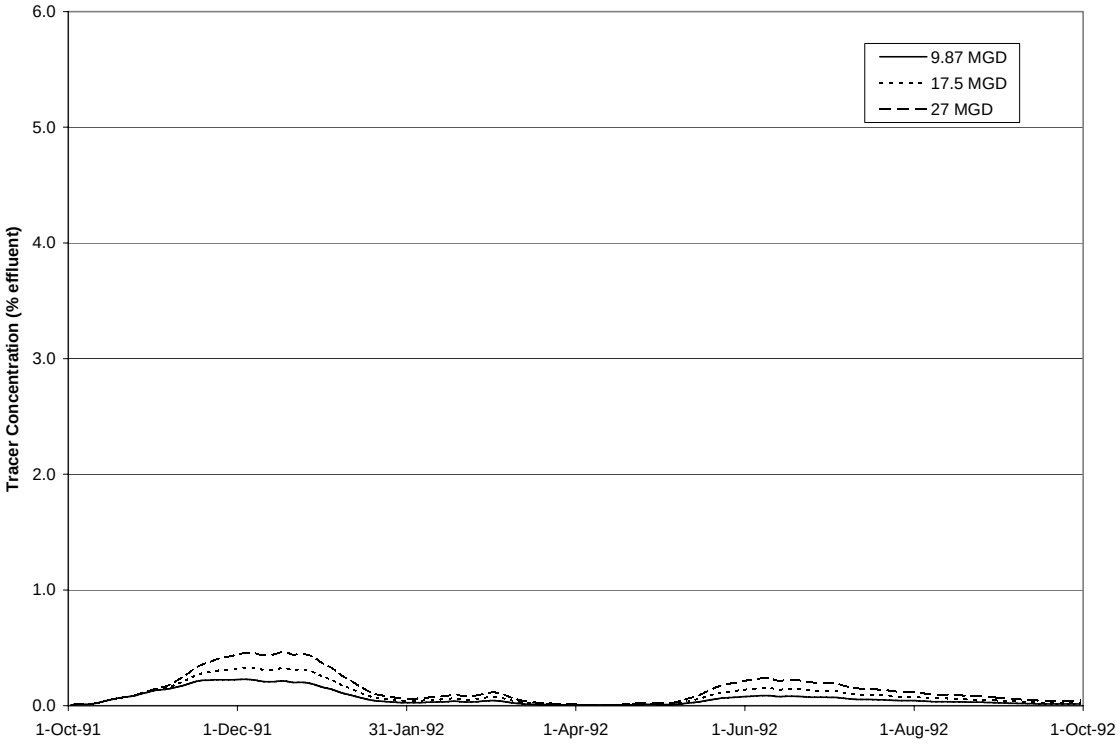

Figure 40 Tidally averaged tracer concentrations for the 1991–1992 simulation at the Contra Costa intake in Rock Slough.

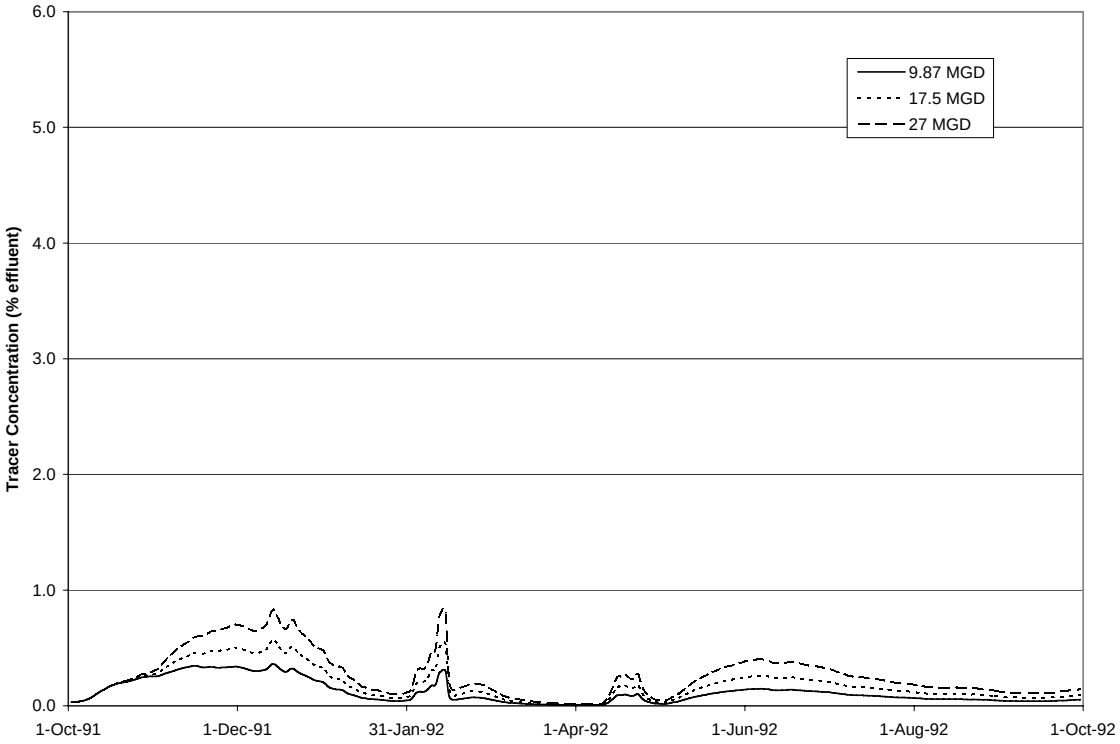

Figure 41 Tidally averaged tracer concentrations for the 1991–1992 simulation at the Contra Costa intake on Old River.

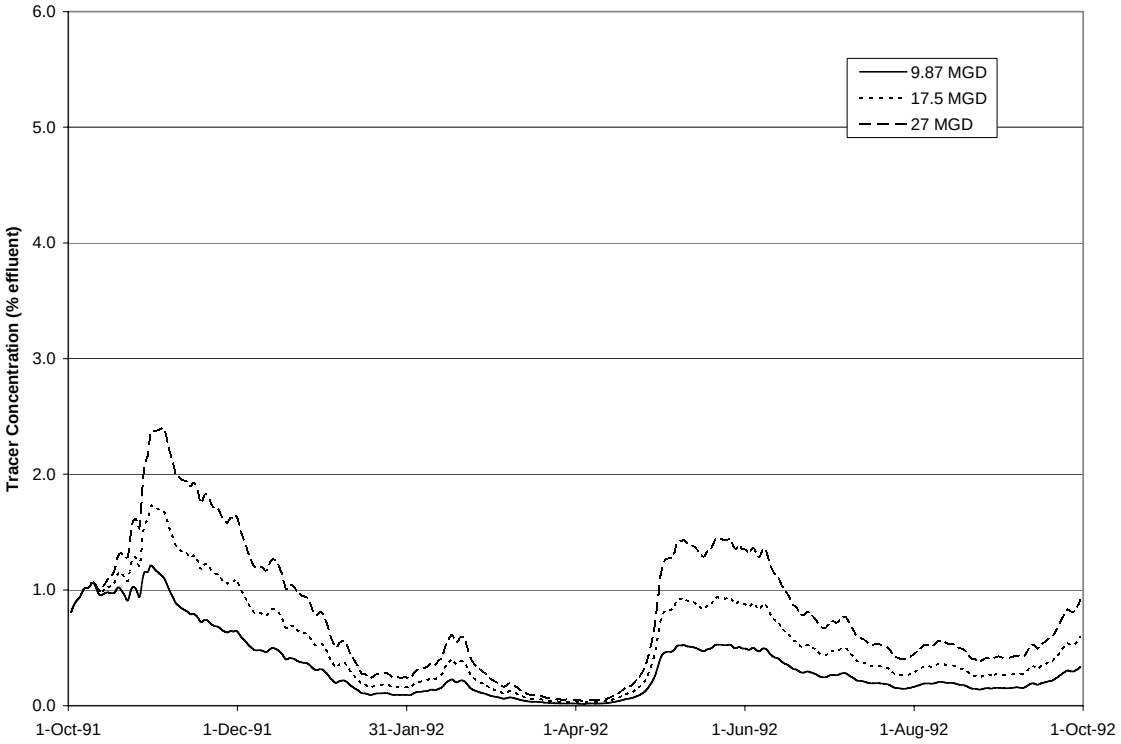

Figure 42 Tidally averaged tracer concentrations for the 1991–1992 simulation at San Joaquin River at Light 18.

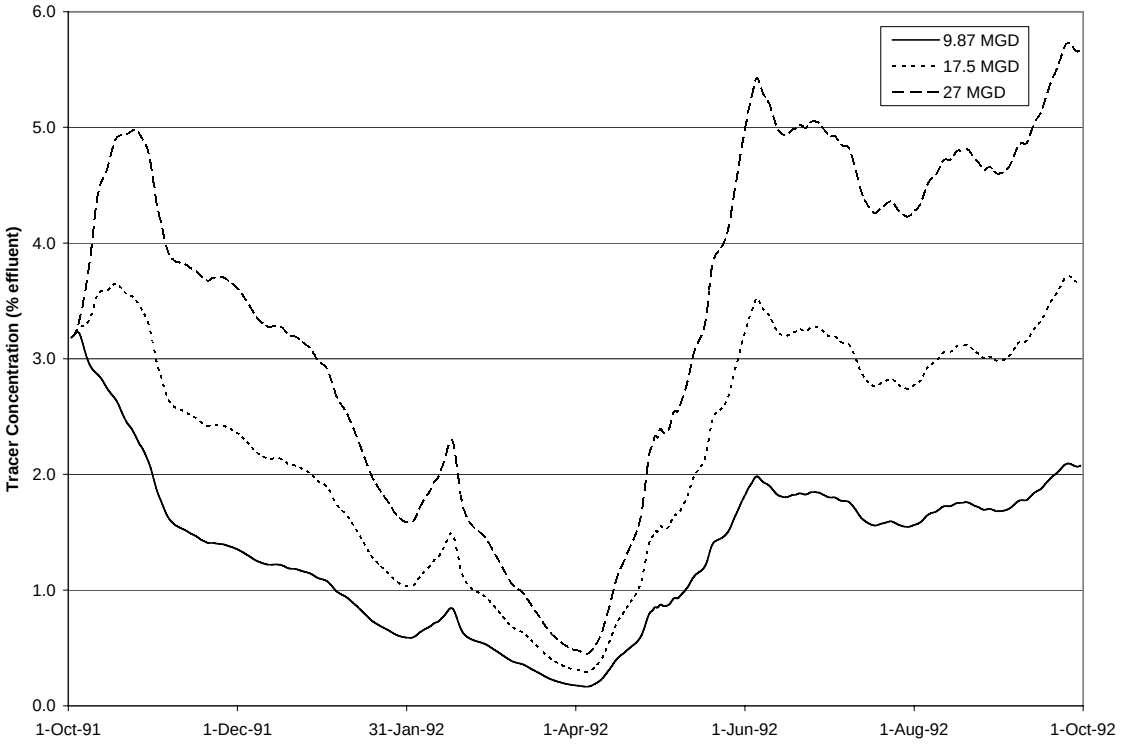

Figure 43 Tidally averaged tracer concentrations for the 1991–1992 simulation at the Stockton Turning Basin.

2002 Simulation Results

Tidally averaged effluent concentrations for the 2002 simulations with 9.87 MGD, 17.5 MGD and 27 MGD Manteca discharge rates are plotted for the six key locations in Figure 37. The range of concentrations at each location is analyzed. November – December 2001 were simulated for model spin up, but results for this time are not shown.

In Figure 44, at the Clifton Court intake, peak effluent concentrations occur at the end of May. The lowest concentrations occur in early February and late July through August. The effluent concentration for the 9.87 MGD case ranges from near zero to 0.6%. For the 17.5 MGD case, effluent concentration ranges near zero to 1%, and for the 27 MGD case, it ranges from 0.1% to 1.5%.

In Figure 45, at the Delta Mendota Canal intake at Lindemann Road, peak effluent concentrations occur at the end of May. The lowest concentrations occur in late July. With the exception of May, the concentrations are fairly consistent throughout the year. The effluent concentration for the 9.87 MGD case ranges from 0.1% to 0.6%. For the 17.5 MGD case, effluent concentration ranges from 0.2% to 1 %, and for the 27 MGD case, it ranges from 0.3% to 1.5%.

In Figure 46, at the Contra Costa intake in Rock Slough, peak effluent concentrations occur at the beginning of June. Concentrations are near zero throughout much of the year except for May through early July and late October through December. The effluent concentration for the 9.87 MGD case ranges from near zero to 0.1%. For the 17.5 MGD case, effluent concentration ranges near zero to 0.3%, and for the 27 MGD case, it ranges from near zero to 0.4%.

In Figure 47, at the Contra Costa intake in Old River, peak effluent concentrations occur at the beginning of June. Concentrations are near zero during February through April and throughout August. The effluent concentration for the 9.87 MGD case ranges from near zero to 0.2%. For the 17.5 MGD case, effluent concentration ranges near zero to 0.4%, and for the 27 MGD case, it ranges from near zero to 0.6%.

In Figure 48, at San Joaquin River at Light 18, peak effluent concentrations occur at the end of October. The lowest concentrations occur during late January through mid February and late July through mid August. The effluent concentration for the 9.87 MGD case ranges from near zero to 0.5%. For the 17.5 MGD case, effluent concentration ranges from less than 0.1% to 1%, and for the 27 MGD case, it ranges from 0.1% to 1.5%.

In Figure 49, at the Stockton Turning Basin, peak effluent concentrations occur at the beginning of October. The lowest concentrations occur in mid January and mid May. The effluent concentration for the 9.87 MGD case ranges from 0.5% to 1.2%. For the 17.5 MGD case, effluent concentration ranges from 0.8% to 2.1%, and for the 27 MGD case, it ranges from 1.3% to 3.3%.

Results are summarized in Table 6.

Table 6 Summary of minimum and maximum effluent concentrations for 2002 simulations.

Location	**Minimum effluent concentration**			**Maximum effluent concentration**		
	9.87 MGD	**17.5 MGD**	**27 MGD**	**9.87 MGD**	**17.5 MGD**	**27 MGD**
Clifton Court intake	<0.1%	<0.1%	0.1%	0.6%	1.0%	1.5%
DMC intake	0.1%	0.2%	0.3%	0.6%	1.0%	1.5%
CC intake at Rock Slough	<0.1%	<0.1%	<0.1%	0.1%	0.3%	0.4%
CC intake on Old River	<0.1%	<0.1%	<0.1%	0.2%	0.4%	0.6%
San Joaquin R. at Light 18	<0.1%	0.1%	0.1%	0.5%	1.0%	1.5%
Stockton Turning Basin	0.5%	0.8%	1.3%	1.2%	2.1%	3.3%

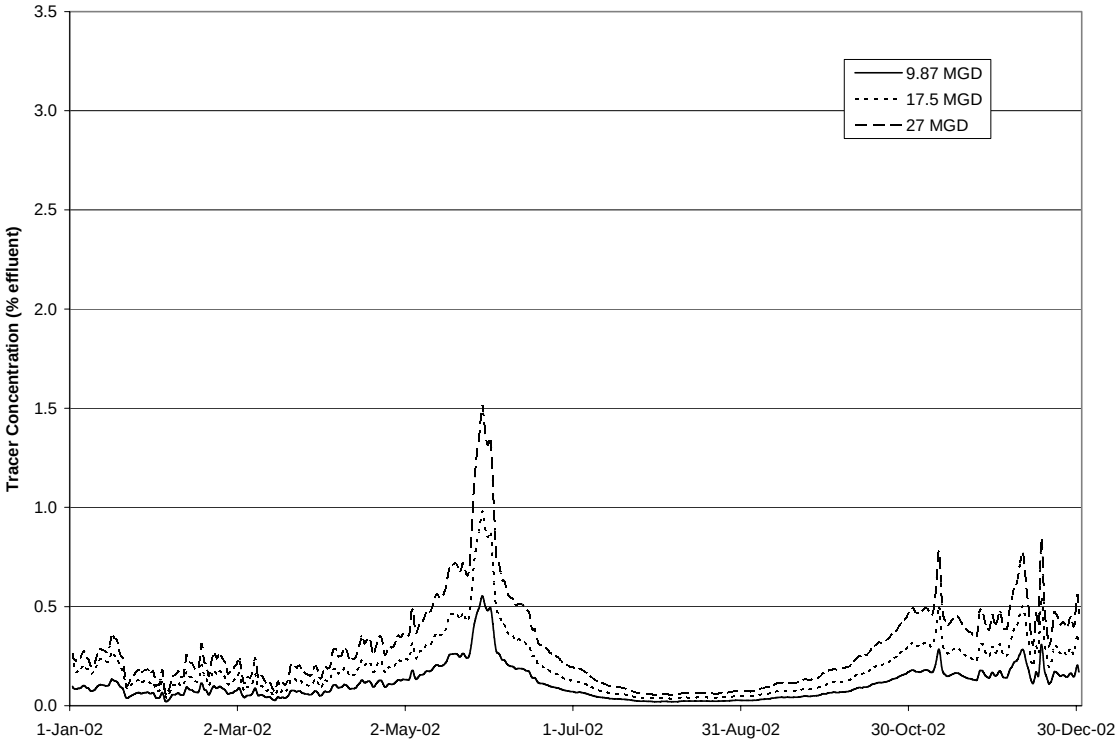

Figure 44 Tidally averaged tracer concentrations for the 2002 simulation at Clifton Court intake.

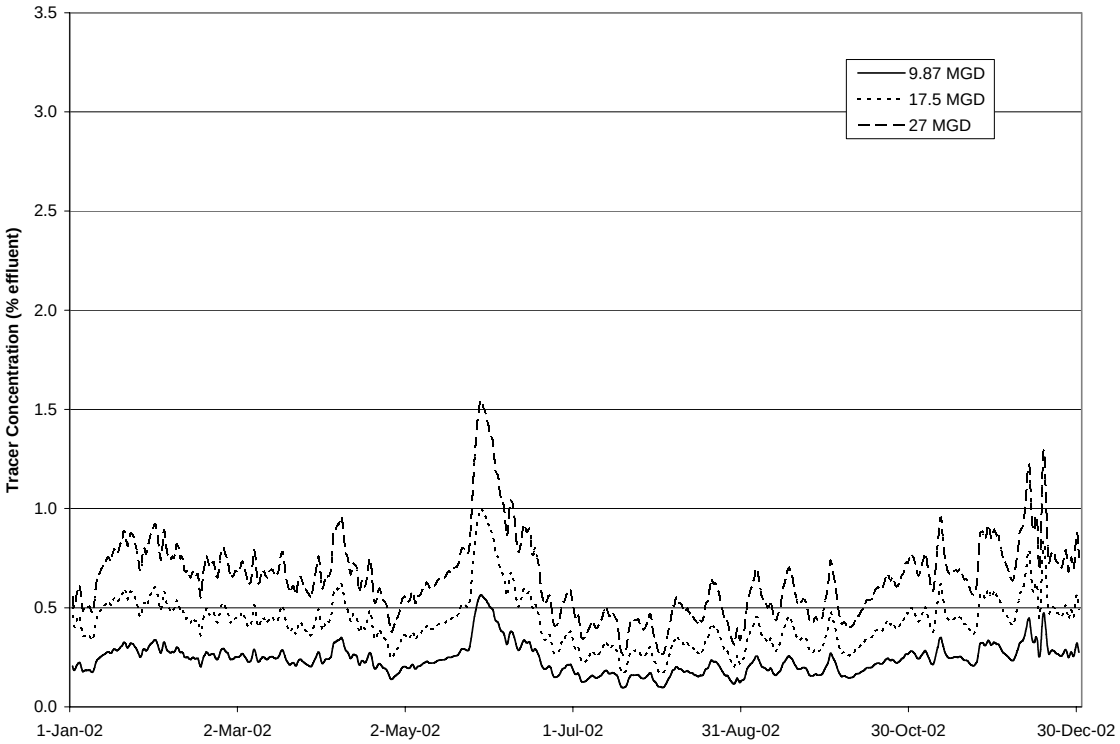

Figure 45 Tidally averaged tracer concentrations for the 2002 simulation at DMC intake.

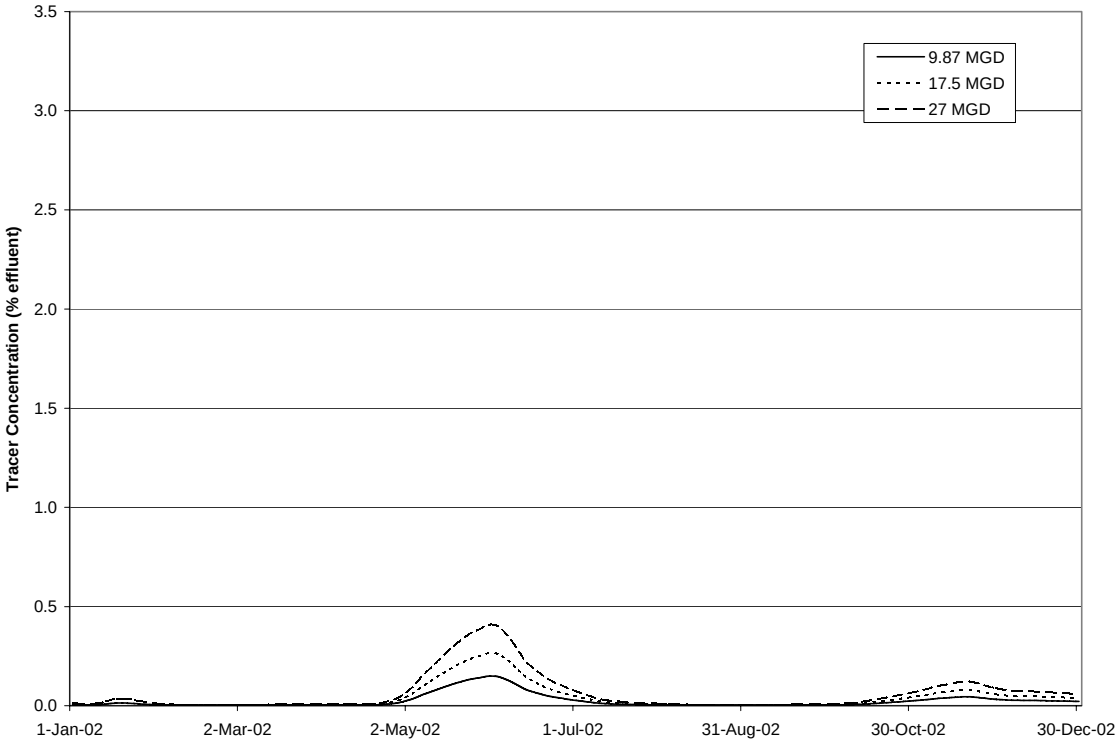

Figure 46 Tidally averaged tracer concentrations for the 2002 simulation at Contra Costa intake in Rock Slough.

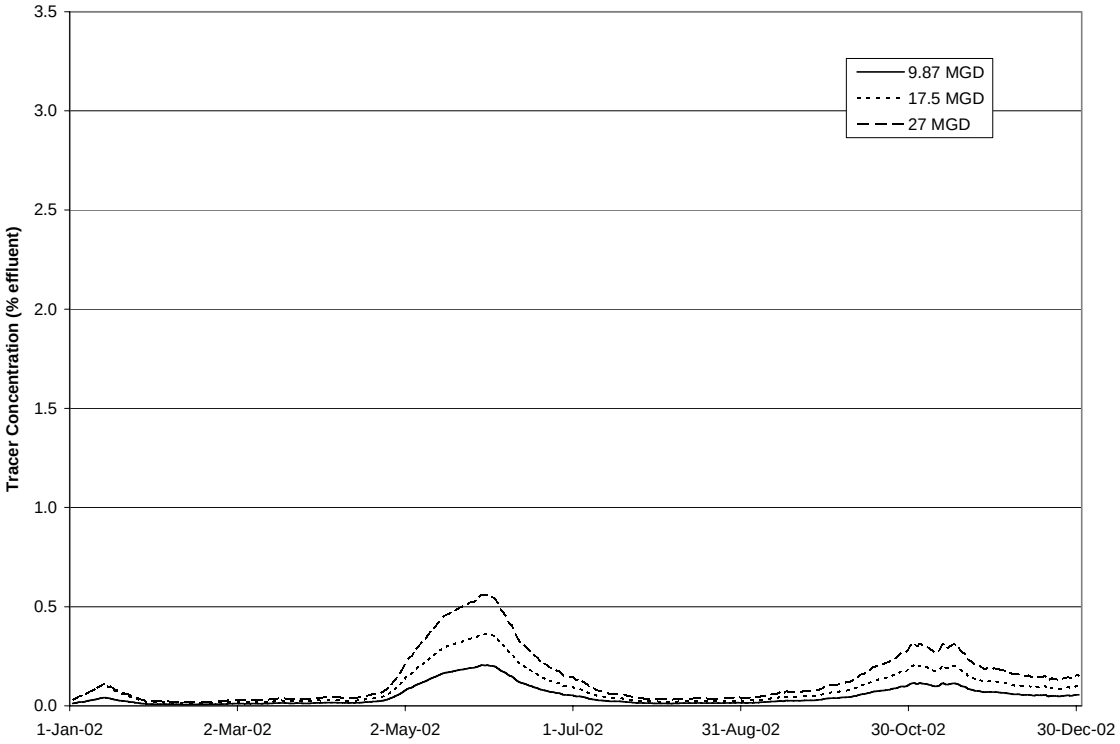

Figure 47 Tidally averaged tracer concentrations for the 2002 simulation at Contra Costa intake on Old River.

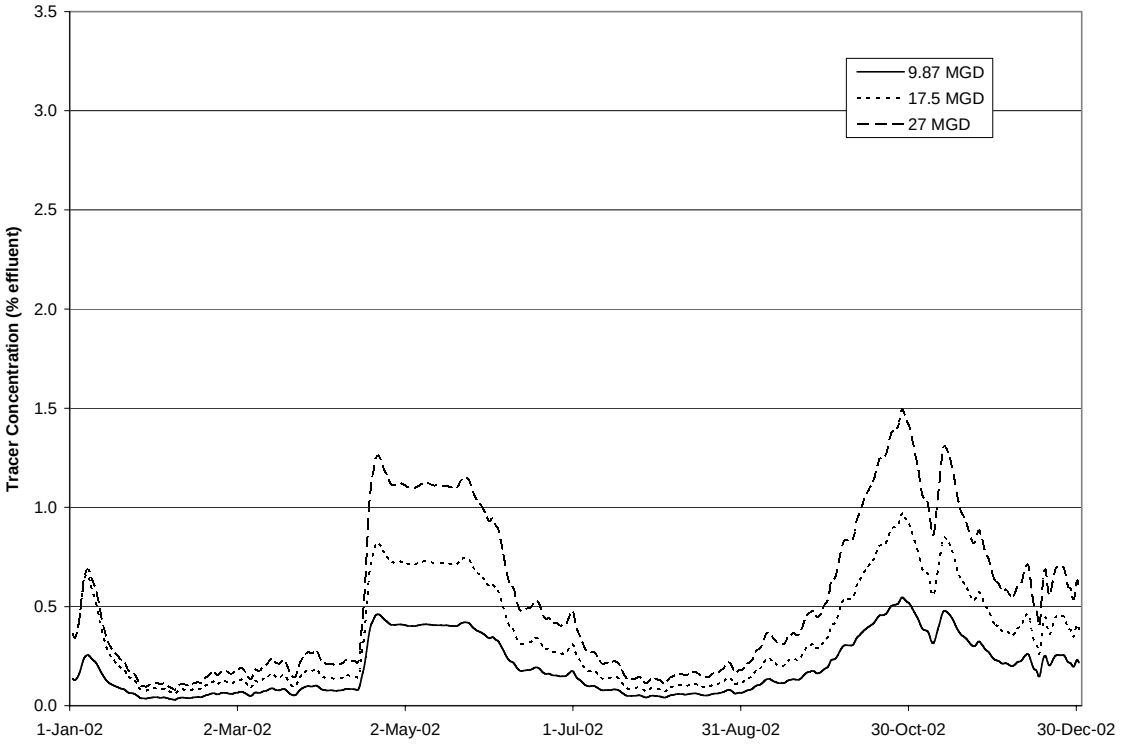

Figure 48 Tidally averaged tracer concentrations for the 2002 simulation at San Joaquin River Light 18.

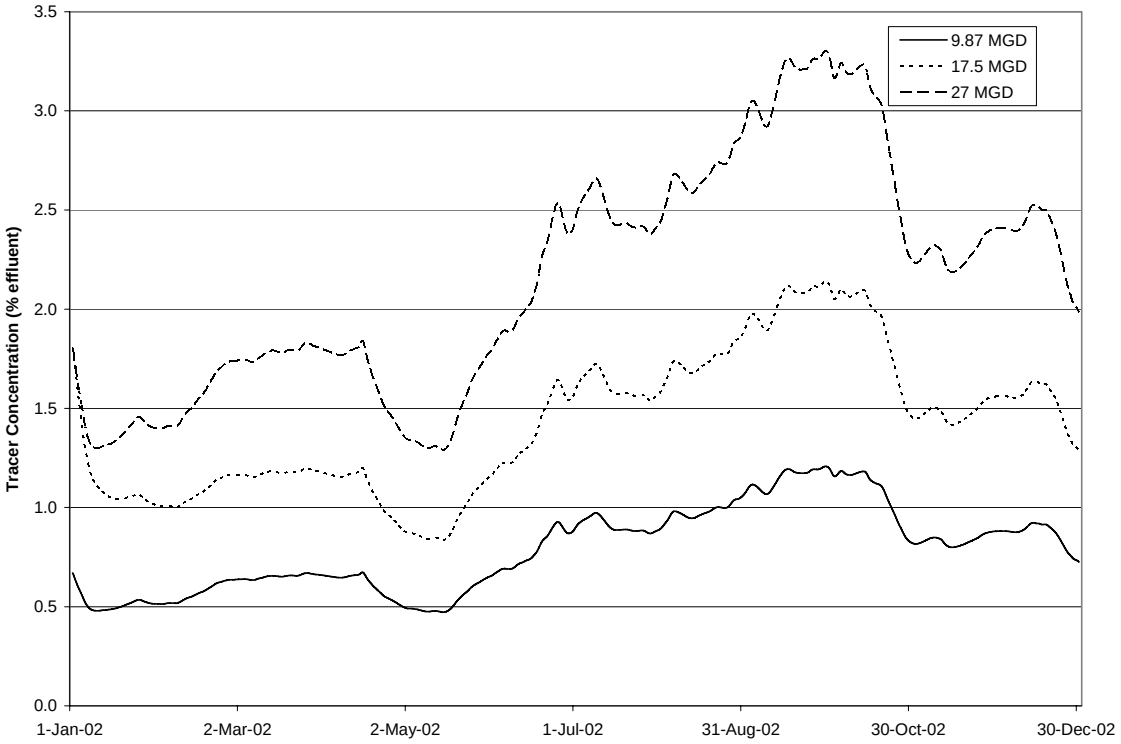

Figure 49 Tidally averaged tracer concentrations for the 2002 simulation Stockton Turning Basin.

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